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FITNESS CHECK

of the

EU Animal Welfare legislation

{SWD(2022) 329 final}

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Glossary

Term or acronym	*Meaning or definition*
CAP	Common Agricultural Policy
COA	European Court of Auditors
ECJ	The Court of Justice of the European Union
EFSA	European Food and Safety Authority
EPRS	European Parliament Research Service
EUAWS	European Union Animal Welfare Strategy (2012-2015)
FPD	Foot-pad Dermatitis
OCR	Official Controls Regulation

- **INTRODUCTION**

Under the EU Farm to Fork Strategy, , the Commission has committed to revise the following pieces of EU animal welfare legislation[1] by 2023, to ensure a higher level of animal welfare by aligning the current rules with the latest scientific evidence, broadening their scope and making them easier to enforce, as well as to contribute to the achievement of a more sustainable food system:

- Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes, (the "Farm Directive")
- Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens (the "Laying Hens Directive"),
- Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production (the "Broilers Directive"),
- Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves (the "Calves Directive"),
- Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (the "Pigs Directive"),
- Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport (the "Transport Regulation"), and
- Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing (the "Killing Regulation").

In 2020, in order to implement this commitment, the Commission initiated a **fitness check** of the above-mentioned legislation which targets the welfare of food producing animals (hereafter also referred to as "EU animal welfare legislation"). This fitness check aims to assess whether the existing rules are still fit for purpose, in particular the extent to which they are relevant, efficient, effective, coherent, and have an added value. The Fitness Check covers the period from the adoption of each legislative act up to and including 2020, and all EU Member States, including the UK up to the end of its EU exit transition period[2]. The outcome of the fitness check will inform the revision of the EU animal welfare legislation[3].

- **Short description of methodology**

The Commission published a roadmap setting out the scope and approach for the fitness check on 20 May 2020 for a four-week feedback period. Feedback was received from 172 citizens and organisations and was considered for the purpose of the fitness check.

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[1] Including supplementing legislation, such as Council Regulation (EC) No 1255/97 of 25 June 1997 concerning Community criteria for staging points and amending the route plan referred to in the Annex to Directive 91/628/EEC (OJ L 174, 2.7.1997, p. 1–6). Other pieces of legislation, such as Directive 2010/63/EU on the protection of animals used for scientific purposes, the Animal Health Law and the Official Controls Regulation, which might be partly relevant, are not included in the fitness check as they have different objectives and aim to tackle different, although inter-related, problems..

[2] On 31 January 2020, the United Kingdom formally left the European Union and entered into an 11-month transition period, which ran until 31 December 2020. The Brexit transition is the period in which the United Kingdom is no longer a member of the EU but remains a member of the single market and customs union.

[3] The fitness check is performed back-to-back with the impact assessment process, which started with the publication of an Inception Impact Assessment on 6 July 2021 (based on preliminary fitness check findings).

A wide range of primary and secondary data sources have been used to collect evidence and answer the fitness check questions. An independent study to support the cost-benefit analysis was commissioned and launched in 2021, undertaken by an external expert, referred to as 'the CBA study' (see Annex VIII).

Stakeholders' views were gathered through a public consultation and targeted consultation activities, such as interviews with stakeholders - including exchanges with the European Food Safety Authority (EFSA) and the EU Animal Welfare Platform - and a targeted survey. A Stakeholder Conference held on 9 December 2021 provided an additional opportunity to gather input on the shortcomings and achievements of the current EU animal welfare legislation. All stakeholder groups were reached, covering the supply chain from producers to consumers. A synopsis report summarising all consultation activities, as well as their results, is provided in Annex V.

The desk study comprised an extensive literature review, which included among others the analysis of scientific and policy documents produced by European institutions and bodies (such as scientific opinions from EFSA, audit reports from the European Commission, and impact assessments), reports and scientific publications from non-governmental organizations and dedicated research institutes, as well as academic literature.

1.2 Limitations and robustness of findings

Several challenges and limitations have been identified in the context of the activities referred to above.

- Data available at EU level is not extensive and reliable enough to convey meaningful information about levels of compliance with the legislation on animal welfare at farm, during transport and at the time of killing, as confirmed by the European Court of Auditors in its Special Report on Animal Welfare in 2018.[4] This conclusion is exacerbated by different interpretations of vague provisions by public and private stakeholders, which also affects the data reported by Member States in their annual reports to the Commission on the results of their official controls[5] on the respect of the existing rules along the agri-food chain. As a result, the annual reports are not sufficiently complete, consistent, reliable or sufficiently detailed to draw robust conclusions on compliance with the legislation across the EU.
- There is no single generally agreed indicator to measure animal welfare[6] [7] (and not even any common definition of animal welfare). Hence, a detailed quantitative

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4 European Court of Auditors, Special report No 31/2018: Animal welfare in the EU: closing the gap between ambitious goals and practical implementation, paragraph 100.

5 Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application with food and feed law, animal rules on animal health and welfare rules (…) ("OCR") (OJ L 95, 7.4.2017, p. 1).

6 Commission Overview report - the use of indicators for animal welfare at farm level (2021-7319). The 'Evaluation of the EU Policy on Animal Welfare and Possible Policy Options for the Future', performed by M Rayment et al and published by the Commission in 2010 ("Rayment et al"), also recognised that since there is no single generally agreed parameter for welfare, a detailed quantitative analysis of improvement (or lack thereof) in animal welfare because of EU legislation is difficult.

7 'Animal welfare on the farm – ex-post evaluation of the EU legislation: Prospects for animal welfare labelling at EU level', ("EPRS, 2021". The research team encountered significant difficulties in terms of data availability and data quality, for two main reasons: First, the animal welfare Directives leave much

analysis of improvement in animal welfare because of EU legislation is difficult. This conclusion has been reached also by the European Commission in it its "Evaluation of the EU Policy on Animal Welfare and Possible Policy Options for the Future"[8], published in 2010, which covered the same scope. In order to mitigate this, statistics on the incidence of injuries and certain diseases and on the sales of antibiotics were used to assess the level of animal welfare, as well as slaughterhouse statistics on mortality rates[9].

- The reconstruction of the situation prior to the adoption of the current EU animal welfare legislation is mainly descriptive and based on reports, studies and information underpinning the various legislative acts. This is largely due to the lack of agreed welfare indicators to build solid points of comparison with time-span starting from the nineties, and also to the difficulty to collect data so many years later.[10] To mitigate the lack of quantitative data to measure the situation at the time the current EU animal welfare legislation was adopted, i.e. mainly in the nineties, focus has been put on providing a qualitative description as solid as possible, based on the limited data available, such as statistics on the incidence of injuries and certain diseases and on the sales of antibiotics, as well as slaughterhouse statistics on mortality rates, to assess developments in animal welfare over time.
- The lack of animal welfare indicators and data - including a lack of coherent production and price datasets – was a major impediment to the cost-benefit analysis. Many costs could not be monetised, and benefits could in general not be quantified.[11]. For the reasons of trade secrecy and a lack of pan-European data, interviewed stakeholders were generally not in a position to share detailed information on their sector's business activities and market share. As a result, the consultation activities produced limited quantifiable evidence as regards the costs of compliance with the EU animal welfare legislation. Hence, the cost-benefit analysis rely to a large extent on literature available, including peer-reviewed publications and grey literature.

Despite the scarcity of data described above, the available literature and other evidence, including from on-site audits in the Member States, allow the fitness check findings to remain overall sufficiently robust as regards the development of animal welfare in the EU. However, to some extent assumptions had to be made, for instance as regards the environmental benefits provided by the current EU welfare legislation.

A detailed presentation of the methodological approach followed (including limitations and mitigation measures) can be found in Annex II.

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freedom to the Member States to specify numerous requirements and how to assess them. Second, official controls and the availability of their outcomes have been approached in different ways by Member States.

8 Rayment et al.

9 A more detailed description of the indicators used for the fitness check can be found in Annex III (evaluation matrix)

10 With the exception of the Killing Regulation, no impact assessment was made before the adoption of the legislation concerned. Only some explanatory memoranda exist, which do not provide detailed analysis or background information.

11 C. Wieck and S. Dusel (2022), Cost-Benefit Analysis of EU Animal Welfare Legislation ("CBA study", see Annex VIII), p 109.

- **WHAT WAS THE EXPECTED OUTCOME OF THE INTERVENTION?**

1.1 Description of the intervention and its objectives

The adoption of the current EU animal welfare legislation was primarily intended to improve animal welfare, to an economically acceptable extent [12], by avoiding to expose animals to unnecessary suffering and pain and provide an environment corresponding to their needs, in light of new scientific knowledge available at the time when the legislative acts were adopted[13]. The expectations at the time of adoption of the animal welfare legislation (mostly in the 1990's) were therefore focussed on triggering a shift from the objective of promoting food production to that of ensuring that animals did not suffer beyond what was necessary to ensure the viability of the production system, with a focus on improving the quality of the meat[14]. Embedding the protection of animal welfare into the objectives of EU legislation governing food producing animals was an important political achievement, and the expectations were that the main practices identified as unnecessary for the viability of the food production, e.g. pigs kept in isolation, poultry kept in high densities and killing without stunning, would cease to exist.

Another general objective was to reduce differences among the Member States in the rearing, transport and killing of farmed animals that distorted competition among operators and created obstacles to cross-border exchanges, by introducing common minimum standards across the EU. In addition, specific objectives were to address societal demands, considering animal welfare to be a Community value, and to improve the knowledge and competence among animal handlers.

At the time of adoption of current rules, animal welfare was understood as "avoiding unnecessary suffering of the animals", based on the *Five Freedoms principles*[15]. Earlier, animals were not even considered to feel pain[16]. As explained in section 4.3.2.1, such an

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12 In a sense, the EU animal welfare legislation can be considered as a "compromise legislation": The standards of animal welfare should be high but not so high that they jeopardize the economic viability of the food business operators in the short terms (in the legislation referred to as "rational development of production").

13 E.g. as regards the ban on the tethering of calves, group housing of sows and the ban on battery cages for laying hens.

14 Today, given the current societal concerns and market evolutions, such a sub-ordinate role for the animal welfare objective seems no longer accepted.

15 Adopted by the British Farm Animal Welfare Council (since 2019 called Animal Welfare Committee), which is an expert committee giving advise on animal welfare matters, including legislative changes, to the public authorities in the United Kingdom. The "five freedoms" are: Freedom from hunger and thirst, by ready access to water and a diet to maintain health and vigour; Freedom from discomfort, by providing an appropriate environment; Freedom from pain, injury and disease, by prevention or rapid diagnosis and treatment; Freedom to express normal behaviour, by providing sufficient space, proper facilities and appropriate company of the animal's own kind; Freedom from fear and distress, by ensuring conditions and treatment, which avoid mental suffering ().

16 Lecture from E.C. Straiton on September 30, 1961 at the symposium of the University Federation for Animal Welfare, printed in Nature, Volume 194, Issue 4832, 9 June 9 1962 p. 927. ('farm people often, or more than often, assume too easily that the reactions of animals to pain are vastly less than might be guessed by comparison with those of human beings').

understanding is not in line with the current perspective of animal welfare, which is reflected in the "Five Domains" principle and in which animal welfare is understood as the physical and mental state of an animal in relation to the conditions in which it lives and dies.

Before the adoption of the current EU animal welfare legislation, many **animals were not protected from unnecessary suffering and pain** across the EU, and there was an **uneven playing field** for EU business operators, because of outdated and incomplete animal welfare legislation at EU level, and the fact that the legislation was differently applied across the EU Member States[17]. There was a lack of enforcement by the Member States of the EU legislation in some areas, with important pieces of EU legislation not having been fully applied or not having the intended effects on the welfare of animals[18]. There was also a lack of knowledge of what animal welfare means among stakeholders dealing with animals, with consequences for the conception of modern production methods and more animal-friendly, alternative systems of production and practices.

Triggered by raising expectations from citizens and higher demands from business operators, and inspired by actions at international level, the current EU animal welfare legislation was adopted to address these problems. Legal and political commitments, as well as and societal concerns, as expressed in the EU Treaties[19] and in European Conventions on animal welfare[20], were contextual to the adoption of the current EU animal welfare legislation. In addition, the legislation has changed, for instance for slaughterhouses, with the adoption of a series of EU legislative acts on food safety which emphasised the responsibilities of business operators[21].

Animal welfare at farm level

The current EU legislation on animal welfare at farm level primarily covers intensive farming – or rather industrial - sectors (pigs, calves, laying hens and broilers).[22]

When it was adopted, the expectations were that it should improve animal welfare by providing an environment corresponding to the needs of the animals, established according to the scientific evidence available at that time[23]. It therefore introduced rules on housing and especially as regards space allowances, addressing the tethering of calves, group housing of

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17 The Killing Regulation was preceded by Council Directive 93/119/EC on the protection of animals at the time of killing (in turn repealing Council Directive 74/577/EEC). The Transport Regulation was preceded by Council Directive 91/628/EEC (that repealed Directive 77/489/EEC). The Laying Hens Directive was preceded by Council Directive 88/166/EEC. On the welfare of calves, pigs and broilers, there was no EU legislation before the Calves Directive (1991), the Pigs Directive (1991) and the Broiler Directive (2007). Neither were there any general EU requirements for the welfare of farmed animals before the Farm Directive was adopted (in 1998).

18 In particular, this contributed to the adoption of Directives 91/628/EEC and 95/29/EC on animal transport and Directive 93/119/EC being replaced by Regulations in 2005 and 2009 respectively.

19 Protocol on protection and welfare of animals, annexed to the Amsterdam Treaty establishing the European Community; Official Journal C 340, 1997, p 0010.

20 E.g. the European Convention for the Protection of Animals kept for Farming Purposes (1976).

21 COM(2008)553, explanatory memorandum.

22 Currently, certain general exemptions exist for small farms and holdings, such as the threshold of 500 chicken in Article 1 of the Broilers Directive and the threshold of 350 laying hens in Article 1 of the Laying Hens Directive.

23 Article 3 of the Farm Directive requires the Member States to ensure that animals are not caused any unnecessary pain, suffering or injury.

sows and the ban on battery cages for laying hens.[24] For pigs, for example, it established the requirement to provide enrichment material. For laying hens, "enriched cages" and "alternative systems" were defined and established as alternatives to unenriched ("barren" or "battery") cages. Calves were to benefit from an environment corresponding to their needs as a herd-living species. For that reason, it was provided that calves are to be reared in groups beyond a certain age.

The legislation was also expected to reduce differences in the rearing of livestock that distorted competition among operators established in different Member States, and created obstacles to those active in several Member States, by introducing common standards, higher than the standards in place at that time. Finally, the Farm Directive introduced rules applicable to all species of farmed animals: at the time rules existed only for pigs, calves, and laying hens[25]. In this respect the expectation was that animal welfare of species not covered by a specific legislation would increase.

The rules have been modified in different occasions and evolved over time towards a less prescriptive and towards more animal oriented approach, since 2007 complemented by animal based indicators, e.g. measuring food pad dermatitis on broilers (see also section 3.1)[26].

Animal welfare during transport

In 1991[27], the EU established common minimum rules on the protection of animals during transport, replacing old rules from 1977. Those rules abolished the systematic checks at the internal borders of the Community and aimed at regulating the long transport of animals as far as possible.

Such legislation was replaced by the current one[28], adopted on the basis of the experience gained by implementing 1991 rules and in particular the difficulties encountered due to the differences in transposition of that Directive at national level, as well as new scientific evidence available[29]. The objective was to improve animal welfare by requiring further training of transporters and prior approval of the means of transport and limit long journeys as far as possible. However, contrary to the European Commission's proposal tabled in 2003, the provisions on maximum journey times remained unchanged from previous rules laid down in 1991 due to the difficulties in finding a political agreement. By replacing a Directive with a Regulation, it was also expected that differences in implementation among Member States would be reduced.

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24 Only at that time, the first publications on applied behaviour appeared, such as "The scientific assessment of animal welfare", by D. Broom, in Applied Animal Behaviour Science, Volume 20 (1988).

25 Those rules were established by the EU legislation giving effect to the European Convention for the Protection of Animals Kept for Farming Purposes.

26 Certain provisions in the Directives on pigs and calves were later updated in light of new scientific evidence (latest change for calves in 1997, codified in 2008, and for pigs in 2001, also codified in 2008). The EU rules on the welfare of laying hens, adopted in 1999, and those for chickens kept for meat production, adopted in 2007, have never been updated but they were complemented by egg and by poultry meat marketing standards legislation (labelling requirements of the farming method). Regulation (EC) No. 589/2008.

27 Council Directive 91/628/EEC on the protection of animals during transport.

28 Council Regulation (EC) No 1/2005 on the protection of animals during transport and related operations.

29 Scientific opinion adopted in 2002 by Scientific Committee on Animal Health and Animal Welfare.

Welfare at the time of killing

When Council Directive 93/119/EC was adopted, the objective was to avoid unnecessary suffering of animals when being slaughtered. For this purpose, the Directive laid down detailed rules on e.g. the construction, facilities and equipment of slaughterhouses. It also required that persons engaged in the handling and killing of the animals have the knowledge and skills necessary to perform the tasks "humanely and efficiently".

The Directive was replaced in 2009 by the Killing Regulation establishing common and directly applicable rules on the welfare of animals at the time of killing, because of the important discrepancies between the Member States' transposition and implementation of the Directive. For instance, the Regulation increased the operators' responsibilities and introduced new training requirements. Furthermore, technical standards and scientific knowledge had evolved since 1993[30] and there was a need to incorporate import related requirements[31], further to the adoption of the OIE international animal welfare standards in 2004.[32]

Similarly to the rules on transport, it was expected that animal welfare would improve and differences in implementation among Member States would be reduced (by replacing the Directive with a Regulation).[33]

For a more detailed illustration of the intervention logic, see chart in Annex VI.

1.2 Point(s) of comparison

The situation before the adoption of the current EU animal welfare legislation in the three main welfare areas is taken as a point of comparison for the purpose of the fitness check. In the early nineties, many animals in Europe were subject to unnecessary suffering and pain as they were kept and transported under conditions that did not allow them to express their natural behaviour, killed in a way that did not sufficiently protect them from pain, and often handled by people without sufficient competence about animal welfare.[34][35][36][37] In general, the systems for animal husbandry, transport and slaughter were largely driven by economic

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30 E.g. the EFSA opinions on the welfare aspects of the main systems of stunning and killing the main commercial species of animals (2004), and on the welfare aspects of the main systems of stunning and killing applied to commercially farmed deer, goats, rabbits, ostriches, ducks, geese and quail (2006).

31 The Killing Regulation requires slaughterhouses in third countries exporting meat to the EU to comply with similar standards to those in the Regulation. The standard of the World Organisation for Animal Health (OIE) is taken into account when assessing equivalency between the standards implemented in third countries and the ones of the Community.

32 COM (2008)553, explanatory memorandum.

33 Following a favourable EFSA opinion on low atmospheric pressure system for the stunning of broiler chickens, Annexes I and II to the Killing Regulation have been amended by Commission Implementing Regulation (EU) 2018/723.

34 Interview with a senior European Commission staff member (23/11/2021).

35 Rayment et al.

36 D. Broom (2017), Animal Welfare in the European Union ("Broom, 2017"), p. 9.

37 Animal welfare resolution of the European Parliament of 12 July 1985: "whereas the past decades have seen significant developments in the business structure of agriculture, in particular in the (intensive)animal rearing sector (…) these developments have brought about great changes in the living conditions and welfare of the animals concerned". Official Journal of the European Communities, C 229, 9 September 1985 - Publications Office of the EU (europa.eu)

reasons with very little consideration of animal needs. Sometimes, in the absence of common standards for animal welfare, Member States' national legislation differed, adopting stricter welfare standards, to the extent that they negatively affected the common market, causing unfair competition and hampered the productivity of the EU agri-food sector.

As for **farm** level welfare, calves were provided a poor diet to make their meat white enough to interest consumers[38], keeping them in individual stalls for all their life, often in complete darkness[39]. To increase the productivity of animals at farms, pregnant sows were confined in stalls and tethered, without any possibility for normal social interactions with other animals or to turn around, laying hens were kept cramped in small battery cages that did not permit them to flap their wings[40]. For instance, in 1996, 93% of laying hens in the EU lived in battery cages (of a size of an A4 page), and only 7% in alternative systems[41]. In short, the requirements were not adapted to the animals' needs. The use of antimicrobials and other veterinary medicines was widespread, chronic diseases and mortality rates were high and injuries were frequent[42]. As described in section 2.1, the current EU Directives were expected to allow animals to express their natural behaviour to a greater extent.

As for animal **transport**, in 2005, around 72 000 long journeys (between 8 and 24 hours) and very long journeys (more than 24 hours) were performed in the EU[43]. Many animals arrived to slaughterhouses with injuries, transported by companies that were not specialised in animals transport and handled by people without sufficient knowledge of animal welfare, which in some cases resulted in low quality meat and being rejected for human consumption. The Transport Regulation was expected to address these problems, for instance by requiring that training should be a prerequisite for any person handing animals during transport (see also section 2.1).

As for **slaughter**, the killing of animals was a process that caused stress for the animals, jeopardized the work safety of slaughterhouse staff and reduced the quality of the meat. The Killing Regulation was in particular expected to address the problems identified related to a lack of harmonised methodology for new stunning methods, a lack of clear responsibilities for operators, insufficient competence of personnel or insufficient conditions for the welfare of animals during killing for disease control purposes (see also section 2.1)[44].

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38 CBA study, p 78.

39 D. Simonin and A. Gavinelli, « The European Union legislation on animal welfare: state of play, enforcement and future activities », In: Hild S. & Schweitzer L. (Eds), Animal Welfare: From Science to Law, 2019, pp.59-70. For these reasons, the Directive forbids keeping calves in permanent darkness and tethering. It also requires a balanced diet adapted to the needs of the calves by providing progressively fibrous food and sufficient iron.

40 Broom, 2017.

41 EU Egg Dashboard

42 M. Malena et al, Comparison of Mortality Rates in Different Categories of Pigs and Cattle during Transport for Slaughter (2007)

43 Eurogroup for Animals, 'A strategy to reduce and replace live animal transport. Towards a meat and carcasses only trade' (2019).

44 COM(2008)553, explanatory memorandum.

- **HOW HAS THE SITUATION EVOLVED OVER THE EVALUATION PERIOD?**

3.1 Developments concerning animal welfare

Animal welfare at farm level

During the last two decades, there has been a decline in livestock populations across the EU. Between 2001 and 2020, the EU's total livestock count for pigs, bovine animals, sheep and goats fell by an estimated 8.9 %[45]. In 2020, there were 146 million head of pigs, 76 million head of bovine animals (such as cattle or buffaloes), and an estimated 75 million head of sheep and goats on EU farms[46]. Broilers, egg-laying hens and turkeys in the EU are estimated around 4.5 billion[47]. A vast majority of the EU's livestock are reared on very large farms, and that share has been increasing in recent years[48].The number of farms is in steep decline: in 2016 there were 10,3 million agricultural holdings in the EU-27, which is 4,1 million fewer farms than in 2005[49].

Amendments to the original EU animal welfare legislation did not change the initial architecture of the EU animal welfare legislation, anchored at the definition of animal welfare as simply the avoidance of unnecessary suffering. However, since the nineties, not only the farm structure but also the assessment of animal welfare has been changing. When the current legislation was adopted, welfare was still assessed 'on the basis of the housing and resources that have been provided to animals (input- or resource-based measures)'[50]. It was assumed that the primary source of unnecessary suffering was related to certain type of housing and the lack of a certain quantity of resources, depending on the species.

In the last 15 years, with the evolvement of the concept of animal welfare, also the focus of the assessment has shifted from a focus on structural requirements to 'outcome- or animal-based measures (variables that are measured directly on animals, e.g. injury or lameness) as valid indicators of animal welfare, since welfare is a characteristic of the individual animal, not just of the system in which animals are farmed'[51].

Regarding the implementation of the Directives, certain Member States have introduced stricter requirements than those set out at EU level, while others followed the minimum requirements[52].

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45 Eurostat, 'Key figures on the European food chain', 2021 edition, p. 31.

46 Ibid, p. 30. A majority of the EU's livestock is held in just a few of the EU Member States. Between one fifth and one quarter (23.3 %) of the EU's bovine population was found in France and similar shares of the EU's pig (22.4 %) and sheep (24.8 %) populations were in Spain. Greece (28.8 %) and Spain (21.4 %) together accounted for more than half of all the EU's goats.

47 Broom, 2017.

48 Eurostat, 'Agriculture, forestry and fishery statistics', 2020 edition..

49 Ibid. And so has the number of farmers and those employed in agriculture; the share of people employed in agriculture fell from 6.4 % of total EU employment in 2005 to 4.6 % in 2016.

50 Rayment et al, p. 27.

51 Ibid.

52 For example, Austria, Denmark, Finland, Germany, the Netherlands, and Sweden introduced stricter requirements on broilers than the ones set out in the Broilers Directive (EPRS, 2021, p. 37). Regarding the Calves Directive, Germany went beyond the minimum standards by requiring additional requirements on accommodations (EPRS 2021, p. 38). There is also Sweden by requiring additional requirements for suitable bedding (Swedish Animal Welfare Act 2018:1192 and its Ordinance (2019:66), 2019).

The European Court of Justice has delivered several judgements in recent years, in which animal welfare is recognised to be an objective as a legitimate public interest for Union legislation to pursue[53].

Animal welfare during transport

Data from TRACES (Trade Control and Expert System)[54] indicates that the total number of animals transported between the EU Member States increased by 19% between 2009 and 2015. The increase of transported animals caused an upwards trend in the number of consignments within the same years. Nevertheless, different trends were observed for the different animal categories. The number of transported cattle, sheep and goats decreased as well as their number of consignments. The number of heads of horses, pigs and poultry increased together with the number of consignments for said animals. During the same time, the consignments for pigs, sheep and goats remained relatively stable[55].

The duration of intra-EU journeys has increased for all time categories from 2005 to 2015. Short journeys, lasting less than 8 hours, have relatively steadily increased from 227 000 journeys per year in 2005 to 260 000 journeys in 2015. Long journeys (between 8 and 24 hours) and very long journeys (more than 24 hours) have almost doubled in the same period of time, going from 72 000 journeys per year to 125 000 journeys. The eastward expansion of the EU resulted in increased transport times. The biggest increase in long-distance journeys (+80 %) occurred between 2005 and 2009, after the accession of Bulgaria and Romania to the EU[56].

Today, around 4 million cattle, 28 million pigs, 4 million sheep, around 243 million poultry and 150 thousand horses are transported for more than 8 hours within the EU every year[57].

The case law of the Court of Justice of the European Union[58], has clarified that the operators of transports to third countries shall ensure that such transports comply with the EU animal welfare standards until their final place of destination in a non-EU country. It seems that most transporters do not meet applicable EU rules after leaving the Union[59].

A vast majority of respondents (94% - 55 564 out of 59 281) considered that **the export of live animals** to non-EU countries for slaughter should be prohibited. Such an option was supported by one-third of the business organisations (32% -211 out of 660).

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53 V. Vomáčka, 'Animal welfare before the Court of Justice', ERA Forum (2020) 20:691–705.

54 TRACES is the European Commission's online platform for sanitary and phytosanitary certification required for the importation of animals, animal products, food and feed of non-animal origin and plants into the European Union, and the intra-EU trade and EU exports of animals and certain animal products.

55 'Regulation (EC) No 1/2005 on the protection of animals during transport and - European Implementation Assessment', by the EPRS (2018).

56 Eurogroup for Animals, 'A strategy to reduce and replace live animal transport. Towards a meat and carcasses only trade' (2019).

57 Commission website.

58 The "Zuchtvieh-2" case in 2015, confirmed in the "Vion Livestock" case in 2017.

59 Commission Overview Report (2019-6834), "Welfare of animals exported by road".

In 2016, the exports of live cattle and sheep were worth more than 4 billon euro according to Eurostat. In 2018, the EU's beef exports were estimated to be 1.24 billion euro. Over the last years, exports of live animals and meat have increased. Live animals go mainly to the Middle East and North Africa. For instance, 1 102 827 live beef animals were exported from the EU in 2018[60].

Market dynamics are the main factor for animal transports. One of the main reasons for this trade is still to exploit price differentials between Member States. In particular, the cost of feed is one of the most important cost factors in animal production, and this cost varies between Member States and regions. Furthermore, a limited slaughter or processing capacity in some Member States as well as the fact that regional production of meat within the EU does not equal regional consumption, may also encourage intra-Union trade in live animals[61]. In this sense, the Transport Regulation objective to reduce long journeys have not been fully met.

Animal welfare at the time of killing

The development of meat production in the EU seems rather stable since more than a decade. For instance, the pig meat production in the EU increased from 21,1 million tons in 2004 to 23 million tons in 2020, and poultry meat production increased from 9,4 million tons in 2004 to 13,6 million tons in 2020. At the same time, however, the production of bovine meat has decreased from 7,6 million tons in 2004 to 6,8 million tons in 2020[62]. Every year nearly 360 million pigs, sheep, goats and cattle as well as several billion poultry are killed in EU slaughterhouses. The European fur industry adds another 25 million animals to the figure[63].

As regards the compliance with the Killing Regulation, significant problems with water bath stunning in the poultry sector have been identified[64].

Scientists have recognised fish as sentient beings[65], which is not reflected in the EU animal welfare legislation in the sense of specific requirements. As regards the killing of fish, some processes are pointed out to be particularly inhumane. Killing of farmed fish by taking them out of the water takes a long time before fish die and it is frightening and painful to the fish[66].

3.2. Compliance and enforcement

Official controls of compliance with the EU animal welfare legislation is primarily the responsibility of the Member States. Such controls have been performed in accordance with

60 Ibid, p 2.

61 Commission report (COM(2011)700 final) on the impact of Council Regulation (EC) No 1/2005 on the protection of animals during transport.

62 Eurostat, "Agricultural production – livestock and meat" (2021).

63 Commission website, "Slaughter & Stunning".

64 Commission Overview Report (2015-7213) 'Animal welfare at slaughter in Member States 2013-2015'.

65 EFSA (2009), 'General approach to fish welfare and to the concept of sentience in fish, Scientific Opinion of the Panel on Animal Health and Welfare', p. 954.

66 European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015', pp. 14-16 and 20-23.

Regulation (EC) No 882/2004[67] up to 2019, and are currently carried out in accordance with the Official Controls Regulation (OCR) (EU) 2017/625[68]. At EU level, audits[69] performed by the Commission allow for recommendations to be made to the Member States, if necessary followed up by infringement procedures[70]. The initiation of such proceedings against those Member States that had failed to ensure implementation of the ban on unenriched cages for laying hens in 2012, led to several Member States taking accelerated corrective actions, averting the need for court action to proceed in most cases[71].

According to the findings of the evaluation of the EU Animal Welfare Strategy (2012-2015), in 2021, the areas where most Member States are struggling to comply with the requirements set in the legislation are animal transport, welfare of pigs (e.g. routine pigs' tail docking) and protection at the time of killing[72].

Welfare during transport

Compliance with the Transport Regulation in the EU has improved over time. However, there are still challenging issues associated with long journeys and in particular transport in extreme temperatures and the transport of vulnerable animals, such as unweaned calves and pregnant animals[73].

The main concerns for the welfare of animals relate to the part of the journey outside of the EU. Available information indicates that there are still challenging issued regarding transporters' compliance with the applicable/relevant EU rules after leaving the Union, e.g. as regards transport of unfit animals, breaches in stocking densities, and insufficient provision of rest, feed, water and bedding[74].

Other issues in terms of enforcement include non-deterrent penalties for non-compliance. The measures adopted following non-compliances with animal welfare rules during transport are decided by national competent authorities and therefore differ throughout the EU and so are

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67 Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the compliance with food and feed law, animal health and animal welfare rules (OJ L 165, 30.4.2004, p. 1).

68 Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application with food and feed law, animal rules on animal health and welfare rules (…) ("OCR") (OJ L 95, 7.4.2017, p. 1). Articles 151, 152, 154, 156, 157 and 158 of the OCR which require Member States to submit annual reports to the Commission on their inspections carried out to check compliance with the Farming Directive, the Laying Hens Directive, the Broilers Directive, the Calves Directive, the Pigs Directive and the Transport Regulation.

69 Article 45(1) and 45(3) of Regulation No 882/2004 and Article 116 and Article 117 of the OCR.

70 E.g. the ECJ case C-416/07 (judgment of September 2009) concerning animal welfare during transport and slaughter in Greece.

71 Report from the Commission (COM(2018)627) on the overall application of official controls in Member States (2014-2016), p. 9.

72 European Commission (2021), 'Commission Staff Working Document, Evaluation of the European Union Strategy for the Protection and Welfare of Animals 2012-2015', , p. 44. ("EUAWS evaluation") See also the CBA study, p 66 (compliance with the rules on stocking densities in the Broilers Directive) and p 74 ("satisfactory" compliance with the Calves Directive).

73 Commission Overview report (2019-6834) on the 'Welfare of Animals Exported by Road'. The problems related to the transport of pregnant animals were also addressed in many replies to the Open Public Consultation.

74 EUAWS evaluation, p. 44.)

the triggering levels for sanctions and penalties and the amounts imposed for non-compliances[75]. There are also practical challenges to impose penalties on transporters who are registered in another Member States, as different national administrations are involved.

54% of respondents to the public consultation undertaken in the context of the evaluation of the EU Animal Welfare strategy (2012-2015) confirmed that compliance is an issue in the transport area, with a few stakeholders highlighting long journeys and transport to third countries, high temperatures, non-observance of space requirements and transport of calves and adult bovines as key issues[76].

As regards the transport by sea, Member States' systems in place to approve livestock vessels and authorise transporters[77] are insufficient (with the exception of Ireland and Portugal). Main reasons for this are the lack of technical experience and resources to carry out all the necessary specific tasks[78].

Welfare of pigs

Available data show that tail-docking of pigs is still a routine practice in almost all Member States, although this is forbidden by current legislation, and approximately 150 million pigs annually are subject to this practice. With the exception of Finland and Sweden, and although actions have been taken by the EU Member States, such actions have not yet resulted in better compliance with the provisions of the Pig Directive which prohibit routine tail docking in pigs or with providing suitable enrichments materials (such as rope, fresh wood, branches and straw) in sufficient quantity[79]. The lack of serious and uniform enforcement is a challenge for stopping routine tail docking of pigs. In addition, the very active internal market for pigs has been identified as a reason for non-compliance, since Member States' authorities and producers are afraid of losing competitiveness if they strengthen enforcement towards others who are competitors[80].

Welfare at the time of killing

National or regional authorities carry out checks on slaughterhouses because of the food safety and disease transmission legislation[81] as well as the animal welfare legislation. The requirements for such checks are therefore more demanding than those for checks on farm. As

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75 Commission Overview Report (2019-6834) on the welfare of animals exported by road, p. 15. Also the certification procedures differ considerably between the Member States, see p 85 of the CBA study.

76 EUAWS evaluation, p. 44.

77 Article 6(1) and Article 7(2) of the Transport Regulation.

78 Commission Overview Report (2019-6835) on the welfare of animals transported by sea.

79 EUAWS evaluation, p. 45.

80 Commission Staff Working Document (SWD(2020)283 final) accompanying the Commission's report (COM(2020)756 final) on the overall operation of official controls performed in Member States (2017-2018), p. 12f.

81 Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption (OJ L 139, 30.4.2004, p. 206–320), repealed and replaced by the OCR in 2019.

a result, the enforcement of animal welfare regulations at slaughterhouses is often a more efficient tool than the enforcement of animal welfare regulations on farms[82].

There is evidence of a lack of compliance with the Killing Regulation, for instance as concerns the application the required parameters for electrical waterbath stunning of poultry[83]. In addition, in 2019 there were documentations by NGOs and media regarding fraudulent treatment of animals at slaughterhouses in some Member States indicating a lack of regular supervision of some areas by official services[84]. As a follow-up, the European Commission is performing a series of audits in certain Member States, the results of which are published on the Commission's website (including the recommendations made in relation to the implementation issues observed).

- **EVALUATION FINDINGS**

4.1. To what extent was the intervention successful and why?

As described below, the current EU legislation has improved the welfare of many animals, although not for all species, for instance by improving the competence of certain animal handlers. It has also to some extent helped to ensure fair competition for EU business operators, although the adoption of differing national animal welfare requirements in recent years weakens this achievement. Business operators, in particular farmers, often consider the market return on their costs of compliance to be insufficient. While the consistency between the respective pieces of EU animal welfare legislation, and the coherence with other policy areas, in general is good, there is still room for further synergies.

4.1.1 Effectiveness

As mentioned in section 2.1, the expectations were mainly related to the elimination of "bad" practices which were considered unnecessary for the viability of the production, as illustrated in the table below. For farming, it was the practice of keeping calves and sows in isolation and keeping laying hens in small, unenriched cages. For transport, it was the long journeys. For slaughter, it was the slaughter without stunning and better animal handling at the slaughterhouse.

Focus was put on addressing matters of political importance, recognising citizens' expectations and the protection of the welfare of food producing animals as a legitimate public objective: the Directives in particular set general "obligations of result" rather than laying down detailed prescriptions governing farming practices and left room for interpretation and manoeuvre to the Member States, which, in the vast majority of instances

82 Broom, 2017, p. 44.

83 Commission Overview Report (2015-7213) on Animal welfare at slaughter in Member States.

84 Such as regards the arrival of unfit dairy cows in Germany and Poland, or the situation in various slaughterhouses in France, as reported by animal welfare NGOs. As for the audits, see for instance the report (2019-6839) from the audit in Poland, (. The audit was carried out "following the public broadcast on Polish television of slaughter practices in a slaughterhouse involving cows which were unable to stand ("downer cows") or were injured", which pointed to violations of EU animal welfare legislation.

(influenced also by national factors), transposed EU rules keeping their generic language and without "operationalising" them. This, in turn, made the monitoring of implementation very difficult.

Clearly, the expectations were very limited in terms of concrete and measurable outcomes relating to the improvement in animal welfare: those expected outcomes can be described as a significant reduction of certain type of major injuries and diseases (at farms, during transport and at the time of killing) for the main categories of food producing animals on which the political debate was concentrated. Therefore, the "success" of the animal welfare legislation has been measured by the extent to which the animals are allowed to express their natural behaviour, on the basis of certain measurable indicators such as mortality rates, the use of antibiotics, and the prevalence of certain injuries and diseases.

Available evidence suggests an **improvement of animal welfare** if compared to the situation before the application of the current EU animal welfare rules[85]. This is in line with the expectations on how the objective of improving animal welfare would be achieved, as described above. However, the degree of such improvement is not the same for all the species[86] and across the different welfare areas.

Expectation	**Objective (key requirements)**	**Indicators**	**Outcome (level of success, maximum: 5 +)**
To improve animal welfare by eliminating "bad" practices, but only to the extent that a viable food production system is still ensured.	Farming: group housing for sows and calves; enriched cages for laying hens; better environment for pigs allowing not to dock their tails without triggering a tail biting outbreak; less lesions for broilers.	Injuries (foot-pad dermatitis), diseases (mastitis, bronchitis), mortality rates, use of antimicrobials (data from ESVAC), use of cages.	++++ (tail docking still practiced routinely in most Member States)
	Transport: fitness for transport; limit long journeys as far as	Injuries (keel-bone fractures, leg disorders), medical	+++ (long journeys not reduced; limited communication, in

[85] There is also evidence suggesting that working conditions have improved for farmers as a result of the Directives (but not necessarily for pig farmers). Issues related to possible negative impacts of the animal welfare legislation on health and safety at work have been reported to Commission's services but they seem primarily due to inappropriate implementation of the rules (EPRS 2021, and information provided by Mutualité Sociale Agricole in France to the Commission on 23 November 2021 -).

[86] CBA study, p 108. Contrary to the intention, a number of practices, such as mutilations, and a lack of loose materials for manipulation, could not be abolished by the legislation.

	possible; exchange of information between competent authorities	condition (lameness), mortality rates, exchanges of communication between Member States regarding non-compliance.	particular in cases of export by road)
	Killing: Stunning; better animal handling	Number of animals stunned before killing; Presence of Animal Welfare Officers in all large slaughterhouses; Certification of competence for all slaughterhouse staff handling live animals.	++++ (waterbath stunning of poultry and CO2 stunning of pigs remain as difficult areas)

Concerning welfare at **farm**, the housing system has a major impact on animal welfare. Based on requirements introduced by the Pigs Directive for all holdings (from 1 January 2013), sows and gilts are group-housed for certain period of their breeding lives. Previously, breeding females could be kept their whole lives within individual stalls, without being able to move or turn. Regarding laying hens, from 1 January 2012, cages without enrichment materials and very little space to move (less than an A4 page) were banned in the EU and are no longer used[87]. The ban brought an improvement in the life of the approximatively 360 million laying hens kept in the Union[88]. In 1996, 93% of laying hens in the EU lived in battery cages, and 7% in alternative systems. In 2020, 48% live in enriched cages, 33,9% in barn/aviary systems and 18,1% (of which 6,2% in organic systems) are free range[89]. This results in a 93% increase of animals kept in alternative systems, allowing for a greater extent of natural behaviour to be expressed.

The only animal based indicators of welfare currently required by EU law to be monitored by animal handlers, and reported to the competent authorities, are found in the Broilers Directive[90]: It refers to "poor welfare conditions such as abnormal levels of contact dermatitis,

87 Article 5(2) of the Laying Hens Directive.

88 D. Simonin D. and A. Gavinelli A., 'The European Union legislation on animal welfare: state of play, enforcement and future activities', In: Hild S. & Schweitzer L. (Eds), *Animal Welfare: From Science to Law*, 2019, pp. 59-70.

89 EU Egg Dashboard.

90 See Annex III.

parasitism and systemic illness in the holding". Slaughterhouse inspections of footpad dermatitis (a condition characterised by lesions on the feet of poultry) are considered best at demonstrating whether animal welfare of broilers must be or has improved in a specific holding, as it is the first contact dermatitis that appears[91].

Data received from the Danish Veterinary and Food Administration show that since 2002, the occurrence of footpad dermatitis in broilers has been monitored in all Danish slaughterhouses for broilers and has decreased. The development since 2002 has been favourable[92]. Similarly, in Sweden, the occurrence of footpad dermatitis decreased from 11 % in 1994 to 6 % in 1996[93]. And with an almost constant decrease since the entry into force of the Broilers Directive, the occurrence of footpad dermatitis in Sweden nowadays seems negligible[94]. Corresponding data could exist in all Member States, but this is not collected in any structural or regular manner across the EU (since no such requirements exist).

Another indicator is represented by mortality rates[95]. For instance, statistics from the Netherlands suggests a reduction in piglet mortality (from 13,5% in 2015 to 12,2% in 2019)[96].

Somatic cell count is widely used in the EU to monitor milk quality, as an indicator of milk hygiene. It is also an indicator of sub-clinical mastitis, a disease which is more common among high-yielding cows in intensive production systems. Data collected from certain Member States show a constant reduction in the average somatic cell count over a period of many years, which could indicate a certain improvement of the welfare of dairy cattle in the EU in this regard[97]. However, some data also suggests an increase of somatic cells in recent years, for instance in Sweden[98].

Despite the lack of commonly agreed indicators to measure improvements of welfare, it can be considered that the implementation of legislative requirements, such as those on group housing of calves, sows and gilts[99], and the ban of unenriched cages, have contributed to improve the environment in which the animals live, and therefore improved the welfare of animals as it allows them to behave more naturally[100]. This reasoning seems to be supported by a reduction of number of certain injuries[101] and chronic diseases that are conditioned to the

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91 Report (COM(2018)181 final) from the Commission on the application of Directive 2007/43/EC and its influence on the welfare of chickens kept for meat production, as well as the development of welfare indicators, , p. 10. See also the CBA study, p 70.

92 Data submitted by the Ministry of Food, Agriculture and Fisheries, The Danish Veterinary and Food Administration, in January 2022.

93 B. Algers (2001), 'Monitoring Animal Welfare on Commercial Broiler Farms in Sweden' Acta Agriculturae Scandinavica, Section A — Animal Science: Vol 51, Issue sup030

94 Data for the period 1994-2021, submitted by the Swedish Board of Agriculture in January 2022.

95 P. T. Thomsen, 'Cow mortality as an indicator of animal welfare in dairy herds', Research in Veterinary Science, Volume 119, August 2018, pp 239-243.

96 Data from the Agrovision management system, submitted by the Dutch Ministry of Agriculture, Nature and Food Quality in December 2021. See also: The EU PiG network, 'Reducing pig mortality through a high standard of care'..

97 Commission Overview Report (2017-6241) on the welfare of dairy cattle in the EU. .

98 Data submitted by the Swedish Board of Agriculture to the Commission in December 2021.

99 CBA study, p 42 and p 75.

100 CBA study p 51 and 58. In 1996, 93% of laying hens in the EU lived in battery cages, and 7% in alternative systems. In 2020, 48% live in enriched cages, 33,9% in barn/aviary systems and 11,9% are free range.

101 CBA study p 88.

environment, i.e. by the type of farming, such as mastitis[102] in cows, and bronchitis in pigs, if compared to the situation a number of years ago.

Data also seems to support the picture of an improved animal welfare during **transport** in the EU if compared to the situation prior to 2005[103]. For instance, the number of animals reported "dead on arrival" decreased significantly from 2005 to 2009. The difference in death rates was greater for long journeys than for shorter ones. Compared to the situation prior to 2005, there has also been a significant decrease in the number of animals "observed unfit for travel upon arrival at destination"[104]. For instance, in Romania the Transport Regulation is considered to have improved many conditions related to animal protection and welfare, such as loading surface, transport duration, lesion and mortality rate upon arrival at destination[105].

Still, compliance with animal welfare requirements remains a challenge. In 2020, 7 703 administrative sanctions were applied by the Member States' competent authorities, as a result of their official controls on animal transports. The main issues were the fitness of the animals (cattle and pigs), transport practices (poultry) and transport documentation[106]. The absence of clear, easy channels of communication and feedback between public and animal health authorities and legal services for cases involving the transport of unfit animals hinders effective enforcement. Strict competence barriers and poor inter-departmental communication, including absence of feedback, were frequent weaknesses in the systems which hindered free discussion and progression of such cases[107]. Furthermore it has been noted, e.g. by Belgium, that foreign transporters are responsible for a significant proportion of the infringements, something which is posing further difficulties for enforcement for the competent authorities[108].

From 2011 to 2020, the sales of antimicrobial veterinary medicines in the EU was reduced by 43%. This seems to indicate an improved animal health, to which higher standards of animal welfare have contributed[109]. In particular, there is evidence that the need to use antimicrobials (other than coccidiostats) for treating common conditions has been substantially reduced, or

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102 Commission Overview Report (2017-6241) on the welfare of dairy cattle in the EU

103 Report (COM(2011)700 final) from the Commission on the impact of Council Regulation (EC) No 1/2005, in particular p 13-15.

104 Ibid, in particular p. 9.

105 I. Andronie et al (2013), 'Impact of EC Regulation on Animal Protection during Transport in Romania – some Aspects', Scientific Papers Animal Science and Biotechnologies.

106 Commission staff working document (SWD(2022)73 final) accompanying the report (COM (2022)129 final) from the Commission on the overall operation of official controls carried out in Member States (2019-2020), p 29.

107 Commission Overview Report (2015-8721) 'Animal welfare - transport of unfit animals in European Union', p 9.

108 Commission staff working document (SWD(2022)73 final) accompanying the report (COM (2022)129 final) from the Commission on the overall operation of official controls carried out in Member States (2019-2020), p 29.

109 European Medicines Agency, Eleventh ESVAC report, 'Sales of veterinary antimicrobial agents in 31 European countries in 2019 and 2020. Trends from 2010 to 2020' (statistics provided by 25 European countries).

avoided altogether, in those Member States which have a strong focus on welfare, health and hygiene issues[110].

As regards **slaughter**, there is also evidence of improvements. A series of Commission audits in 13 Member States indicated that business operators had acted on their new responsibilities in the Killing Regulation and designated animal welfare officers, put standard operating procedures in place and monitored their implementation. There was generally better compliance and better animal welfare in the red meat sector whereas there were significant problems with waterbath stunning in the poultry sector[111].

The improvement in animal welfare is supported by literature[112], and reflected in all stakeholder interviews. In addition, the current EU animal welfare legislation is considered to have provided important ecosystems services and contributed to better public health (less incidence and spread of animal-born diseases[113]) as well as to a better working experience for staff and an improved sectoral image [114].

In the public consultation, more respondents agreed (49% - 28 875 out of 59 281) than disagreed (40% - 23 999) that, compared to 25 years ago, there is more uniform protection of farmed animals across EU countries. However, the result appears to indicate that more could be achieved. Indeed, 92% of respondents in the public consultation declared that the EU legislation does not ensure adequate and uniform protection of all animal species in need. This is also supported by literature[115].

Compared to the period prior to its adoption, the EU animal welfare legislation seems to have improved the welfare of many of Europe's animals, in particular those that are covered by targeted legislation, such as pigs, calves, laying hens, and animals during transport. As an example: Around 360 million laying hens are no longer kept in unenriched cages. The welfare of animals such as turkeys and dairy cows for which species-specific legislation exists, does not seem to have improved sufficiently[116].

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110 Commission report (COM (2018)181 final) on the application of the Broilers Directive, p 8.

111 Commssion Overview Report (2015-7213) - Animal welfare at slaughter in Member States (2013-1015).

112 Broom, 2017

113 H. Blokhuis et al (2008), 'Animal welfare's impact on the food chain', Trends in Food Science & Technology.

114 M.S. Dawkins (2016), ';'Animal welfare and efficient farming: Is conflict inevitable?' Animal Production Science, 57(2), 201–208. See also Farm Animal Welfare Committee (2011) 'Economics and Farm Animal Welfare'; J.N. Fernandes et al. (2021) 'Costs and Benefits of Improving Farm Animal Welfare', Agriculture, 11(104), 1–14; ; E. Kollenda et al. (2020), 'Transitioning Towards Cage-Free Farming in the EU: Assessment of environmental and socio-economic impacts of increased animal welfare standards'; Rayment et al. (2010) and ; Stichting Wageningen Research (2011), 'Good animal welfare in a socio-economic context: Project to promote insight on the impact for the animal, the production chain and society of upgrading animal welfare standards'.

115 European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015', , . See also Eurogroup for Animals' report "No Animal left behind" (2021).

116 Broom, 2017, p 51. See also EPRS (2021) and the Commission Overview Report (2017-6241) - Welfare of Cattle on Dairy Farms.

Even after the adoption of the current EU rules, many animals cannot express natural behaviour because of their restriction to move, e.g. animals kept under individual confinement and in cages. Also, the current legislation does not require calves to be kept with their mothers after birth, although that would be their natural needs and broilers are kept in dimmed light to decrease aggressive behaviour that could easily appear when kept in high stocking densities and in natural light. Mutilations such as routine tail docking, beak trimming and dehorning are still practiced. Many dairy cows suffer due to inappropriate conditions e.g. tethering, too short stalls for size of body, cement flooring responsible for lameness and injuries. Intensification of milk production still leads to regular mastitis and metabolic problems resulting in pain and suffering and finally a reduced longevity[117] [118].

This is due to a compromise between economic factors (the "rational development of production") and animal welfare objectives, reflected in the objectives of the legislation currently in force.

Evidence supports that EU animal welfare legislation has contributed to a fairer competition among EU producers[119]. This seems to be confirmed by the results of the public consultation. More respondents (48% - 28 579 out of 59 281) agreed than disagreed (32% -18 914 out of 59 281) that having common rules on animal welfare has facilitated trade and improved competition in Europe, by removing obstacles to trading animals and products of animal origin in the single market. This corresponds well with the targeted survey, in which 49% (20 out of 41) of the respondents considered that the EU animal welfare legislation has strongly or relatively contributed to a better functioning of the EU internal market.

Expectation	**Objective (key requirements)**	**Indicators**	**Outcome (level of success, maximum: 5 +)**
Improve the functioning of the internal market.	Common minimum standards.	The extent to which fair competition among operations active in different Member States is ensured, as indicated by complaints related to access to other Member States' market and the level of intra-EU trade.	+++

[117] European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015'

[118] Broom, , 2017: 'Some system changes required by law in the EU have led to great improvement in animal welfare'.

[119] Econwelfare (2011), Final Report).

In the targeted survey, a vast majority of the respondents (85% - 35 out of 41) considered that the EU animal welfare legislation has contributed to some extent (little, relatively or strongly) to a better functioning of the EU market. Those data are supported also by literature, such as the European Parliament's Research Service's evaluation of the EU animal welfare legislation, performed in 2021.

In the public consultation, a majority of business organisations (51% - 337 out of 660) strongly agreed or tended to agree to the claim that the EU animal welfare rules has facilitated trade and improved competition in Europe, for instance by removing obstacles to trading animals and products of animal origin in the single market. Only 15% (102 out of 660) of the business organisations strongly disagreed to that statement. Those data are also supported by literature, including the evaluation of the EU animal welfare legislation performed by the Commission in 2010[120].

However, it also follows from the majority of interviews with pan-European producers and business organisations that the more restrictive national legislations of some Member States are problematic since those national rules also must be respected to be able to operate on that market, which increases their production costs and affect the single market.

Another interviewed business organisation explained that the uneven implementation of the Transport Regulation has a negative impact on their costs. One example given was related to transports in high temperatures during summer: While transports are halted in many countries due to the heat, they still take place in some other countries.

Furthermore, while the legislation has in general helped to reduce distortions in the internal market caused by differences in national standards, there is a lack of action on enforcement[121]. In addition, certain Member States have taken more and more national measures going beyond an EU animal welfare legislation that remained unchanged for more than 10 years. Because of this, despite the improvement, it cannot be considered that the objectives of the legislation were fully achieved.

To a considerable extent, the shortcomings of the current EU animal welfare legislation are caused by a lack of precision of some of the current rules, lack of species-specific provisions and lack of tools for monitoring and a consistent, uniform enforcement.

Vagueness of current rules

A certain lack of precision of current rules has been identified as a barrier to fully achieve the objective of improving welfare as it impedes an effective harmonisation[122] and constitutes one of the obstacles to the success of the legislation. Different interpretations and implementation

[120] Rayment et al.

[121] European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015'

[122] Rayment et al.

of EU animal welfare legislation led to differing levels of animal welfare in the EU and resulted in 'a lack of consistency around enforcement'[123]. Whilst numerous questions have been clarified by the Court of Justice through the preliminary ruling procedure, in the area of animal transport[124] and stunning[125], numerous issues remain.

Certain requirements are too vague to allow proper enforcement. For example, in a case related to Directive 91/629/EEC laying down obligatory minimum standards for the protection of calves, the Advocate General of the European Court of Justice considered that *"the conditional nature of the rules precludes them from being recognised as having the slightest binding force and that where, on the other hand, a standard is laid down in mandatory terms, its imprecision renders it unenforceable"*[126].

In the context of an evaluation of the animal welfare Directives performed by the European Parliament Research Service in 2021, most stakeholders interviewed[127] consider that the wording of the legislation is often 'inadequate, too vague, or providing exceptions or derogations to requirements'[128].

Examples of vague terminology such as 'sufficient' or 'appropriate' exist in all areas of EU animal welfare legislation, i.e. farm level, transport, and at the time of killing. While the use of words like "sufficient" or "adequate" can be necessary when legislating at EU level to leave margin for necessary local adaptations, the use of these words in the EU animal welfare legislation is so widespread that it is an obstacle for effective and coherent enforcement. As an example, in the Transport Regulation, the word "sufficient" is used 21 times, the word "adequate" 14 times and the word "appropriate" 39 times.

Similarly, some transport rules have been interpreted differently by Member States, including as regards the fitness of animals to travel[129][130]. The absence of definitions sometimes accentuates the lack of precision(e.g. on what is to be considered an "end of career animal").

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123 EUAWS evaluation, p. 57.

124 Judgement of 23 April 2015, *Zuchtvieh-Export GmbH*, Case C-424/13, ECLI:EU:C:2015:259 regarding the applicability of Union welfare rules on transport to the extra-Union leg of the journey and Judgment of 19 October 2017, Vion Livestock BV v Staatssecretaris van Economische Zaken, C-383/16, ECLI:EU:C:2017:783 on the requirement to fill in the journey log also on the extra Union leg of the journey..

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125 Judgement of 26 February 2019, Œuvre d'assistance aux bêtes d'abattoirs (OABA), Case C-497/17, ECLI:EU:C:2019:137 regarding the possibility to label religiously slaughtered meat as "organic" and Judgement of 17 December 2020, *Centraal Israëlitisch Consistorie van België and Others,* Case C-336/19, ECLI:EU:C:2020:1031

126 Case C-1/96: R. v. Minister of Agriculture, Fisheries and Food Ex parte Compassion In World Farming Limited, ruling of 19 March 1998.

127 National competent authorities, non-governmental organisations, experts, industry representatives.

128 EPRS, 2021, p. 15.

129 Rayment et al, p. 49.

130 A need to clarify the definition and identification of organisers and transporters and of their obligations was identified by the European Parliament in its recommendation on the protection of animals during transport,

To some extent, the use of vague terms as "appropriate" follows naturally from the use of Directives, as these need to be transposed and implemented at national level and include "obligations of results" for the Member States. However, the Farm Directive is so vague that it gives too wide a margin for implementation.

Furthermore, as mentioned above, also the directly applicable Regulations contain these vague terms. This is usually the result of the political context during the legislative process. One example of this is the rules on journey times in the Transport Regulation. Another example is the Pigs Directive, where the Commission proposed a prohibition on castrations and mutilations, while the legislator opted to allow for flexibility and derogations.

However, also the Commission proposals contained vague terminology. This can best be explained by the fact that the introduction of objectives related to the protection of animal welfare in EU secondary legislation was already an important political achievement, and that the EU animal welfare legislation itself recognises the protection of animal welfare as an objective only to the extent to which animal welfare does not compromise the viability of the production as the result of a compromise between different interests (welfare of animals vs economic viability of food business operators). Hence the need to leave some margin for interpretation to Member States in certain cases in order for the Member States to be able to take into account national factors.

In the public consultation less than a quarter of the respondents strongly agreed (3%, 1 998 of 59 281) or tended to agree (18%, 10 547 of 59 281) that the current EU animal welfare legislation is clear and easy to apply. And in the targeted survey, a clear majority (64% - 53 out of 83) considered the current EU animal welfare requirements to be unclear and difficult to apply. A view that was shared by 49% (322 out of 660) of business organisations.

The Farm Directive has to some extent established a common framework for the welfare of farmed animals in the EU[131]. However, the vagueness of some requirements and large margins of interpretation makes it difficult to directly attribute changes in welfare to certain provisions.[132] For instance, the requirements on the level of competence of animal handlers are not specified clearly enough[133], which allows animals to be handled by people without sufficient knowledge about animal welfare. Examples of vague terminology such as 'sufficient' or 'appropriate' exist in all areas of EU animal welfare legislation, i.e. farm level, transport, and at the time of killing.

With regard to welfare of pigs, the reference to "routine" tail-docking may be interpreted in different ways. Furthermore, the Pigs Directive states that: '[pigs] must have permanent access to a sufficient quantity of material to enable proper investigation and manipulation

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adopted on 20 January 2022, further to the report by the Committee of Inquiry on the Protection of Animals during Transport ("ANIT committee").

131 Report (COM (2016)558 final) from the Commission on the implementation of Council Directive 98/58/EC concerning the protection of animals kept for farming purposes, , p. 6-8.

132 EPRS, 2021.

133 Ibid.

activities'. Here, the term 'sufficient quantity' is not sufficiently precise and open for interpretation, which reinforces the problems of implementation of the Directive.[134][135]

Certain practices, such as mutilations or keeping animals in high stocking densities have remained widespread because of exceptions built e.g. into the Pigs Directive[136] or into the Broilers Directive. Diverging national requirements or tolerances for the application of such exceptions have created 'significant distortions'[137]. These distortions are due to certain Member States going beyond the EU minimum requirements[138].

Evidence collected through interviews illustrates 'differences in the level of political commitment to achieving better on-farm animal welfare' in the way some countries have implemented the legislation[139]. For instance, in 2019 Italy and Spain provided virtually no regulation that goes beyond the EU requirements (and in these countries the enforcement of these EU requirements was also weak, resulting in several proceedings by the EU, e.g. as regards the use of battery cages for poultry), while in Germany, regulations exist independently from EU demands, reflecting a high level of public concern for animal welfare[140]. In the past, and still to a certain extent today, Member States of the North West of the EU have been at the forefront of animal welfare. However, due to increased awareness, political commitment and activism in member states such as Italy, France and Czechia, the image of a leading North and West and a lagging South and East has begun to change[141]. Social media, which did not exist when the current EU legislation was adopted, has also contributed to greater awareness about animal welfare, often through shocking images from intensive farming systems, animal transports and slaughterhouses[142].

Judging from complaints addressed to the European Commission, the fact that Member States are allowed to adopt stricter national rules - provided among other that these do not have a negative impact on the internal market and are proportionate - and have a margin of discretion as regards EU animal welfare legislation, causes practical problems for EU business operators involved in cross-border animal transport[143].

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134 European Commission, Recommendation (EU) 2016/336 of 8 March 2016 introduces a number of parameters that are pertinent in reducing tail-biting and lists the characteristics of an optimal enrichment material. The accompanying Staff working document (SWD(2016)49 final) provides Member States with further details on the issue and also gives them tools and indicators that can be used in assessing the on farm situation.

135 CBA study p 110, where it is concluded that "the more vague the wording, the more loopholes and ways to circumvent the legislation will be explored, in particular when costs of compliance are high".

136 EPRS, 2021, p. 43.

137 Ibid.

138 Broom, 2017, pp-26-27.

139 EPRS, 2021, p. 57.

140 C.S. Vogeler (2019), 'Why do Farm Animal Welfare Regulations Vary Between EU Member States? A Comparative Analysis of Societal and Party Political Determinants in France, Germany, Italy, Spain and the UK.', Journal of Common Market Studies, Volume 57, Number 2, pp 317-335.

141 EPRS 2021, pp. 1-2.

142 O. Rodak, (2020), 'Hashtag hijacking and crowdsourcing transparency: social media affordances and the governance of farm animal protection', Agriculture and Human Values 37, pp 281–294.

143 Example of such a complaint was submitted to the European Commission on 12 August 2021. In that case, a German transport company complained against the fact that certain national provisions in Denmark went beyond the requirements of the Transport Regulation.

For instance, in 2005 an organisation of pig producers brought an action before a court in Denmark, arguing that the Danish legislation relating to the transport of pigs imposed certain standards in respect of the minimum height of compartments, minimum inspection height and maximum loading densities which were contrary to various rules of the Transport Regulation[144].

In the light of the above, a common understanding of existing animal welfare rules and how they are to be applied and enforced seems needed. This is supported by views expressed by interviewed business organisations, representing farmers and food processors.

Species-specific provisions

Many provisions in the Farm Directive are too generic to protect the welfare of certain animals, such as farmed fish, turkeys, rabbits, equines and bovines, as they are not adapted to their specific needs[145]. For example, the Farm Directive is silent as regards the practice of extracting blood serum (to produce PMSG) from pregnant mares, while certain stakeholders consider this practice to be incompatible with the welfare of the animals. Also the practice of force feeding is questioned by stakeholders. However, foie gras production is legal in the European Union, and it is up to Member States to decide whether to ban the production within their own territories provided that the marketing of foie gras remains permitted. This is in line with Article 13 of the Treaty of the Functioning of the EU, which requires that "customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage" must be respected.

Absence of harmonised species-specific requirements also resulted in the adoption of differing national legislation, e.g. on rabbit farming, leading to diverging animal welfare in Member States and in unequal baselines for competition (see examples in Annex III).

According to most stakeholders, the absence of species-specific protection is a key problem for dairy cows, broiler and hen breeders, rabbits, sheep, and turkey[146]. The "lack of more specific requirements for housing of cattle has been linked to low-cost housing solutions that do not provide a proper level of protection in case of adverse weather, and to overcrowding in confined housing"[147]. Another example is "the absence of more specific requirements on tethering has been linked with tethering of dairy cows for long periods of time in some parts of Europe"[148].

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144 Case C-316/10, judgment of the Court on 21 December 2011.

145 European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015' , p. 17-20. See also the Commission Overview Report (2017-6241) on the welfare of dairy cattle in the EU. As for the latter: It was considered almost impossible to get an overall picture of the level of welfare in the EU dairy sector with the data publicly available, Member States were invited to consider the use of animal-based welfare indicators (such as somatic cell count, scoring for lameness, body condition score and longevity) at farm level, when checking compliance with the Directive. This, since for dairy cows measures focused on disease, injury and reproductive problems may be used as indicators of animal welfare.

146 EPRS, 2021.

147 EPRS, 2021, p. 44.

148 EPRS, 2021, p.41.

Similarly, more specific requirements would be needed in order to increase the welfare of some fish species, such as the European sea bass and gilthead sea bream, at the time of killing[149].

The issue of lack of species-specific legislation, both at farm level and during transport and at the time of killing, is raised by the interviewed organisations. Furthermore, although in the Open Public Consultation, 92% of the respondents (54 504 out of 59 281) considered that the current EU animal welfare legislation ensures an adequate and uniform protection of all animals in need, 89% of the respondents (52 593 out of 59 281) considered that specific requirements for further animal species should be introduced.

Another objective of the current EU animal welfare legislation was to **better address the societal demands** at the time of its adoption. Those demands are reflected in the European Parliament's resolution of 20 February 1987 on animal welfare policy, which called on the Commission to make proposals on the rearing of livestock, including minimum standards for the intensive farming of pigs and veal calves, and on the protection of animals during transport[150].

Another reflection of the political context is provided by the Council of Europe's Conventions on the Protection for Animals in International Transports (1964), for Animals kept for Farming purposes (1976) and for the Protection of Animals for Slaughter (1979). The "bad" practices targeted by the current EU animal welfare legislation represent the areas of greatest political and societal concern in the early 1990's, as expressed in these documents.

Expectation	**Objective (key requirements)**	**Indicators**	**Outcome (level of success, maximum: 5 +)**

[149] Report (COM(2018)87 final) from the Commission on the possibility of introducing certain requirements regarding the protection of fish at the time of killing.

[150] OJ C 76, 23.3.1987, p. 185

Better address societal demands.	Provisions targeting "bad" practices, such as the ban on the unenriched cages for laying hens, the ban on routine tail docking of pigs and the rules on group housing of sows.	The extent to which the notion of animal welfare as a Community value, as expressed through political conventions and resolutions, is reflected in the legislation.	+++ (routine tail docking of pigs remains a problem). *To note is that the expectations have evolved to also include the full range of needs of the animals, including socialisation.*

Monitoring systems and enforcement tools

It is assumed that a high level of enforcement of the current EU legislation improves compliance and hence contributes to achieving higher levels of animal welfare and similar - if not the same - conditions for EU operators.

As explained in section 3.1, slaughterhouse inspections have been found to be the most efficient and effective way of prioritising farm investigations with the aim to check the level of animal welfare. Also, authorities and keepers are able to measure progress and maintain standards based on real animal welfare outcomes, e.g. through scoring footpad dermatitis[151][152].

The lack of commonly agreed indicators has been considered as one of the main factors hampering compliance and enforcement, specifically for what concerns the Laying Hens Directive, the Pigs Directive and the Calves Directive[153]. From the Commission's report on the overall application of official controls carried out in Member States (2019-2020), it follows that most EU countries have difficulties in demonstrating the level of, or trends in, compliance regarding animal welfare, due to the absence of specific objectives and defined indicators to monitor[154]. Some Member States, such as for instance the Netherlands, are developing measurable performance criteria for checking animal welfare, for instance when carrying out dairy farm inspections[155]. But still, there is a lack of harmonised criteria and

[151] Commission report (COM(2018) 181 final) on the application of Directive 2007/43/EC and its influence on the welfare of chickens kept for meat production, as well as the development of welfare indicators, p. 10.

[152] Other types of contact dermatitis are hock burns and breast blisters. In addition to those, for farm keeping birds at stocking densities above 33kg/m2, also the daily mortality rates and cumulative daily mortality rates can give an indication of the welfare situation on a farm, or how it is being managed.

[153] European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015'

[154] COM(2022)129 final, p. 31.

[155] Commission Overview report (2021-7319) on the use of indicators for animal welfare at farm level.

indicators, which undermines the capability of competent authorities to identify cases in which animals are not sufficiently protected and to take measures to ensure a high animal welfare.

The obligation for competent authorities to monitor implementation has been introduced relatively recently. They are provided by the EU rules on official controls. In addition, Article 32 of the Transport Regulation requires the Commission to present a report to the European Parliament and the Council on the impact of that Regulation. Similarly, Article 6(2) of the Broilers Directive contains an obligation for the Commission to submit a report on the application of that Directive[156]. Other than that, no proper monitoring framework with indication of clear indicators has been established at the time of adoption of the existing texts.

One important source of information is the (more than 150) reports from the audits and fact-finding missions performed by the Commission, primarily in the Member States, which has formed the basis of a series of overview reports. For instance, those reports show that the Netherlands has an advanced system to verify compliance with the Laying Hens Directive, combining targeted inspections with information from a quality scheme and cross-checking data from various sources, which allows to the competent authorities to establish baselines and see trends[157].

While enforcement procedures are in place, both in Member States and at EU level, 'variations in enforcement undermine progress towards uniformly high standards across the EU'[158]. The fact that such high level of enforcement has not been reached in all Member States, leads to differences in compliance with the EU animal welfare legislation, which is harming the level playing field for transport companies[159]. This also reflected in interviews, where several stakeholders mentioned that the legislation has not been effectively enforced across the Member States (hence a need for the Commission to take infringement actions), e.g. as regards animal transports.

It follows from the targeted survey that the majority of responding Member States consider that the current rules are difficult to enforce (in particular as regards animal welfare at farm level and during transport)[160]. Also, according to feedback received on the Fitness Check roadmap, there is a need to better coordinate competent authorities' controls at the European level. As regards animal transport, the Member States' authorities and the Commission do not have IT systems or software to readily monitor the route, temperature or driving hours of vehicles transporting animals. Certain transport related data is made available to the competent authorities through TRACES, which contains the results of official checks. However, TRACES has certain access and design restrictions which make it difficult to get an

156 These reports (i.e. COM(2011)700 final and COM(2018)181 final) have both been taken into account in the fitness check.

157 Commission Overview Report (2021-7319) on the use of indicators for animal welfare at farm level.

158 Rayment et al.

159 W. Baltussen et al (2011), Study on the impact of Regulation (EC) No 1/2005 on the protection of animals during transport, p 20.

160 Only for the Killing Regulation, some Member States (29%, or 4 of 14) did not consider the legislation difficult to enforce at all.

overview of the general situation regarding transport of animals for export, to identify the most risky situations and to target the controls more effectively[161].

In 2011, EFSA made recommendations to develop better tools for monitoring of animal welfare during transport, such as:

- "On the navigation systems, temperature monitoring systems should be incorporated.
- Minimum standards should be established regarding data type to be recorded, the system and the on-board architecture"[162].

Moreover, EFSA concluded that documentation and manual monitoring in the journey logs are 'often incomplete and/or not returned to the competent authority of departure to allow for verifying compliance'[163].

Similarly, in 2013, EFSA published four scientific opinions on the welfare of cattle, pigs, sheep and goats, and poultry during the slaughter process[164]. The opinions proposed practical means of complying with the requirement of monitoring indicators and using sampling protocols in slaughterhouses.

However, none of these EFSA recommendations have been reflected in the EU legislation so far.

It may be assumed that this lack of monitoring tools has a negative impact on compliance and enforcement. Inadequate enforcement, in turn, has additional negative impacts on compliance, as there may be economic incentives for operators not to comply with some provisions, like in the case of transport of unfit animals (where having to dispose of an animal as fallen stock could entail a cost of around 500 euro)[165]. Consequently, the lack of monitoring has a negative impact on animal welfare and the competition among EU food business operators[166].

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161 Commission Overview Report (2019-6834) on the welfare of animals exported by road and the European Court of Auditors' Special report No 31/2018: Animal welfare in the EU: closing the gap between ambitious goals and practical implementation.

162 EFSA Journal 2011, 9(1):1966, Scientific Opinion Concerning the Welfare of Animals during Transport, , pp-1-2.

163 Ibid, p 61.. It follows from the opinion that this is also confirmed by reports from the Commission's audits in 2008 and 2009, from NGOs and from the Joint Research Centre on temperatures during transport.

164 Scientific Opinion on monitoring procedures at slaughterhouses for bovines | EFSA (europa.eu) Scientific Opinion on monitoring procedures at slaughterhouses for pigs | EFSA (europa.eu) Scientific Opinion on monitoring procedures at slaughterhouses for sheep and goats | EFSA (europa.eu) Scientific Opinion on monitoring procedures at slaughterhouses for poultry | EFSA (europa.eu)

165 Commission Overview Report (2015-8721) on transport of unfit animals in the EU. It also follows from the report that fines imposed by Member States are usually low in comparison with the value obtained for the animal (e.g. a fine of € 250 was imposed to transport a bull with a broken leg, when the approximate value of a slaughter bull may be around € 1 500).

166 Ibid, p 5.

Training and competences

Since the competence of people handling animals is important to ensure animal welfare[167][168][169][170][171], the current EU animal welfare legislation introduced several new training requirements.

EU law requires formal training for the pig and broiler sectors, and (more detailed and demanding, e.g. by requiring certificates) in the transport and slaughter sectors, which has implications for farmers and workers on 317,920 pig farms and some 23,360 large broiler farms, 2,721 companies transporting animals between Member States, with many more transporters operating domestically, and staff in slaughterhouses killing some 360 million mammals and several billion poultry every year[172]. However, the method of training or length of the courses is not specified in any EU legislation, and there are great variations between the Member States[173].

Despite the high level of training on animal welfare for slaughterhouse staff (due to previous national licensing requirements) prior the Killing Regulation, its impact assessment identified as specific problem "the insufficient competence of personnel handling animals". Thanks to the Killing Regulation the requirements for training were more consistent and demanding across all slaughterhouses after 2013[174], resulting in reduced stress and injuries amongst the animals[175]. In addition, training has supported the practical implementation of the Killing Regulation and increased the technical competence of the slaughterhouse personnel, which had a positive impact on the animals' welfare to some extent[176].

Various livestock sectors find training on animal behaviour very beneficial not only to avoid animal welfare problems, but also 'to improve production, avoid mutilations and reduce the use of medicines'[177]. Moreover, training courses help to establish high standards and pride in work[178].

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167 European Commission (2012), 'Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015'.

168 Impact Assessment Report (COM(2008)553) accompanying the proposal for a Council Regulation on the protecting of animals at the time of killing, p. 30. "Better training on animal welfare is likely to lead to calmer animals, more efficient stunning and lower number of work accidents."

169 Tremblay, 2017; Ebinghaus, Ivemeyer and Knierim, 2018; Grandin, 2019. (referred to in AGROSYNERGIE EEIG, Study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use). See also the CBA study, p 88: "appropriate training of staff is an important prerequisite for animal welfare".

170 EPRS, 2021.

171 Broom, 2017.

172 Commission Overview Report (2016-6001) on education activities for farm, transport and slaughterhouse staff on animal welfare, p 1.

173 Ibid s 8.

174 Ibid, p 6.

175 Commission Overview Report (2008-7974) of missions carried out in 2006-2007 to evaluate controls of animal welfare at the time of killing: "Training of slaughterhouse staff allows them to better understand the impact of their job on animal welfare and systems of licensing provide further assurances particularly for critical stages such as the stunning and slaughter".

176 Commission Overview Report (2015-7213) 'Animal welfare at slaughter in Member States (2013-2015)'.

177 Ibid, p. 9.

178 Broom,, 2017.

Also, one of the most widely mentioned positive impact of the implementation of the Broilers Directive are the training provisions, according to surveyed competent authorities. In 2017, only three Member States appeared to not offer adequate training courses. This was an improvement on the situation pre-implementation[179]. Training courses in countries such as Spain, Italy, and Ireland have been mentioned as 'key contributors to improving practices' at farm-level[180]. In Denmark, in the broiler sector, keepers were trained and found a better understanding of stress particularly useful[181].

The fact that all drivers have to hold certificates of appropriate training courses is an important improvement of the Transport Regulation compared to the former Directive of 1991[182], as it helps to ensure animal welfare competence. Similarly, the Killing Regulation requires that certain slaughter operations may only be carried out by persons holding a certificate of competence for such operations[183].

Expectation	**Objective (key requirements)**	**Indicators**	**Outcome (level of success, maximum: 5 +)**
Improve the competence by animal handlers.	Require training and competence of people handling animals at farms, during transport and in slaughterhouses.	The level of trainings provided by the Member States and the methods and procedures of certifications.	++++ (harmonisation missing, in particular at farm level)

Although it is mandatory in the EU for pig and broiler producers to take part in animal welfare training, not all farmers do. A study on education and information activities on animal welfare, commissioned by the Commission and concluded in 2016, showed differences

[179] Food Chain Evaluation Consortium (2017), Study on the application of the broiler directive 2007/43/EC and development of welfare indicators:. Only in Hungary, Luxembourg, Spain, Sweden and the UK were training courses in accordance with the Broilers Directive offered prior to the implementation of the Directive in 2010.

[180] EPRS, 2021.

[181] Commission Overview Report (2016-6001) on education activities for farm, transport and slaughterhouse staff on animal welfare. See also Broom, 2017.

[182] Rayment et al. See also the CBA study, p 89, from which follows thatthe effects of training varies between the Member States due to differences in implementation of training courses and examination procedures.

[183] Article 7(2) of the Killing Regulation.

between the Member States with regards to the percentage of professionals trained as well as the quality of information on legislation received during the training courses[184].

According to the study, while a high percentage of farmers, lorry drivers and slaughterhouse personnel had received up to date information on animal welfare (with the exception of lorry drivers in Spain and slaughterhouse personnel in Greece and Spain), many showed poor knowledge of EU animal welfare legislation associated with their professions. Furthermore, the study identified a lack of harmonisation in training activities for professionals and a lack of consistent assessment of the validity and efficiency of the certifications awarded at the end of the trainings.

Still, evidence points to a need for further training. For instance, in 2017, one-third (35%) of Danish livestock drivers had doubts regarding the fitness for transport of specific cows 'at least frequently', and only half of them could answer questions about fitness for transport correctly'[185]. Also, according to EFSA, the lack of appropriate skills among the staff is the origin of most (29 out of 30) animal welfare hazards that occur during slaughter, mainly in relation with stunning and bleeding[186].

This is confirmed by the evaluation of the EU Animal Welfare Strategy (2012-2015), concluded in 2021, according to which the need for continued training and education of personnel working with animals remains highly relevant[187]. This is also supported by a survey of Chief Veterinary Officers under the Finnish Presidency of the EU, where both the attitude and insufficient knowledge of operators and farmers were highlighted as the main reasons for lack of compliance.

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184 EDUCAWEL, p 46. The main obstacles for not attending courses vary from lack of help on the farm while the farmer is away, lack of financial support or even the irrelevance of the course to individual farmers' needs. The lowest percentages of farmers who have been trained in animal welfare were those working with laying hens.

185 M.S. Herskin, A. Hels, I. Anneberg, P.T. Thomsen (2017), 'Livestock drivers' knowledge about dairy cow fitness for transport – A Danish questionnaire survey', p. 64. t,

186 EFSA opinion (2020) on the welfare of pigs at slaughter. See also the CBA study, p 100.

187 EUAWS evaluation, p 26.

4.1.2 Efficiency

Costs

A cost-benefit study was performed in 2021-2022 to assess the costs and benefits of the EU animal welfare legislation for businesses, consumers and public authorities, regarding the dimensions animal welfare, environment and public health.

Due to limited data availability, hypothetical scenarios had to be established in order to approximate absolute values for changes in production costs. These hypothetical scenarios might not correspond to the real developments. They represent the best estimates that could be made based on several assumptions derived from the limited available literature[188].

The study shows that a direct costs of compliance with the EU animal welfare legislation occurred for businesses and public administrations. To note is that there is no evidence on the costs of implementing the Farm Directive, since its provisions are too generally formulated[189].

In terms of economic importance, only costs of compliance for businesses and administrative/enforcement costs of public authorities could be monetised[190]. Even though the available evidence does not allow to provide a full picture of costs incurred by concerned stakeholder groups in relation to the legislative requirements in place, it helps assessing the economic importance of the legislations for the different stages of the production process. For instance, according to the study's estimations, the direct costs of compliance account to about:

- 404,9 million EUR per year (i.e. 1,47% of an annual average pig production value) for the Pigs Directive.
- 35,8 million EUR per year (i.e. 0,26% of an annual average broiler meat production value) for the Broiler Directive.
- Between 23 million EUR and 49 million EUR per year (i.e. less than 0,11% of an annual average production value for the slaughterhouses) for the Killing Regulation.

The cost items that are included in direct compliance costs only include adjustment costs, as no charges or administrative costs for businesses could be found in the literature used in the CBA study[191]. A distinction has been made between "recurrent" costs (estimated to 40% of the total costs) and "one-off" costs, the latter being costs related to provision that require a conversion of housing systems. In the case of the Pigs Directive, the one-off costs for farmers

188 The cost calculations in the study do not cover the Directives in their entirety but only selected provisions. Hence, the total cost of compliance with the EU animal welfare legislation could not be estimated. National legislations and private standards introduced after the EU legislations came into force are not taken into account. The split into one-off costs and recurrent costs was not performed for each cost item individually but in a coarse approximation at the level of provisions.

189 The CBA study concludes that the Farm Directive has been linked to some administrative costs for farmers (record keeping, usually considered good practice and a norm in modern farming). However, while other implementation costs may have been generated by the Directive, e.g. to improve buildings, such changes have also been driven by other policies than animal welfare legislation (e.g. support to farmers to modernise and optimise their buildings and equipment) and as such are difficult to attribute to the Directive.

190 Costs for consumers could not be quantified, in particular because of a lack of coherent historical data.

191 CBA study, p 50.

are estimated to 157,6 million euro, while their recurrent costs amount to 247,3 million euro per year. In the case of the Laying Hens Directive, the recurrent annual costs for farmers is estimated to 152 million euro, while the one-off costs amount to 440 million euro per year[192].

These values have to be taken with utmost care, as they are based on average annual values, contain many assumptions, and are only one snapshot in time. Nevertheless, they show that the cost burden of improving animal welfare differed considerably between the different actors in the production process.

Clearly, the EU animal welfare legislation has led to **increased costs** and additional administrative burden. These costs are mainly borne by the farmers. For example, an interviewed organisation representing farmers has estimated that the Pigs Directive entailed an average cost of 300-350 euro per sow.

However, the situation as regards compliance costs differs considerably between the Member States. Not only are there differences in the implementation of common requirements, but some countries have more stringent rules which also must be complied with by those who want to operate on their markets.

In addition, **costs are also stemming from other policy areas**, such as environmental requirements. For instance, one interviewed organisation representing the meat trading industry estimates that the EU's Nitrate Directive (which prohibits the use of animal manure beyond a certain amount, which implies buying chemical fertilizers and using more soil) leads to an additional cost of 5 cent per pig kilo alive weight.

For farmers, the costs of compliance with the EU animal welfare legislation stem from infrastructural and/or equipment adaptations/substitutions, reduction of stocking densities, extra materials (e.g. feed), labour (e.g. need for extra staff, training), administration (e.g. paperwork and record-keeping), transaction costs (e.g. information gathering on legislation; coordination with other farming activities and legislations). According to the CBA study[193], the main compliance costs for pig farmers are related to manipulable materials for weaners and rearing pigs, while for poultry farmers, the largest compliance costs were related to the ban on unenriched cages for laying hens. The Pigs Directive, the Laying Hens Directive and the Calves Directive (although only for veal production) implied structural changes (ban of gestation and veal crates, ban of unenriched cages)[194].

The Broilers Directive implied a fundamental change in the principle of animal welfare regulation by introducing the systematic monitoring of animal-based indicators at slaughterhouses but cost estimates for this particular provision are scarce and the available studies suggest that costs might have been limited. At the farm level, the Broilers Directive led to mostly incremental changes[195]. According to one interviewed pan-European organisation representing the poultry sector, the production costs per kilo of live bird have increased by 2-3% due to the reduction in stocking densities required by the Broilers Directive.

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192 Ibid, p 50 and p 63.
193 Ibid, p 49 and p 63.
194 Ibid p 16.
195 CBA study p 109.

In 2010, the additional cost imposed on the livestock sector by the EU animal welfare standards were estimated at around 2% of the overall output of this sector, most of which derived from the transport sector[196][197].

For **animal transports**, the main compliance costs are the recurrent costs related to the drawing up and keeping of transport and planning information. Due to lack of data, for the Transport Regulation, no percentage of compliance costs in relation to economic importance could be estimated in the cost-benefit study. In a study from 2010, however, the Transport Regulation was estimated to impose costs as high as 1 726 million euro annually[198]. The available limited evidence suggests that costs to public authorities (inspection costs) have increased in the range of 5 % to 15 % due to the Transport Regulation[199]. According to a study from 2011, the Transport Regulation increased the administrative costs for Member States' competent authorities as well as for transport companies. While no reliable evidence was available on the additional administrative costs for the authorities, they were estimated to 25 euro per journey, 515 euro for transporter authorisation and 26 euro per certificate of approval for a vehicle. Since these costs were mainly labour costs, they differed between Member States[200].

Although considerable savings of administrative cost for transport operators are conceivable through the use of digital tools, this potential seems largely unused up to date[201]. It has been suggested that an online database for registration of transport of animals could yield cost savings of 627 million euro[202]. The use such a system would also allow collecting reliable data on the state of compliance of operators in the Union and allow addressing enforcement weaknesses in a more efficient way, compared to today's system which is mainly paper based.[203]. The potential of potential of digitalisation as a tool for reducing burdens also for farmers and slaughterhouse operators as well as competent authorities could be further explored.

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196 Rayment et al. There was limited evidence of the economic impact of new EU legislation on the sectors affected, and in particular whether these costs affect economic sustainability by causing a loss of output or employment at EU level. The scale of economic impacts depends on supply and demand conditions, variations in market protection for agricultural products, and the significance of animal welfare compared to other costs and business drivers. While some claims of adverse economic impacts had been made by industry, there was little independent evidence that animal welfare policies have affected the economic sustainability of the sectors concerned.

197 Inspection costs for the Member States' competent authorities, to ensure compliance with the legislation, were then estimated to 2,8 million euro per year for the Laying hens Directive, 8,2 million euro per year for the Pigs Directive and 9,6 million euro per year for the Calves Directive.

198 Rayment et al.

199 CBA study p 90.

200 W. Baltussen et al (2011), Study on the impact of Regulation (EC) No 1/2005 on the protection of animals during transport, p 20.

201 CBA study p 87 and p 90. For instance, digital route planning is considered to have a potential to yield economic benefits.

202 Conclusions of the European Commission High Level Group of Independent Stakeholders on Administrative Burdens (the "Stoiber Group"), presented in Rayment et al.

203 Rayment et al, p. 30. However, one interviewed industry member pointed out that despite 'the introduction of more electronic based systems there is still an additional burden of keeping paper records for inspection at a later date'

For slaughterhouses' costs of compliance, there is very little evidence, but the main inspection costs for the competent authorities to verify compliance with the Killing Regulation are due to the setting up of national reference networks and the certification of its staff (the latter partially recovered from slaughterhouses via fees)[204]. Costs due to the Killing Regulation are considered limited compared to the output of the sector[205]. However, the waterbath stunning electrical parameters that ensure effective stunning are associated with more haemorrhages and therefore less revenues for the operator. There can thus be a trade-off between animal welfare and economics.[206].

The EU animal welfare legislation contains several exemptions of relevance for **small and medium sized companies (SMEs)**. In addition to the exemption from the Laying Hens Directive and the Broilers Directive for smaller holdings, described in footnote 22, the Transport Regulation only partially applies to the transport of animals carried out by farmers themselves. And the Killing Regulation exempts e.g. small slaughterhouses from the requirement of having an animal welfare officer.

It follows from the recent study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use that it is difficult to state that introducing new animal welfare requirements for pigs and laying hens have had any effect on the size of farms[207]. This seems to suggest that the negative impact on SMEs, at least in those sectors, has been very limited.

However, as explained above, evidence from Commission audits in the Member States suggest that certain provisions in the Killing Regulation are disproportionally burdensome for smaller slaughterhouses. Areas for simplification were identified in the targeted survey (the main one being rules on monitoring and registration, suggested by 24%, or 10 out of 41, of the respondents). However, the majority of respondents (54% - 22 out of 41) did not consider that the Killing Regulation could be simplified for SMEs without compromising the standards of animal welfare. And while a vast majority of business organisations responding to the public consultation (65% - 428 out of 660) consider that the current EU animal welfare rules are disproportionally burdensome and/or costly for SMEs, that view was only shared by 30% (25 out of 83) of the public authorities and 16% (8 624 out of 54 611) of the EU citizens.

In order to reduce costs and administrative burden, the Killing Regulation exempts workers who have three years' experience from its training requirements. However, some of its other provisions, such as the requirement of recording the electrical parameters for head only

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204 Ibid, p 86 and p 100.

205 Ibid. The Killing Regulation (which was then not yet applicable) was expected to increase cost up to 23 – 49 million annually.

206 CBA study p 101. The electrical parameters that ensure effective stunning are associated with more haemorrhages and therefore less revenues for the operator.

207 AGROSYNERGIE EEIG (2022), Study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use, p 37.

stunning, could be considered as unpractical and disproportionate for small slaughterhouses, where staff is limited[208].

Concerning animal welfare related **inspection cost**s more in general (for which fees may be collected), in the targeted survey Member States indicated that the requirements most costly to enforce for competent authorities are those related to administration (21% - 3 out of 14) and to infrastructure (14% - 2 out of 14).

Benefits

While many potential benefits for the animals, consumers, the environment or public health could be identified and linked to the implementation of the current legislation, due to lack of animal-related indicators, or clear evidence on what had been achieved in practice, these benefits may not be quantified and safely attributed to the change in animal welfare legislation[209].

Still, evidence suggests that an improved welfare of animals, to which the EU legislation contributes, has ethical benefits, but also brings several other (economic, social) benefits for farmers, such as higher productivity[210] and product quality[211], (savings due to) lower use of antibiotics and lower incidence of injuries and chronic diseases (such as mastitis). Further benefits include enhanced ecosystems services, reduced green gas emissions, better public health (less incidence and spread of animal-born diseases and antimicrobial resistance[212]), better working experience for staff (job satisfaction[213], pride, work safety[214]), and improved sectoral image[215].

For instance, one interviewed industry organisation estimates that the Pigs Directive has increased the yield of pig production by 1% and considers that there has also been an increased job satisfaction and work safety for farmers. According to one interviewed industry organisation, higher meat quality has led to 5 % increase in sales volumes for pig meat.

Costs versus benefits

In the targeted survey, around a third of the respondents could not provide an answer on whether the **costs of compliance** with the EU animal welfare legislation are outweighed by

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208 Overview Report (2015-7213) 'Animal welfare at slaughter in Member States (2013-2015)'

209 CBA study, p 16.

210 J.N. Fernandez et al (2021), 'Costs and Benefits of Improving Farm Animal Welfare', MPDI Agriculture.

211 CBA study, p 89.

212 Commission report (COM (2018)181 final) on the application of the Broilers Directive, from which it follows that the need to use antimicrobials (other than coccidiostats) for treating common conditions has been substantially reduced, or avoided altogether, in those Member States which have a strong focus on welfare, health and hygiene issues.

213 Commission Overview Report (2016-6001) on Educating Professionals on Animal Welfare, p 6. Slaughterhouse workers with no previous formal training, examinations, or certificates, benefited from a sense of achievement by being certified as competent, in accordance with the Killing Regulation.

214 CBA study p 67 (e.g. the limits for ammonia levels in ambient air, laid down in the Broilers Directive).

215 Ibid, p 76 (reputation of veal farming has improved).

the benefits. Of those that did reply, a majority considered that the benefits for slaughterhouses (54% - 13 out of 24) and retailers (67% - 16 out of 24) outweigh the costs. For farmers and transporters the opinions are more split, with somewhat less than half of the respondents considering that the benefits outweigh the costs.

In the public consultation, a vast majority (72% - 476 out of 660) of the companies/business organisations and business associations who responded to the public consultation believed that abiding by (certain) animal welfare requirements set in EU rules are (too) burdensome and costly for producers (e.g. farmers).

These costs should also be seen in relation to the **costs of non-compliance**. An interviewed consumers' organisation considers that the benefits of the EU animal welfare legislation is higher than the costs, since the negative impacts on non-compliance are also costly and should not be underestimated. For instance, meat rejections in slaughterhouses due to bad animal welfare (resulting e.g. in skin lesions, bruises or abscess in limbs or defect in meat maturation – PSE/DFD meat) is estimated to represent 43% of the profit margin for the producers and poses a serious threat to the viability of pig farms in Ireland[216].

It follows from the cost-benefit study that, since consumers frequently emphasise that animal welfare is of high importance, any legislative improvement in animal welfare may be considered beneficial for them. However, studies also show that consumers do not consider the current level to be sufficient. Hence, consumers' actual benefits from the studied legislative changes are likely rather limited[217].

Interviewed industry organisations jointly consider that, while the consumers' interest for animal welfare has increased in later years, the **market return** is still not sufficient to recover investments made in animal welfare (because consumers are not aware of the standards under which their food is produced, and that price is the most important factor for their food choices)[218]. According to an interviewed pan-European organisation representing farmers, the costs of compliance with current EU animal welfare requirements has resulted in an increase in consumer prices of 1,0% or 1,2%.

It should be noted, though, that the situation is different in different Member States. For example, regarding commercial rabbit farming, market demands have been the driver behind the development of different production methods. The Netherlands and Hungary use cage-free system, in spite of this not being a legal requirement in their country, as a way to access external markets that demand higher animal welfare during production (e.g. Belgium, Germany and Switzerland)[219].

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216 S. Harley et al (2014), 'Docking the value of pigmeat. Prevalence and financial implications of welfare lesions in Irish slaughter pigs', Animal welfare (South Mimms, England) 23(3), pp 275-285

217 CBA study p 108. The same holds for environment and public health. Some small positive benefits could be detected, but the relationships were vague and not quantifiable.

218 E. Majewski et al (2012), 'Cost-effectiveness assessment of improving animal welfare standards in the European Agriculture'. International Association of Agricultural Economics' Triennial Conference, Brazil. See also Rayment et al. (2010).

219 Commission Overview Report (2017-6303) on Commercial Farming of Rabbits in the European Union.

Stakeholders concerns for a lack of market return were also identified in the impact assessment for the EU Animal Welfare Strategy in 2012. However, according to the recently published study on animal welfare labelling, there is evidence that consumers are willing, up to a certain extent, to pay a higher price for animal welfare compared to a standard product, and that their willingness to pay may be maximised through an information campaign, combined with animal welfare labelling[220].

Furthermore, while the effects of animal welfare requirements are indeed not easily quantifiable or translated financially[221], it has been suggested that the socioeconomic impact of the EU animal welfare legislation seems limited and/or has been compensated in medium/long term[222]. It has also been suggested, although evidence collected is limited, that the costs of implementing the animal welfare legislation were, in general, justified given the positive impacts they had[223].

This seems to be confirmed by the CBA study, whose overall assessment is positive,[224], and by the recent CAP study according to which the implementation of new animal welfare requirements did not impact the economic viability of laying hen and pig farms[225]. In fact, the EU animal welfare legislation seems to have a very limited effect on the competitiveness of EU food business operators. Instead, differences in production costs seem mainly driven by "productivity, land and labour cost and feed price"[226]. Hence, it would seem that the objective to ensure the viability of the food production system has been achieved.

4.1.3 Coherence

Under the coherence criterion, it has been assessed whether/to what extent the different components of the legislation operate well together to achieve the given objectives (*internal coherence*). The assessment allows identifying synergies and complementarities which increases effectiveness; or contradictions which affect the way the policy area delivers. It has also been explored whether the animal welfare legislation is coherent with other relevant EU legislation, relevant initiatives taken in third countries and international organisations (*external coherence*).

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220 M. Maestre et al (2022), Study on animal welfare labelling.

221 M.S. Dawkins (2016), 'Animal welfare and efficient farming: Is conflict inevitable?' Animal Production Science, 57(2), 201–208. See also Farm Animal Welfare Committee (2011) 'Economics and Farm Animal Welfare', and J.N. Fernandes et al. (2021) 'Costs and Benefits of Improving Farm Animal Welfare', Agriculture, 11(104), 1–14. These benefits are neither quantifiable nor safely attributed to the changes in the EU animal welfare legislation (CBA study p 107).

222 Rayment et al 2010 and Menghi et al (2014),

223 EPRS,2021. The conclusion is based on desk research and interviews of stakeholders at EU and national level in a sample of 11 Member States.

224 CBA study p 16. The overall assessment is positive as it is considered that an EU-wide minimum standard was established - even if some challenges remain concerning the level of animal welfare, harmonised implementation and enforcement. While not all animal welfare issues could be eliminated with the current EU legislation, it has at least offered protection against a deterioration of the animal welfare situation by setting a minimum legislative standard.

225 AGROSYNERGIE EEIG (2022), Study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use, p 45.

226 Menghi et al (2014).

4.1.3.1 Internal coherence

Overall, evidence suggests that the EU legislation on the welfare of farmed animals is coherent[227][228]. The various components of EU animal welfare legislation are broadly complementary, mutually supporting and consistent. There is limited evidence of incoherence in and between EU Directives and Regulations on animal welfare[229].

However, in the targeted survey, only around half (49 %, or 20 out of 41) of all respondents replied that the provisions contained in current EU animal welfare legislation are consistent with each other and that there are synergies between the different areas of welfare.

Some inconsistencies are also mentioned in the literature, namely the mismatch between legislative intents and concrete practices and between certain legal requirements and the effective welfare of animals[230]. For example, according to the Pigs Directive, pigs must be allowed to express their exploratory behaviour and have access to an environment meeting their physical activity needs. Yet, the directive allows confinement in individual cages for certain categories of animals[231]. Other examples of cases where general animal welfare principles of avoiding pain and suffering conflict with the specific legislation are the mutilations of pigs (castration, tooth grinding, etc., all of this without anaesthesia).

Another example is the Farm Directive. It states that *'no animal shall be kept for farming purposes unless it can reasonably be expected, on the basis of its genotype or phenotype, that it can be kept without detrimental effect on its health or welfare'*. Despite this, many genotypes and phenotypes have been selected which have negative welfare consequences, such as laying hens with a high rate of keel-bone fractures because they are too small compared to their eggs and lay too early[232].

These inconsistencies show the inherent tension between animal welfare principles and their practical implementation. This tension is mainly due to a compromise between societal expectations and business operators' interests, which varies overtime.

4.1.3.2 External coherence

While no major conflicts with other EU policies have been identified, evidence demonstrates certain tensions and differences[233], which are further elaborated upon below. In particular, stakeholders advocated for a better integration between animal welfare legislation and international trade policy, aquaculture policy and agriculture policy[234]. Also, in the targeted

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227 Rayment et al.
228 Commission study on the Impact of Animal Welfare International Activities (2017).
229 EPRS, 2021.
230 Ibid.
231 Ibid.
232 Regulation (EU) 2016/1012 on zootechnical and genealogical conditions for the breeding, trade in and entry into the Union of purebred breeding animals, hybrid breeding pigs and the germinal products thereof (OJ L 171, 29.6.2016, p. 66–143) does not contain any rules on that, apart from a reference to animal welfare in a recital.
233 EPRS, 2021.
234 EPRS, 2021.

survey, only 12% (5 out of 41) of stakeholders agreed that the current EU animal welfare legislation is consistent with other EU policy areas.

EU animal health legislation[235] recognises the link between animal health and animal welfare. The rules designed to prevent and control animal diseases are to be implemented by taking into account animal welfare (including the sparing of any avoidable pain, distress or suffering).

The fact that the EU animal welfare and animal health legislations were developed in a coherent and complementary way can be illustrated by the provisions on depopulation of the Killing Regulation. These ensure that, when a group of animals are culled for animal health reasons (due to an outbreak of a contagious disease), this is done in respect of animal welfare rules. In addition, the protection of animal health is also one of the objectives of the Transport Regulation and potential tensions have been directly solved by the legislator (see e.g. recital 13 on specific measures safeguarding the health and welfare of animals when resting at control posts, to avoid the spreading of contagious diseases).

Some representatives of national farmers' organisations for the pig and poultry sectors have argued that there were certain tensions. For instance, it was claimed that enrichment material for pigs such as straw or wood would pose some African Swine Fever or contamination risk from wild boars, or phasing out cages would bring more risk from the point of view of Avian Influenza. However, this is not supported by evidence as these welfare requirements can be easily combined with the necessary biosecurity measures. For examples, no increases in influenza outbreaks have been observed in poultry farms with alternative systems (i.e. without cages) compared to farms using enriched cages (i.e. in case of avian influenza outbreak, free range and organic hens have to be kept indoor in line with biosecurity measures). And, as pointed out by an interviewed pan-European organisation representing veterinarians, biosecurity measures are taken in a particular situation, in which such procedure is normal, and cannot be considered as an inconsistency per se.

The EU animal welfare legislation is broadly coherent with the EU animal health legislation[236]. Even though some stakeholders called for greater integration[237], evidence suggests that the areas of current EU animal welfare legislation where cages are banned (i.e. for a large part of pigs and calves' lives) consistently complemented animal health rules.

Regarding transport, the **social regulation for drivers** provides[238] for resting times for drivers that are different from those provided for animals in the Transport Regulation. These

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235 Regulation (EU) 2016/429 on transmissible animal diseases and amending and repealing certain acts in the area of animal health. Recital 7: This Regulation does not contain provisions which regulate animal welfare. However, animal health and welfare are linked: better animal health promotes better animal welfare, and vice versa. When disease prevention and control measures are carried out in accordance with this Regulation, their effect on animal welfare, understood in the light of Article 13 of the Treaty on the Functioning of the European Union (TFEU), should be considered in order to spare the animals concerned any avoidable pain, distress or suffering." (OJ L 84, 31.3.2016, p. 1–208).

236 Regulation (EU) 2016/429 on transmissible animal diseases

237 EPRS, 2021.

238 Regulation (EC) No 561/2006 on driving times, breaks and rest periods for drivers, Directive 2002/15/EC on the organisation of the working time of persons performing mobile road transport activities, Directive

requirement are difficult and costly to reconcile[239]. For the sake of the animals, the length of the journey should be minimised, while drivers need to rest and sleep. According to Regulation (EC) No 561/2006, the daily driving time may not exceed 9 hours, but may be extended to maximum 10 hours not more than twice during the week. On the other side, the Transport Regulation allows transporting animals for long journeys under certain conditions – up to 19 hours for young animals, 24 hours for horses and pigs and 29 hours for adult bovines. Therefore, while these provisions are legally compatible with each other, the requirement to minimise the animals' journey implies that there should be more than one driver for journeys of more than 9 hours, which generates additional costs. This is an area where a higher level of coherence is expected by stakeholders, including NGO's.[240] [241]

The **Common Agricultural Policy** (CAP) provides a number of measures and instruments with a potential effect on animal welfare such as: 1) the cross compliance scheme[242], 2) the marketing standards for egg production, 3) the rural development legislation which has specific animal welfare related measures and financial instruments, and 4) the rules on organic farming[243].

To some extent, in the 2014-2020 period, the CAP instruments and measures contributed to Member State promotion of animal welfare, depending on the implementation choices. In particular, specific rural development measures for animal welfare was the most effective for improving animal welfare as it could be used to foster a set of coherent practices (involving housing conditions, feeding, enhancement of natural behaviour and/or health management practices)[244]. As for the marketing standards for eggs, the rules for indicating the farming methods applied for laying hens (Regulation (EC) No 589/2008), have to some extent contributed in promoting animal welfare friendly production methods for eggs, and alternative uses of egg production in the EU.[245] [246] [247]

2006/22/EC enforcing social legislation relating to road transport activities, Regulation (EU) No 165/2014 on tachographs in road transport.

239 One of the stakeholders interviewed (FVE) stressed that 'the amount of hours allowed for animal transport and for drivers are not compatible'. In the case C-469/14 Masterrind, the European Court of Justice stated that resting periods between movements may, in principle, be longer than one hour (the minimum intermediate resting period for transporting bovine animals) as long as they do not constitute a risk of injury or undue suffering for the transported animals. The ruling also indicates that the periods of movement may include one or more stopping periods as long as the time length of these stops is counted in the overall travel time allowed for the animals". The practical solution today would be to use two drivers per transport, which has economic consequences for the business operators.

240 Animals' Angels (2021), '100 Reasons to revise the Transport Regulation'.

241 A similar example is the transport of animals used for scientific purposes. There, the Transport Regulation hampers the implementation of Directive 2010/63/EU, since certain of its provisions seem difficult, albeit not impossible, to reconcile with the principles of reduction and refinement, enshrined in the Directive.

242 Compliance with e.g. EU animal welfare requirements is a precondition to receive CAP financial support.

243 However, the CAP is not expected to reduce the cost of implementation of the EU animal welfare legislation, as CAP payments can only be made if there is proof of an investment or a practice going beyond the EU animal welfare requirements.

244 AGROSYNERGIE EEIG (2022), Study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use, p 37.

245 Commission Staff Working Document (SWD(2020)230 final) on the evaluation of marketing standards (contained in the CMO Regulation, the 'Breakfast Directives' and CMO secondary legislation)

In most Member States/regions studied, the cross-compliance scheme was effective in influencing farmers' practices, especially in Member States and regions where animal farms do not yet fully meet the requirements of the EU directives on animal welfare.

As a whole, the CAP appears to have helped improve animal welfare locally, in specific sectors and/or Member States and regions, depending on the implementation choices. However, the overall effect is not significant, as only a limited number of successful cases were identified. And while the CAP instruments and measures have the ability to contribute to animal welfare, the extent to which this has been the case varies across the EU depending on Member States' and Regions' implementation choices for direct payments and rural development programmes. Member States having stricter national rules than EU ones (Denmark, the Netherland, Austria, Finland and Sweden) tended to make more use of these instruments to reach animal welfare objectives[248].

Many animal welfare problems are linked to highly intensive farming systems. However, the sectors that use the most intensive farming systems (pigs, poultry, rabbits, and to a certain extent dairy cows) are usually not the main beneficiaries of the CAP measures. These sectors are not sufficiently addressed by the CAP measures targeting welfare aspects[249].

Animal welfare issues can arise from intensive indoor production systems. i.e. systems with animals in high stocking density, when increased pressures on animals are not managed properly (unbalanced diet, use of rapid-growth breeds, use of antimicrobial group treatments, inappropriate flooring and manure management, mutilations, etc.). Such intensive indoor systems are often not subject to cross-compliance as they are not eligible to direct payments. [250]

As concluded in the evaluation of the EU Animal Welfare Strategy (2012-2015), there is a clear need to further optimise synergies with the CAP for the period 2021-27 and to make better use of the instruments offered by it to strengthen CAP beneficiaries' awareness on animal welfare requirements, to improve animal welfare standards in animal husbandry, and to mainstream them into the regulatory framework governing agricultural activities[251].

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246 Regarding labels, according to a Eurobarometer survey carried out in 2016, 52% of Europeans look for animal welfare labels when shopping. Yet, one in ten Europeans does not know that these labels exist, and only a third of EU respondents consider the information on animal welfare available to consumers sufficient for them to choose products accordingly (see M. Maestre et al, , p. 16).

247 According to a 2019 Eurobarometer survey, animal welfare 'features amongst the most important determinants influencing purchasing decisions of European consumers, weighting as much as environmental concerns and religious beliefs (19%) (even if with significant variations across Member States). However, origin (53%), cost (51%), food safety (50%), taste (49%) and nutritional content (44%) are far more important for consumers.' (EPRS, , 2021).

248 AGROSYNERGIE EEIG (2022), Study on CAP Measures and Instruments Promoting Animal Welfare and Reduction of Antimicrobials Use. Only 34 out of 118 rural development programmes (20 regional and 14 national) across 17 Member States had programmed the measure specifically oriented towards animal welfare (M14) over the 2014-2020 period.

249 Ibid.

250 The study recommends that generally, eligibility criteria must be set to ensure that investments in animal husbandry holdings enable improvement in animal welfare conditions, and suggests that EU legislation could be complemented on this aspect.

251 EUAWS evaluation, p 71-72..

In other words, the challenges identified in improving animal welfare are not always targeted by Member States with CAP instruments/measures. This is reflected in views expressed by interviewed NGO's, who consider that the available subsidies under the CAP have not been fully exploited by Member States to take some of the economic burden off from producers[252]. In the targeted survey, only 9% (1 out of 11) of the business and professional organisations, and 14% (2 out of 14) of Member States, consider that there are inconsistencies between the EU animal welfare legislation and agricultural policy[253].

The relationship between animal welfare and **EU environmental policy** (as part of a sustainable food system, addressed in the European Green Deal), is complex. Literature suggests that EU animal welfare legislation has in general avoided conflict with environmental policy[254]. However, at a time when reducing greenhouse gas emissions is becoming a major challenge[255], it is necessary to further reinforce the relationship between animal welfare and the environment to contribute even more to a sustainable food production system.

Farmers and competent authorities seem to disagree on the extent to which the animal welfare legislation is coherent with environmental policy for instance as regards carbon and other emissions and their negative impact on climate and the environment[256].

However, there are areas in which animal welfare and environmental protection go hand in hand, for instance with 'open range, pasture based systems supporting reduction in ammonia and contributing to biodiversity'[257][258][259].

Furthermore, lower density production systems, such as the organic laying hen systems, are overall consistent with environmental policies, despite some tensions concerning the land use[260]. If properly managed, livestock production contributes to enhanced ecosystems services, improved soil health and less air and water pollution[261]. Notably, animal housing and in-house manure management aspects offer synergy opportunities for animal welfare and air pollution reduction measures (ammonia, methane). Stricter animal welfare rules with regard to reduced livestock density, increased access to outdoor/grazing time, manure

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252 The subsidies under the CAP has not been exploited, to take some of the economic burden off from producers.

253 Similar views were expressed by Member States: Only 14% (2 out of 14) considered that there are inconsistencies between the EU animal welfare legislation and agricultural policy, while for environmental policy the number was 29% (4 out of 14).

254 Menghi et al. (2014), Broom (2017) and Rayment et al. (2010).

255 GRAIN and the Institute for Agriculture and Trade Policy (2018), 'Emissions impossible, How big Meat and Dairy are Heating up the Planet'.

256 EPRS, 2021, p 69

257 EPRS, 2021, p. 69.

258 The Dutch national competent authority recommends pasture access to animals in order to reduce ammonia emissions..

259 J. Pykälä (2000), 'Mitigating human effects on European biodiversity through traditional animal husbandry', Conservation Biology, , 14(3):pp 705-712.

260 E. Kollenda, , et al, A. (2020), ,'Transitioning Towards Cage-Free Farming in the EU: Assessment of environmental and socio-economic impacts of increased animal welfare standards'., pp. 25-26.

261 Menghi et al (2014), S.E. Place (2018), 'Animal welfare and environmental issues'(in J. A. Mench (Ed.), Advances in Agricultural Animal Welfare: Science and Practice, pp. 69–89), and L. Van Woensel & J. Tarlton, J. (2017), 'What if animal farming were not so bad for the environment?', Strategic Foresight, EPRS.

management/cleanliness requirements and indoor air quality requirements will have positive impact not only on the welfare of livestock but also contribute to the clean air objectives and reduced air pollution impact on human health and the environment.

No conclusive evidence has been found for synergies between the environmental policy and the EU animal welfare legislation on the transport and killing of animals. However, a point of complementarity has been suggested, linked to the issue of short versus extended supply chains since the Transport Regulation requires that animals' journey times are as short as possible[262].

If improved animal welfare standards appear to conflict with environmental objectives, it is mainly based on the assumption that consumption of animal products would remain unchanged. It is, however clear that a transition to more sustainable food systems cannot be envisaged without changes in food consumption partners.

As for the **EU trade policy**, unlike health standards, EU animal welfare standards do not apply systematically to imported products. Animal welfare measures are considered to be non-product related process and production methods. Under the WTO rules, it is only possible to apply non-product related process and production methods to imports subject to certain conditions. In particular the measures must be non-discriminatory and necessary to achieve a legitimate objective[263]. The case-law has confirmed that an animal welfare-related ban on import of certain products (namely seal products) could fall under the public morals exemption in the GATT (Article XX a).

EU animal welfare standards are among the highest in the world[264], but only EU standards at the time of slaughter[265] apply to imported products. Meat imported into the EU has to come from animals slaughtered under conditions equivalent to those prescribed in the Killing Regulation. The animal welfare requirements are incorporated into the import certificates and the veterinary authority of the country of origin has to certify them together with the animal and public health requirements[266]. There are instruments to ensure the compliance with this requirement, in particular the Commission's audits in third countries exporting to the EU. During the period 2017-2021, 21 such audits took place. Recommendations pertaining animal welfare were made in 42% (9 out of 21) of the above audits, showing the Commission's commitment on this matter. Those being the only applicable standards to imported products,

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262 Kollenda et al. (2020). Specifically, transport requirements and associated GHG emissions, including those associated to feed production (both in Europe and in the rest of the world), imply significant environmental costs. In this regard, the quantity of feed and the scale of imports, as well as the distance and the transport type, are important parameters when assessing the extent of the environmental impact of animal transportation. To note is that transports of carcasses, instead of meat, would result in GHG emissions as well.

263 Commission report on the application of EU health and environmental standards to imported agricultural and agri-food products (COM(2022) 226 final).

264 However, several countries such as New Zealand, Australia and Switzerland have modern and advanced animal welfare requirements, sometimes even going further than EU standards (e.g. Australia's requirements for the export of live animals).

265 Article 12 of Regulation (EC) No 1099/2009 on the protection of animals at the time of killing.

there is room for a greater integration between EU animal welfare rules and the EU trade policy.

So far, in bilateral trade negotiations, the EU has chosen to promote enhanced cooperation with trade partners rather than using unilateral measures. Provisions on cooperation on animal welfare have been included in the following agreements: EU-Chile (2002) [267], EU-Korea (2011) [268], EU-Co-Ec-Pe (2012)[269], EU-Central America (2012) [270], EU-Canada CETA (2017) [271], EU-Japan EPA (2019) [272], EU-Singapore (2019) [273], EU-Mexico (2020) [274] and EU-New Zealand (2022)[275].

Since the EU-Chile agreement provided for a working plan to develop animal welfare norms of interest of the Parties, Chile developed its national legislation in line with the EU (Animal protection law, Regulation on protection of the animals during transport, Regulation on animal protection during the slaughter, Regulation on animal protection at intensive production, marketing and in other place of holding animals). Furthermore, the future EU-Mercosur agreement, EU-Chile modernised agreement and the revision of the EU-Mexico trade agreement will recognise that animals are sentient beings, which a first step towards improving animal welfare.

The EU has association agreements with Eastern European countries such as Georgia[276], Moldova[277] and Ukraine[278], which contain 'approximation' articles by which the countries commit to approximate/align their legislation on SPS (including animal welfare) to that of the

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266 Commission Delegated Regulation (EU) 2020/692, repealing Commission Decision 2007/777/EC laying down the animal and public health conditions and model certificates for imports of certain meat products.

267 Agreement establishing an association between the European Community and its Member States, of the one part, and the Republic of Chile, of the other part (OJ L 352, 30.12.2002, p. 3–1450).

268 Free Trade Agreement between the European Union and its Member States, of the one part, and the Republic of Korea, of the other part (OJ L 127, 14.5.2011, p. 1–1426).

269 Trade Agreement between the European Union and its Member States, of the one part, and Colombia and Peru, of the other part (OJ L 354, 21.12.2012, p. 3–2607).

270 Agreement establishing an Association between the European Union and its Member States, on the one hand, and Central America on the other (OJ L 346, 15.12.2012, p. 3–2621).

271 Chapter 21 of CETA lays out the framework for regulatory cooperation activities, including the establishment of a Regulatory Cooperation Forum.

272 Agreement between the European Union and Japan for an Economic Partnership (Agreement between the European Union and Japan for an Economic Partnership).

273 Free trade Agreement between the European Union and the Republic of Singapore (OJ L 294, 14.11.2019, p. 3–755).

274 EUAWS evaluation 2021.

275 Free Trade Agreement between the European Union and its Member States, of the one part, and New Zealand, of the other part (negotiations concluded on 30/06/2002).

276 Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part (OJ L 261, 30.8.2014, p. 4–743).

277 Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Moldova, of the other part (OJ L 260, 30.8.2014, p. 4–738).

278 Association Agreement between the European Union and its Member States, of the one part, and Ukraine, of the other part (OJ L 161, 29.5.2014, p. 3–2137).

EU. This means that these countries are expected to approximate to the full EU acquis on animal welfare including for their domestic production and exports to other parts of the world.

More recently, and for the first time, the EU made tariff liberalisation conditional to compliance with EU standards; in the concluded but not yet ratified EU-Mercosur trade agreement, duty free access for certain categories of eggs has been granted to Mercosur countries subject to compliance with EU rules on the welfare of laying hens, in particular the requirement of enriched cages.

Despite the costs imposed on EU producers (see section 4.1.2), animal welfare standards appear to have had only a limited impact on the competitiveness of EU producers on the EU market taking into account existing import requirements (differences in production costs seem mainly driven by productivity, land and labour cost and feed price, rather than by animal welfare requirements)[279]. However, for eggs and egg products, there is some evidence suggesting that the differences in animal welfare standards could cause trade diversion and product relocation[280]. As for the trade of live animals, the Transport Regulation does not seem to have had any significate impact. TRACES data show that the historic trend of increasing international trade of live animals continued after the implementation of the Transport Regulation[281].

The EU has inspired and supported the creation and implementation of the **OIE standards and recommendations** on animal welfare[282] [283]. The EU animal welfare legislation is mostly, but not entirely in line with these standards and recommendations. For instance, in the case of animal transport, EU requirements are stricter and more detailed (on space allowances, maximum journey times, resting times, resting facilities, additional standards for vehicles, standard for livestock vessels, etc.). On the contrary, concerning fish welfare, the OIE standards on stunning and killing of farmed fish for human consumption are sometimes stricter than the EU requirements[284].

Evidence suggest that EU activities carried out with international organisations such as the OIE have promoted the EU model on animal welfare in a high number of non-EU countries, and that bilateral cooperation has improved the welfare conditions of farmed animals in some non-EU countries and facilitated the implementation of EU import requirements on animal welfare standards at the time of killing[285].

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279 Menghi et al (2014).

280 Commission report (COM(2018)42 final) on the impact of animal welfare international activities on the competitiveness of European livestock producers in a globalized world.

281 Baltussen et al (2011), p 20.

282 Unlike the OIE's animal health and veterinary public health standards, the OIE's animal welfare standards are not recognised in the WTO SPS Agreement. Nonetheless, as science-based international standards adopted by the OIE World Assembly of Delegates, they are the internationally recognised standards for animal welfare.

283 COM(2018)42 final: "The EU has played a pivotal role in promoting and supporting OIE activities. In particular, the EU has been a major contributor to the OIE standards setting process and has been proactive in fostering active participation by several non-EU countries." "The Commission has also played a key role in the implementation of OIE standards in non-EU countries, in particular on animal welfare at slaughter and during transport."

284 R. Schrijver et al (2017), 'Welfare of farmed fish: Common practices during transport and at slaughter'..

285 COM (2018)42 final.

4.2 How did the EU intervention make a difference?

Evidence from literature and stakeholder interviews suggest that the EU is the right level of intervention and objectives could not reasonably be better achieved at national level[286]. For instance, in relation to welfare of laying hens, the technical and scientific experience from Sweden on enriched cages could be disseminated to all Member States thanks to the intervention at EU level by adopting the Laying Hens Directive[287].

According to one of the professional organisations interviewed, EU animal welfare legislation has contributed to the protection of farmed animals and a better functioning of the EU market 'because if the EU would have not stepped in, every country would have its own legislation'. And some Member States may not have adopted legislation at all, for instance to protect the welfare of calves.

This would have reasonably resulted in distortions of competition and unequal levels of welfare[288]. The EU animal welfare legislation is considered to have served as a "safeguard" against negative developments that could have occurred over time if the legislation had not been adopted[289]. The EU legislation has provided a certain level of harmonisation between Member States and therefore contributed to more equal conditions for operators, leading to some convergence across the EU in increasing animal welfare in a comparable manner.

Moreover, stakeholders at the EU level and at the national level agreed that the EU Directives on welfare at farm level (and in particular the species-specific Directives) 'have provided the drive to progress on a range of issues that many Member States lacked individually'[290] in particular because the political incentives were missing at national level. For instance, one interviewed pan-European producers' organisation expressed the following: "Harmonising the legislation is a positive measure for farmers because all operators know that they are not alone, they all operate under the same rules and that prices are the same for all, regardless of the Member States they are established in".

Interviews with representatives from national authorities suggest that, although certain Member States support possible changes to the legislation to increase animal welfare on-farm, they would not act on their own. Stakeholders agreed that the Directives have added value by providing a common framework for the improvement of animal welfare. Yet, additional efforts are needed to handle divergences in implementation and consumer demands on animal welfare in the EU.[291]

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286 EPRS 2021, p 71.

287 EU wide legislation is also important to set common lower boundaries for farm animal welfare, and to make sure that these are coherently enforced, see: ECONWELFARE (Good animal welfare in a socio-economic context: Project to promote insight on the impact for the animal, the production chain and society of upgrading animal welfare standards).

288 CBA study p 17. Without regulation, one would have to trust the market to regulate animal welfare. Indeed, better animal welfare very much depends on market actors and consumers, but it is clear that this does not work in all countries and not for all animals because market-driven animal welfare improvements often only cover limited production shares and market segments. Hence, a legislative minimum standard is a more effective approach to ensure a minimum level of animal welfare, at least for all those farm animals that fall under the scope of the analysed legislations.

289 CBA study, p 108.

290 EPRS_2021, p. 71.

291 Ibid, p. 16.

The evaluation and the impact assessment of the 2012 Animal Welfare Strategy also indicate that the EU level is the appropriate level for action. Coordination action creates synergy gains, which increases effectiveness and efficiency.[292]

An Implementation Assessment carried out in 2018 on the Transport Regulation[293] concluded that the EU added value of the Regulation is somehow implicit due to the fact that 'trade with live animals within and outside the EU would be difficult in the absence of common rules and standards as regards animal transport'[294]. Indeed, trade of live animals within the EU would be almost impossible if all Member States had their own rules regarding the transport of live animals.

Concerning proportionality and subsidiarity, it can be argued that EU actions in the area of animal welfare do not go beyond of what is necessary to achieve the objectives of the Treaties[295], which recognize animals as sentient being and require this to be taken into account when formulating EU policies in the area of agriculture, fisheries, transport, internal market, research and technological development and space policies[296].

The current EU animal welfare legislation is setting minimum requirements and allows Member States to adopt or maintain national provisions going beyond the common rules.. While some Member States have adopted such national legislation, this is limited to a minority of Member States (e.g. Sweden, Finland, Denmark, the Netherlands and Germany) whose citizens express higher expectations on animal welfare. The large majority of Member States does not go beyond EU rules.

In the case of the Regulations on killing and transport, the areas where Member States can go beyond EU rules are limited (and framed by EU legislation). Therefore EU legislation clearly has the highest added value for those Member States not going beyond EU legislation, but also for the ones going beyond, as it ensures a minimum level of standards and a basis for the internal market.

4.3 Is the intervention relevant?

The current EU animal welfare legislation was an appropriate response to the animal welfare needs and challenges at the time of its adoption, based on the best available science at the time[297]. The key problems and drivers identified were largely addressed but despite the progress made most of these problems and drivers remain relevant today.

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292 EUAWS evaluation, p 89.

293 European Implementation Assessment (2018) of the Regulation (EC) No 1/2005 on the protection of animals during transport and related operations .

294 Ibid, p. 22.

295 Article 13 of the Treaty on the Functioning of the European Union (TFEU).

296 Article 13 TFEU also requires the EU and the Member States to respect the legislative or administrative provisions and customs of the Member States relating in particular to "religious rites, cultural traditions and regional heritage" when formulating and implementing animal welfare policy.

297 Rayment et al. The evaluation concluded that the EU animal welfare legislation had succeeded in striking a balance between the varied needs and expectations of citizens, industry and other groups.

4.3.1 What are the current needs, interests and expectations of stakeholders and to what extent does the current EU animal welfare legislation address them?

4.3.1.1 Farmers and other business operators

It has emerged from interviews with farmers and food business organisations that animal welfare has become an important business factor for producers and that needs and consumer expectations in this specific realm have evolved during the last ten years. The mushrooming of different animal welfare labelling schemes in many Member States in the last ten years is a reflection of this[298]. Still, the expectations of farmers and other business operators to get a sufficient return on the animal welfare investments are not always met.

Interviewed business organisations consider appropriate that standards currently applied to EU businesses should also be applied and demanded from third country operators, and that more information should be provided to consumers about the high level of existing standards. There is also an expectation that the EU animal welfare legislation should be modified to employ scientifically and objectively verifiable criteria, the implementation of which is easy to monitor e.g. using clear indicators, and relatively stable over time (as a certain level of foreseeability is required for investments in animal welfare, also considering the depreciation periods for such investments).

4.3.1.2 Citizens and consumers

Citizens pay increasing attention to animal welfare in the EU[299], notably in western Member States[300]. This is reflected in the rise of political movements concerning the protection of the environment and animal welfare. For example, in October 2002, an Animal Welfare Party was established in the Netherlands. In August 2020, the first Danish Vegan party was created[301]. Animal welfare was added to the German Constitution as a national objective, in 2002. And in 2022, the protection of animals was made part of the Italian Constitution.

Consumers' behaviours and expectations changed over time, leading to greater awareness overall and hence a greater commitment to act to make improvements in the area of animal welfare[302]. The Community Action Plan on the protection and welfare of animals (2006-2010)[303] states that there has been a 'clear shift of public attitudes towards animals over recent decades'[304]. This is also reflected in the evaluation of the EU Animal Welfare Strategy (2012-2015), performed in 2021[305].

A clear and strong reflection of societal concerns about insufficient protection of animal welfare is the European Citizens' Initiative called 'End the Cage Age', which gathered almost

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298 M. Maestre et al (2022), Study on animal welfare labelling.

299 EUAWS evaluation, executive summary, p. 1.

300 However, this increasing attention to animal welfare does not seem to be reflected in consumer behaviour and a greater willingness to pay for animal welfare friendly products (see section 4.1.2).

301 C. Garcia Bouyssou et al (2021), 'The global animal food market drivers and challenges', 1, p. 20.

302 EUAWS evaluation, p. 26.

303 Communication (COM(2006)13 final) from the Commission to the European Parliament and the Council of 23 January 2006 on a Community Action Plan on the Protection and Welfare of animals 2006-2010.

304 EUAWS evaluation, p. 25.

305 Ibid.

1.4 million signatures, and to which the Commission responded positively on 30th June 2021[306] and committed to propose legislation to phase-out the use of stalls and cages for the species covered by the initiative.

The Eurobarometer surveys on the 'Attitudes of EU citizens towards Animal Welfare' show that consumer awareness and citizens' interest in animal welfare have increased from 2006 to 2016. A shift in opinion was observed from those who "probably" believe animal protection should be better, to "certainly" (in 14 Member States, there are increases of more than 5%)"[307] [308].

Despite this shift, citizens and consumers currently lack appropriate information on animal welfare[309]. At EU level, except in the case of eggs[310] (obligatory), organic products[311] and poultry meat[312] (voluntary), there are no specific EU rules on how to inform the consumer about animal welfare[313]. In the public consultation, 84% (46 032 out of 54 611) of the EU citizens did not feel sufficiently informed about the conditions under which animals are farmed in the EU. In general, the public only has a limited understanding of modern farming and of animal welfare issues[314]. The literature also shows that consumers remain poorly informed of the reality of modern farming and their perceptions do not match the assessment of animal welfare issues conducted by national competent authorities, NGOs and academic researchers[315]. The number of citizens that think there is not sufficient choice of animal welfare-friendly food products in shops and supermarkets increased from 38% (in 2006) to 46% (in 2016)[316].

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306 Communication from the Commission on the European Citizens' Initiative (ECI) 'End the Cage Age' (2021/C 274/01).

307 Similarly, since the survey in 2006, there were nine countries where there has been greater than 5% increases in the proportion of respondents who believe the welfare of farmed animals should be better protected.

308 While the Eurobarometer from March 2006 showed that animal welfare is a worry for 64 % of the population, animal-welfare-friendly products usually had a low share of the market. The March 2016 Eurobarometer indicated an important increase in the interest of citizens to animal welfare: 'more than nine in ten EU citizens believe it is important to protect the welfare of farmed animals (94%)'.

309 EUAWS evaluation, executive summary.

310 Commission Directive 2002/4/EC of 30 January 2002 on the registration of establishments keeping laying hens, covered by Council Directive 1999/74/EC

311 Council Regulation (EC) No 834/2007 of 28 June 2007, replaced and repealed by Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 (voluntary regulation not specifically aimed at animal welfare issues but with animal welfare attributes).

312 Commission Regulation (EC) No 543/2008 of 16 June 2008 laying down detailed rules for the application of Council Regulation (EC) No 1234/2007 as regards the marketing standards for poultry meat (voluntary production method labelling).

313 Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015'. Moreover, there were few voluntary certification schemes focusing on animal welfare and their market share is relatively limited in most EU Member States.

314 EPRS, 2021.

315 EPRS, 2021.

316 In 2016, 30% of consumers said they certainly would like to receive more information about the conditions under which farmed animals are treated in their country, compared to 19% in 2006.Furthermore, between 83% and 87% of respondents to the open public consultation do not feel sufficiently informed about the conditions under which animals are farmed, transported, and slaughtered in the EU.

Market has not responded to the increased demand[317], despite of the several differing animal welfare labelling schemes developed in the Member States. The proliferation of different schemes with varying standards across Member States seems to confuse consumers, as well as distort competition, and create challenges for functioning of the internal market[318]. A vast majority of respondents (90% - 53 128 of 59 281) to the open public consultation believe that an EU animal welfare label is a useful tool for informing consumers on the conditions in which animals are treated. In this regard, it has been suggested that the establishment of an EU animal welfare label could ensure an equivalent information level for consumers across the EU. It could also increase transparency in the market[319] and facilitate a better market return for farmers' investment in better animal welfare.

A recently published study on animal welfare labelling provides relevant data[320]. For instance, based on a larger survey (with 300-400 respondents per Member State) and literature review, the study finds that there is evidence of consumer confusion and misinterpretation of existing labels on animal welfare, that here is a clear demand among consumers for information about animal welfare (this need is not fulfilled in many Member States; 16 have no animal welfare label), and that farmers are compensated or rewarded for higher production costs but not necessarily giving them better profit than non-labelled products. It also emerges that consumers' willingness to pay are not always in line with declared intentions, but that consumers are more willing to pay premium prices if they are informed about animal conditions and believe the product is of higher quality.

4.3.1.3 EU institutions and Member States

There is increasing attention paid to animal welfare by EU institutions and Member States. In a meeting of the Council of the European Union on 12 October 2021, EU Ministers of Agriculture largely welcomed a paper from five Member States designed to encourage the Commission to make new animal welfare rules more effective and cover more species, including pets. Recent Council Conclusions[321] state that 'there have been calls for further action with certain Member States highlighting the need for better regulation, better animal welfare and awareness-raising about EU standards and knowledge[322]. Moreover, under the Bulgarian, Austrian and Romanian presidencies[323] in 2018-2019, in-depth discussions were held on the challenges of long-distance transport for animal welfare. In its Conclusions on the EU Farm to Fork Strategy[324], the Council stressed that animal health and welfare are a

317 Commission Staff Working Paper, Impact Assessment on the European Union Strategy for the Protection and Welfare of Animals 2012-2015.
318 M. Maestre et al (2022).
319 Conclusions of the animal welfare labelling subgroup of the EU Animal Welfare Platform, June 2021.
320 M. Maestre et al (2022), Study on animal welfare labelling.
321 Council Conclusions of 16 December 2019 on animal welfare.
322 Council conclusions on animal welfare - an integral part of sustainable animal production - Council Conclusions (16 December 2019), p. 4. - Joint Declaration of Denmark, Germany and the Netherlands on Animal Welfare of 14 December 2014, and the Joint Position paper of Denmark, Germany, Netherlands and Sweden on revising Council Directive 2008/120/EC
323 The presidency of the Council of the European Union rotates among the member states of the EU every six months.
324 Conclusions adopted on 19 October 2020.

precondition for sustainable livestock production, and that animal health is a precondition for a reduced need for antimicrobials. The Council called for the current EU animal welfare legislation to be revised "as soon as possible, in particular on the transport of animals, and propose new rules for animals that are not yet covered by specific EU legislation"[325]. In its Conclusions on an EU-wide animal welfare label, the Council considered that an EU-wide animal welfare label for food produced under animal welfare standards higher than those provided by EU legislation could respond to the consumer demand to easily recognise such food, and invited the Commission to develop a tiered transparent labelling scheme with EU-wide harmonised, relevant, measurable and verifiable criteria for this[326].

A considerable number of written questions from European Parliament has been sent to the European Commission on animal welfare in recent years[327]. The European Parliament has recognized the importance of protecting animal welfare through several parliamentary resolutions. On 20 October 2021, the European Parliament approved the Resolution on the Farm to Fork Strategy. The Resolution 'underlines the importance of taking into account the latest advances in animal welfare science and responding to public, political and market demands for higher animal welfare standards'.

On 20 January 2022, the Recommendation of the Committee of Inquiry on the Protection of Animals during transport (ANIT) was adopted by the European Parliament. It contains several recommendations for an improved protection of animals during transport[328]. Furthermore, on 16 February 2022, the Implementation Report on on-farm animal welfare was adopted by the European Parliament. The report recalls that EFSA has produced several opinions on the use of animal-based measures (i.e. animal welfare indicators), for species not covered by specific legislation (dairy cows and beef cattle), and regrets that these animal-based measures have not been implemented so far. The European Parliament therefore called on the Commission to ensure that these animal-based measures are updated with the latest scientific knowledge and integrated into the existing legislation.

4.3.2 Does the EU legislation on animal welfare remain fit for purpose in the light of the latest developments and ongoing/future challenges?

Significant trends and developments in science and technology, strong societal demands and current and future sustainability challenges, such as climate change, food security, and threats to public health (such as antimicrobial resistance)[329], are not fully reflected in current EU animal welfare rules[330]. The current provisions need to be updated in light of recent

[325] See also Council Conclusions of 28 June 2021 on animal transport.

[326] Council Conclusions on animal welfare labelling of 7 December 2020 .

[327] From 2006 to 2021, a total of 1 278 animal welfare related parliamentary questions were submitted, ranging from 34 questions (2006) to 168 questions (2011) per year.

[328] European Parliament, Protection of animals during transport, European Parliament recommendation of 20 January 2022 to the Council and the Commission following the investigation of alleged contraventions and maladministration in the application of Union law in relation to the protection of animals during transport within and outside the Union.

[329] Animal welfare may contribute to rural development, for instance by increasing job opportunities, and to the reduction of outbreaks of human diseases, and less use of antibiotics, seeJ.N. Fernandes et al (2021), 'Costs and Benefits of Improving Farm Animal Welfare' . .

[330] Broom, 2017.

developments in science and technology. For instance, current rules on stunning of farmed fish[331] and the protection of species like dairy cows (leg and other disorders caused by genetic selection and high milk yields) are not in line with the latest scientific knowledge[332].

In other words, some of the current rules need to be aligned with newly available scientific evidence and ongoing developments. This is illustrated by the important number of scientific opinions that have not been reflected in legislation[333] and the significant number of national provisions developed in this area (see examples in Annex III) because the EU legislation is lagging behind. For example, despite being still authorised according to EU animal welfare legislation, sow stalls and farrowing crates are already banned in Sweden, and the use of cages for turkeys, ducks and geese is not authorised in Poland. Beak-trimming has been banned in Finland since 1996[334]. Enriched cages for laying hens are banned in Austria and Luxembourg[335].

Hence, current EU rules don't provide an optimal protection of animal welfare as they still allow for practices that are now known to be harmful for the animals.

Indeed, the architecture and the core part of the legislation has not changed for more than ten years, in most cases for more than 20 years. The Commission announced in 2012 its intention to explore a simplified legislative framework, replacing the provisions that were laid down in several different Directives, but this was not pursued[336].

Current provisions are not futureproof[337]. Welfare science is 'in constant development and incorporating new insights, for example on the sentience of animals'[338]. Most stakeholders agree that the current legislation is not fully in line with current scientific knowledge and needs to be revised[339].

36% (4 out of 11) of business or professional associations who contributed to the targeted survey consider that the EU animal welfare legislation partially allows them to incorporate advances in science and innovation, while only 27% (3 out of 11) replied that the legislation allows them to do so only mostly or totally (36% did not know – 4 out of 11).

In the context of the Green Deal, the model of food production has to be shifted from a policy primarily driven to ensure food security in Europe (after World War II), to a policy driven by environmental challenges, without compromising food security. Animal welfare is a cornerstone of such a sustainable food system.

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331 EFSA 2013, 2017, 2018, 2020: Animal welfare at slaughter | EFSA (europa.eu).

332 EFSA (2009): Scientific report on the effects of farming systems on dairy cow welfare and disease. Further examples and more details on the EFSA opinions are provided in Annex III.

333 For instance, in 2009, EFSA published several opinions on the welfare aspects of the main systems of stunning and killing for the main fish species farmed in the EU. These EFSA opinions have not been taken into account in the Killing Regulation.

334 L. Evain and M-F Parant (2022), 'Parangonnage européen sur le bien-être animal et la lutte contre la maltraitance animale'.

335 Commission Communication (C(2021)4747) on the European Citizens' Initiative (ECI) "End the Cage Age".

336 EUAWS evaluation, p. 22.

337 To note that the current EU animal welfare legislation has been adopted before the Lisbon Treaty, and needs to be 'Lisbonised'(which would allow for a more flexible and efficient process to amend and update the requirements)

338 Rayment et al.

339 EPRS, 2021.

Still, a vast majority (87% - 51 551 of 59 281) of the respondents to the Open Public Consultation did not consider the current EU animal welfare legislation fit to meet the future challenges in relation to sustainable food production, such as climate change and biodiversity loss[340].

4.3.2.1 Different understanding of animal welfare

Today there is a different **understanding of animal welfare** than when the legislation was adopted. Article 13 of the Treaty on the Functioning of the European Union (TFEU), which came into force in 2009, also recognises animals as sentient beings.

The concept of animal welfare on which the current EU animal welfare legislation is based builds on the 'five freedoms' (absence of negative experiences for the animal). Such concept is now complemented by recent studies showing that animals can experience positive states[341]. Evidence suggests indeed that the "freedom" approach is not wide enough to be used as a basis for assessment of the welfare of a particular animal.[342] Indeed, there is a shift of emphasis in animal welfare science from the 'do not harm' principle towards a more 'positive' perspective on welfare, seeking to identify ways of promoting the welfare of animals[343].

Such a shift has been already seen in national legislation in some countries (e.g. recent German, French and Swedish legislation aims at 'promoting' the well-being of farmed animals – seeking to identify ways of improving the welfare of animals, instead of simply trying to avoid unnecessary suffering[344]). In practical terms, this means giving the animals more possibility to play and to have positive social contacts with other animals. This shift of emphasis in animal welfare science towards a more "positive" perspective on animal welfare is also reflected in debates that inspectors in charge of official controls and farmers have on what 'animal welfare' means[345][346].

This is confirmed by stakeholders who consider that EU legislation should consider this change of understanding animal welfare and not only focus on preventing negative practices (e.g. unnecessary suffering, stress, hunger, thirst, etc.), but also seek to promote a 'good' life for animals kept in farms[347].

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340 Less than half of the stakeholders believed (36%) or strongly believed (7%) that increased animal welfare has so far contributed to a more sustainable food system, for instance by allowing healthier animals to enter the food chain.

341 D. J. Mellor (2016), 'Updating Animal Welfare Thinking: Moving beyond the "Five Freedoms" towards "A Life Worth Living"', Animals 2016, 6(3), 21 –

342 Broom, 2017.

343 EPRS, 2021.

344 T.C. Green and D.J. Mellor D. J. (2011), 'Extending ideas about animal welfare assessment to include 'quality of life' and related concepts', N. Z. Vet. J., 59, 2011, pp. 263–271.

345 EPRS, 2021, p. 40

346 K. Overstreet and I. Anneberg (2020), 'Farmers, inspectors and animal welfare: possibilities for change. A Review', EURCAW Pigs. See also I. Veissier et al. (2021), 'Animal welfare official inspections: farmers and inspectors shared concerns', Animal, volume 15, Issue 1, 2021.

347 EPRS, 2021, p. 40.

Furthermore, in recent years, and particularly since the Covid-19 pandemic, the 'One Health' approach[348] has gained more prominence, recognising that infectious diseases of zoonotic origin may pose a significant threat to human health, notwithstanding the burden on animal health. 'One Health' puts focus on the important interlinks between animal welfare, animal health, public health and the environment. The current legislation does not remain fit for purpose also in light of this development, in particular given the challenge of antimicrobial resistance. Further improvements in animal husbandry would reduce the need to use medication on farms, including antibiotics, since a better welfare contributes to strengthening the animals' immune defense system, as recognised in the EU Farm to Fork Strategy. Proper animal husbandry and animal welfare can also greatly contribute to the early detection of highly pathogenic zoonoses, aiming to stem their spread early enough before they pose a serious cross-border threat to human health. This makes the need for integrated surveillance across the One Health spectrum all the more pertinent.

In addition, ethical concerns – starting to develop in the 1990's but having become more common and prominent in later years – are raised against e.g. exporting animals by road and/or by sea, or the systematic killing of male one-day old chicks in the laying hens sector. A significant portion of society as well as numerous scientists in the field of animal ethics regard the killing of chicks as a serious ethical issue[349]. Every year, hatcheries in the EU kill around 330 million male day-old-chicks[350]. On the basis of these ethical concerns, France, Austria and Germany have decided to ban the killing of one-day old chicks[351]. Other examples of ethical concerns are the progressive ban of fur farming in Europe[352], and the ban on cat and dog fur which was introduced by Regulation (EC) No 1523/2007[353].

A vast majority of the respondents to the public consultation considered that species-specific animal welfare requirements are missing for cats (79%, 47 064 of 59 281) and dogs (80%, 47 272 of 59 281). This is reflected in the stakeholder interviews, where one professional organisation (representing veterinarians) expressed that *"for consumers companion animals are extremely important and there are also a lot of welfare problems there"*. This illustrates

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348 An approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes, including as regards antimicrobial resistance.

349 M. Busse et al (2019), 'Ethical Concerns in Poultry Production: A German Consumer Survey About Dual Purpose Chickens', Journal of Agricultural and Environmental Ethics, 32, p. 906.

350 Commission website: Slaughter & Stunning.

351 L. Evain and M-F Parant (2022), 'Parangonnage européen sur le bien-être animal et la lutte contre la maltraitance animale'.)

352 For instance, fur farming has been prohibited in Austria since 2005 and in the Netherlands since 2021. On 16 March 2022, a European Citizens' Initiative entitled "Fur Free Europe" was registered by the European Commission (C(2022) 1530 final).

353 The Regulation bans the placing on the market and the import to or export from the Union of cat and dog fur and products containing such fur. The ban was adopted in order to address the concerns of European citizens, who consider cats and dogs as pet animals, and therefore do not want to buy products containing fur from cats and dogs.

how the citizens' animal welfare concerns extend to other species than only to those used for food production[354].

In other words, there has been an evolution of values, expectations and demands, in which the moral grounds for keeping and using animals for human purposes are addressed. At the same time, there has been an evolution of science, in which the positive emotions of animals are recognized. This means that the understanding of animal welfare on which the existing EU animal welfare legislation is based, i.e. as simply the avoidance of unnecessary suffering, needs to be updated.

4.3.2.2 Sustainability

While animal welfare is not explicitly mentioned in the United Nations' Sustainable Development Goals (SDGs)[355], it can be argued that working to achieving the SDGs is compatible with working to improve animal welfare[356]. The link between SDGs and animal welfare are stronger when it comes to SGDs 12 (Responsible consumption and production) and 14 (Life below water). The role of animal welfare in sustainability was recognized in a resolution adopted by the United Nations in March 2022.

Environmental impacts due to livestock rearing (see chapter 4.1.3.2.4 above) come with added responsibilities and costs for livestock farmers. For instance, in EU pig and broiler production areas, farmers have been addressing these environmental issues (also in order to comply with environmental standards) by introducing new technologies, thereby enhancing the sustainability of their operations while respecting animal welfare standards. Better integration of technologies in the new animal welfare legislation could help address certain sustainability issues, such as the reduction of particle emissions (similar to the air-cleaning technique used in hospitals and garages)[357].

In addition, better animal welfare would have a positive impact on social sustainability, for instance by promoting the reputation of farmers and other food business operators among consumers and citizens[358].

87% of the respondents (51 551 out of 59 281) to the public consultation do not feel that the current EU animal welfare legislation can meet future challenges in relation to sustainable food production, such as climate change and biodiversity loss[359].

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354 Historically speaking, the welfare of animals used for scientific purposes was addressed at EU level by Council Directive 86/609/EEC (OJ L 358, 18.12.1986), before the current EU legislation on the welfare of farmed animals was introduced.

355 The Sustainable Development Goals were adopted in 2015 by the United Nations as a universal call to action to end poverty and protect the planet.

356 L. Keeling et al. (2019), 'Animal welfare and the United Nations sustainable development goals.', Frontiers in veterinary science 6 (2019): 336.

357 Eurogroup for Animals (2021), "No Animal left behind"

358 Rayment et al (2010). See also M.S. Dawkins (2016), '; 'Animal welfare and efficient farming: Is conflict inevitable?' Animal Production Science, 57(2), 201–208, and Stichting Wageningen Research (2011), 'Good animal welfare in a socio-economic context: Project to promote insight on the impact for the animal, the production chain and society of upgrading animal welfare standards'.

359 Less than half of the stakeholders believed (36%) or strongly believed (7%) that increased animal welfare has so far contributed to a more sustainable food system, for instance by allowing healthier animals to enter the food chain.

More detailed analysis in relation to the five fitness check criteria and questions, together with the "fitness check matrix", is presented in Annex III.

- **WHAT ARE THE CONCLUSIONS AND LESSONS LEARNED?**

General conclusions

The EU legislation has improved the welfare of many of Europe's animals compared to the period preceding its adoption. The fitness check showed that the EU animal welfare legislation has improved to a certain extent the welfare of many of Europe's animals that are covered by targeted legislation (i.e. pigs, calves, laying hens, broilers), and animals during transport and at the time of killing. However, more generally there is still a sub-optimal level of welfare of animals in the EU. In particular, this is the case for species for which such targeted legislation is currently lacking. Furthermore, the current targeted legislation still allows the keeping of animals in cages or other confined housing systems that restrict significantly their movements and hamper their welfare.

The EU animal welfare legislation has contributed to, but not fully ensured, equal conditions for the operators and the economic activities affected. Differences in application and enforcement still create obstacles to the internal market and the achievement of comparable level of animal welfare. Analysis of the legislation and its application shows that this is partly due to the vagueness of certain provisions. The fact that the EU animal welfare legislation is not up to pace with certain developments in different Member States' national legislation further aggravates the situation.

Current EU rules need to be updated in light of new science and technological evidence and developments, as well as the evolution of societal demands. There are certain gaps in the legislation, e.g. as regards the protection of dairy cows and farmed fish for which the above analysis shows that current provisions are not specific and detailed enough and therefore not adapted to their needs. Furthermore, the lack of update of the EU animal welfare legislation for more than 10 years has led certain Member States to adopt an increasing number of national measures going beyond EU requirements.

There is a lack of concepts and tools, such as robust indicators, and baselines to measure animal welfare, its variation, and evolution. A system for monitoring and triggering improvements in animal welfare is missing. Inspired by the work done in the Welfare Quality project in the late 1990's, the use of an animal-based indicator (foot-pad dermatitis) became a legal requirement in 2007, through the adoption of the Broilers Directive. This, together with the requirement of monitoring the effect of stunning in slaughterhouses, are the only requirements to collect animal-based indicators present in the current legislation. Further to this, and the remarks made by the Court of Auditors in their Special Report on Animal Welfare in 2018, several efforts have been made at EU level to construct further indicators (so far with limited success, since animal welfare is a complex and multi-facetted matter)[360].

[360] This is part of the animal welfare mandates given to EFSA in 2020 and 2021, in view of the revision of the legislation in 2023, and of the tasks given to the three EU Animal Welfare Reference Centres. Once identified,

The enforcement of current rules is insufficient in many regards to ensure the level of animal welfare expected by today's citizens. The evaluation of the EU Animal Welfare Strategy (2012-2015) has confirmed that while a certain progress has been made in many areas, some topics like animal transport on long journeys, certain stunning methods and the routine pig tail docking have been identified as remaining areas where the compliance is still challenging. A more consistent enforcement alone would however not be enough as the analysis shows there are also significant shortcomings and deficiencies in the legislation in force.

- **Evaluation criteria assessment**

Effectiveness:

The EU animal welfare legislation has contributed to a better and more uniform protection of many of Europe's farm animals, and helped to reduce competitive distortions in the internal market caused by differences in national standards.

However, many animals are still unnecessarily suffering, and the lack of harmonized species specific requirements for certain species, such as dairy cows, further hampers considerably the protection of those species. In addition, many operators are required to deal with diverging national rules, or different interpretations of common requirements, which create obstacles on the internal market.

To a considerable extent, this is due to shortcomings of the current legislation, especially since many provisions are neither sufficiently precise to be enforceable, nor sufficiently specific to protect the welfare of all relevant species. Their vagueness makes it difficult for the legislation to fully achieve the objectives of improving the internal market and protecting animal welfare.

Different levels of ambition in transposing and supplementing the Directives have further contributed to differing levels of animal welfare at farm level between the Member States, compared to the areas of animal transport and slaughter where Regulations are used. These variations in animal welfare standards have led to competitive distortions in the internal market.

For transport, the current – mainly paper based – system, which depends to a great extent on information provided by the business operator, poses a big challenge to the proper enforcement of the rules. Furthermore, there is a lack of coordination on inspections between authorities in the Member States involved, and the sanction systems are weak and unevenly applied across the Member States. The transport legislation would require more precise provisions, definitions and division of responsibilities between stakeholders in order to make it easier to enforce.

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there is, in Article 21(8) of the OCR, an empowerment for the Commission to establish cases and conditions which require the use of such indicators for official controls.

For slaughter, there is no specific requirement applicable to the killing of farmed fish and some widely used stunning methods are not optimal for the welfare of animals (waterbath stunning, use of high concentration of carbon dioxide for pigs).

Efficiency:

The EU animal welfare legislation is assumed to have brought several additional benefits, such as higher productivity, enhanced ecosystems services, lower use of antibiotics and better public health. Animal welfare however also entails additional costs for food business operators and public authorities.

Evidence, albeit limited, suggests that the benefits outweighs the costs of animal welfare, at least over time. However, business operators consider that the market return on food produced under higher welfare standards is still insufficient to compensate for the additional costs imposed by higher animal welfare standards. Though, the situation differs between Member States and different sectors, due to differences in citizens' expectations and market demands.

The information currently provided to consumers on animal welfare standards is insufficient and incoherent. To a large extent, a better return on animal welfare investment may be achieved by providing more, better but also simpler information to consumers, allowing them to make informed choices in line with their animal welfare concerns.

There is a potential to ease the administrative burden for SME's (for instance, for small slaughterhouses).

Coherence:

The various components of EU animal welfare legislation are broadly complementary, mutually supportive and consistent, and have remained compatible with other EU policies, such as on competitiveness, trade and the environment.

However, in view of the objectives of the Farm to Fork Strategy and the need to make the EU food system more sustainable, a greater leverage of the Common Agriculture Policy and trade policy to achieve animal welfare objectives is needed. There are calls for a greater coherence between the EU's internal legislative framework on animal welfare and its approach to imports. There is also a practical difficulty to reconcile the species-specific journey times for animals in the Transport Regulation, and the driving times under Regulation (EC) No 561/2006 on certain social rules relating to road transports.

EU added value:

Action at EU level serves to ensure that the aspirations of its citizens and businesses, as reflected in the Treaty, are equally promoted and supported.

The objective to ensure a common approach with regard to the protection of animal welfare, and to create a level playing field on the internal market, has been better achieved at EU level.

Relevance:

The current EU animal welfare legislation was an appropriate response to the animal welfare needs and challenges at the time of its adoption, based on the best available science of that time. Despite the progress made most of these the problems and drivers remain relevant today, as increasing societal expectations (including ethical concerns, including regarding the

use of cages), scientific and technological developments and future sustainability challenges are not properly addressed by current rules.

In addition the analysis has demonstrated that certain provisions are too vague, which contributes to a varying level of animal welfare that distorts competition between EU food business operators, a lack of tools to properly monitor the application of the legislation, a lack of appropriate training of staff handling animals that results in a poor management of the animals, and a lack of more tailored requirements to properly address the needs of certain species.

- **Lessons learned**

The current EU animal welfare legislation needs to be updated to reflect societal expectations and ethical concerns, scientific and technological evidence, developments and future sustainability challenges. Citizens' concerns for animal welfare extend beyond animals used for food production.

There is a lack of concepts and tools, such as robust indicators, and baselines to measure animal welfare, its variation, and evolution over time. A system for monitoring and triggering improvements in animal welfare is missing. However, the Commission's overview report from 2022 on the use of indicators for animal welfare at farm level concludes that it would be feasible to establish indicators for different farming systems to monitor whether the animal welfare conditions are improving, remaining stable or worsening. It suggests that, in the context of the revision of the EU animal welfare legislation, the Commission could consider developing a common methodological framework to establish, for each Member State, an overall state of play of the conditions under which animals are treated in farms, and an EU animal welfare dashboard.

The language of certain provisions is too vague and ambiguous, which creates enforcement problems and varying levels of implementation of common requirements. Further precision could be sought, including by providing clearer definitions, and the potential for further simplification and cost reduction, including by an increased use of digital tools, could be explored.

ANNEX I. PROCEDURAL INFORMATION

Lead DG

The European Commission's Directorate-General (DG) for Health and Food Safety is the lead DG for this fitness check (PLAN/2020/6933).

Organisation and timing

The Commission published a roadmap on the fitness check of the EU animal welfare legislation[361] on 20 May 2020. It was open for stakeholders' feedback until 24 August 2020, with 172 responses received. An online public consultation (PC) ran for 14 weeks from 15 October 2021 until 21 January 2022, with 59 281 responses received. Since the fitness check is performed back-to-back to an impact assessment for the revision of the current legislation, the OPC contained questions on the functioning of existing provisions as well as on potential future policy choices.

An inter-service steering group (ISSG) was established in May 2020 involving representatives from several Commission's Directorates-General DG AGRI, DG INTPA, DG ENV, DG JUST, DG MARE, DG MOVE, DG NEAR, DG TRADE, DG RTD and the Secretariat-General. The ISSG contributed to the fitness check and ensured that it met the necessary standards for quality, impartiality and usefulness. The first ISSG meeting was held on 26 June 2020. The second meeting was held on 7 Sept 2020, followed by written exchanges. The last ISSG meeting was held on 28 March 2022.

Exceptions to the Better Regulation Guidelines

None.

Consultation of the Regulatory Scrutiny Board (RSB)

Yes. An upstream meeting with the RSB was held on 29 November 2021. The final meeting with the RSB took place on 11 May 2022, in which the following recommendations were made:

RSB recommendation	Modifications of the draft SWD
• The report should better explain the specific expected outcomes at the time of adoption of	A more detailed description of the expected outcomes at the time of adoption has been added

[361] I.e. Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes; Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens; Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production; Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves; Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs; Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport; and Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing.

the relevant legislation and to what extent each intervention was successful in achieving those outcomes. The lack of agreed definition of animal welfare, the evolution of the concept of animal welfare during the evaluation period, as well as the lack of agreed and measurable indicators should be reflected in this context.	to section 4.1 (in particular in chapter 4.1.1.). The narrative has been expanded and tables have been inserted to better illustrate the expectations and outcomes, as regards each of the legislation's objectives, and the indicators used to measure the level of success. The lack of indicators and other monitoring tools is further addressed in the same chapter, with more evidence collected from the DG SANTE audit and overview reports.
• The report should explain more clearly the reasons for the identified regulatory and implementation failures, in particular regarding the vagueness and flexibility of certain provisions, as well as the related trade-offs. The report should further develop the reasons for performance disparities among Member States and substantiate this analysis with evidence.	More information on EU infringement actions against non-compliant Member States has been added in section 3.2. In the same chapter, the reasons for non-compliance with the ban on routine tail docking of pigs is further elaborated upon. In section 4.1.1, the reasons for the Member States' challenges to enforce the Transport Regulation are further elaborated upon. In the same chapter, the vagueness and flexibility of certain provisions is further elaborated upon and explained. The reasons behind the performance differences among Member States is also further developed in the same chapter-
• The report should take stock of all relevant available data and should consistently use it to support the analysis. More recent (2010-2021) sectorial and horizontal data should be included or the reasons for its unavailability be clearly explained. The report highlights the lack of specific indicators or historic data, but does little to compensate for this by using other sources of information (e.g. from EFSA, inspections to the Member States), case studies and extrapolations or comparisons with third countries. Even where monitoring and collection of indicators is obligatory (e.g. Broilers Directive) the report fails to provide the relevant data or to explain why such data is not useful.	More recent data on trade and animal transports has been added in section 3.1. More recent data on foot-pad dermatitis (i.e. the only animal welfare indicator currently required by EU law) has been added in section 4.1.1. To compensate for the lack of indicators, further and more consistent use has been made of DG SANTE audit and overview reports, as well as of the stakeholders' views as expressed in the interviews, the targeted survey and the public consultation. Trends as regards the evolutions at national levels have been further addressed and identified, with the help of the Commission's annual reports on the operation of official controls in the Member States, and more examples of national data have been added.
• The report should try to estimate the total cost of the legislation (including in absolute values) and explain the metrics used in its calculation. It should consistently analyse the distributional impacts on businesses including SMEs. The limitations of the cost calculations should be set out more consistently in the report.	Since certain provisions are too vague to be measurable and the CBA study targeted certain key provisions, an estimate of the total cost of the EU animal welfare legislation would not be possible. This limitation is more clearly explained in section 4.1.2, where however further analysis on the costs have been added to better explain the distributional impacts, including on SME's (e.g. through a more consistent use of the qualitative evidence available, notably from stakeholder interviews). In section 4.1.3.2., a more thorough analysis of different cost elements, including those not related to animal welfare, is provided.
• The report needs to substantiate the assessment of benefits better. In particular, it should explain clearly the causal link between the legislation and the realised benefits, as well as their magnitude. In view of the lack of comprehensive analysis, the conclusion that	The assessment of the benefits, and their magnitude, has been further expanded upon in section 4.1.2. More evidence to substantiate and/or qualify the claims has been added, including as regards the general conclusion.

'it is generally considered that the benefits outweigh the costs' should either be properly justified or qualified as necessary.	
• Whereas the report recognises the inherent tension between animal welfare principles, their practical implementation and economic factors it should also correlate this with adverse economic impacts and with evolution of consumers' behaviour in this regard.	A new section on "costs vs benefits" has been inserted in section 4.1.2. to better explain the economic consequences of compliance (as well as of non-compliance) with the EU animal welfare legislation. In section 4.3.1.2, further use has been made of the evidence provided through the recent study on animal welfare labelling, to better describe the evolution of consumers' behaviour and willingness to pay.
• The conclusions of the report should acknowledge explicitly, from the lessons learned, the need to provide agreed definitions of animal welfare, indicators, and improve data availability and monitoring. In view of the recognised lack of data, the available evidence in the report does not necessarily support the robustness of some of the conclusions, thus the report should either further substantiate those or qualify them accordingly.	The lack of commonly agreed animal welfare indicators, and the need to improve data availability and monitoring, are now more clearly acknowledged in the conclusions of the report (section 5.1). Additional evidence, provided by a broader literature review and a more comprehensive use of stakeholders' views (including Member States), has been added throughout the report to further substantiate the conclusions. Where relevant, a qualification of these conclusions is made (see e.g. the new tables on expectations vs outcomes in section 4.1.1.)
• The report should analyse and identify specific measures for simplification and administrative burden reduction. The Annex IV table on simplification and burden reduction should be completed accordingly.	The matters of simplification and administrative burdens are further expanded upon in section 4.1.2., in particular as regards the impacts of digitalisation. The table in Annex IV has been completed to the extent possible.

Evidence, sources and quality

This fitness check report drew on the following sources of evidence:

- Desk research
- A cost-benefit analysis (performed by an external expert in the context of a "CBA study").
- Field research, including:
- Analysis of the feedback received on the fitness check roadmap and on the public consultation (PC);
- A series of interviews with stakeholders;
- A targeted survey;
- A stakeholders' conference.

Annex II of this report describes in more detail the data collection tools used to gather the relevant information. i.e. the literature review, the stakeholder interviews, the OPC, the targeted survey and the external study.

ANNEX II. METHODOLOGY AND ANALYTICAL MODELS USED

The methodology used for the fitness check is based on desk and field research, i.e. literature review, a cost-benefit analysis performed by an external expert, interviews with stakeholders, exchanges with EFSA and the EU Platform on Animal Welfare, a targeted survey and a Public Consultation (jointly addressing fitness check and impact assessment issues). A Stakeholder Conference on 9 December 2021 provided an additional opportunity to gather input on the shortcomings and positives aspects of the current EU animal welfare legislation. For more details on the stakeholder consultation activities please refer to Annex V.

Methodology, sources of information and data analysis

The methodology for this support study was based on:

- **Desk-based research**, including **literature review** and extraction of evidence from the following types of documents: EU legislation, Staff Working Documents; reports and documents produced by the Commission and available on the DG SANTE's dedicated website; peer-reviewed academic papers, articles and theses. A total of **more than 200 studies and reports,** selected to provide a broad, factual and science-based overview, were reviewed and provided evidence for the analysis. In addition, statistics from Eurostat, TRACES[362] and the EU meat market observatory[363] have been used, as well as raw data provided by Member States and stakeholders upon request.

  The sources of information used included, among others:
  1. Evaluation of the EU Policy on Animal Welfare and Possible Policy Options for the Future, by DG SANCO (2010)
  2. Impact Assessment of the Killing Regulation (2008)
  3. Impact Assessment (2012) and evaluation (2021) of the EU Animal Welfare Strategy 2012-2015
  4. Commission studies and reports on the implementation of the EU animal welfare legislation
  5. Commission reports from audits in the Member States
  6. Special Eurobarometers on consumers' views on animal welfare (2006 and 2016)
  7. Academic literature
  8. Special Report by the ECA (2018) on animal welfare
  9. European Parliament resolutions (1987-2022) on animal welfare
  10. Council Conclusions (2018-2021) on animal welfare.

[362] https://ec.europa.eu/food/animals/traces_en

[363] https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/market-observatories/meat_en

- **Field research,** including a targeted survey addressed to Member States, international organisations, business organisations, professional organisations, NGO's and academia, and an interview programme targeting business operators along the agri-food chain, including a consumers' organisation. More than 100 stakeholders were reached through these targeted consultation activities, in the form of interviews and/or surveys. In addition, a total of 59 281 respondents contributed to the Public Consultation. Of these responses, 54 611 came from EU citizens (92%), and 2 817 from non-EU citizens (5%). The other 1 856 respondents can be broken down as follows: 116 academics/researchers; 123 business associations; 537 companies/business organisations; 266 NGOs, 103 organisations (11 consumer organisations and 92 environmental organisations); 83 public authorities; 38 trade unions and 590 other (i.e. respondents who identified themselves under this group).

- **Analysis and triangulation of quantitative and qualitative data**, from which conclusions were formulated.

The fitness check was based on the five evaluation criteria – effectiveness, efficiency, relevance, coherence and EU-added value.

Definition of indicators

In the absence of commonly agreed indicators, the level of animal welfare (and its evolution over time) was assessed by using slaughterhouse statistics (e.g. mortality rates) as well as data on certain injuries and diseases, such as footpad dermatitis and mastitis. In general, the definition of animal welfare on the basis of which the indicators have been chosen is described as the extent to which the animals are allowed to express their natural behaviour and not exposed to unnecessary suffering and pain. More detailed information on the indicators used in the fitness check is provided in the Evaluation Matrix (Annex III).

External support study supporting the cost-benefit analysis/economic analysis

The methodological approach of the external study was based on the Better Regulations Guidelines and Toolbox, and specifically Tools #56 and #63 on the cost-benefit analysis. The approach followed and challenges identified are presented in section 2 of the study (see Annex VIII).

A number of provisions were selected that deemed to be the most important and/or costly ones (in terms of compliance costs). The following selection criteria guided the choice of the provisions for the CBA analysis:

- relevance (for stakeholders and the legislation revision process)
- specificity of provisions (sufficiently specific so that a CBA is possible)
- data availability (literature)

Table 1 Provisions chosen for cost benefit assessment

Legislation	Selection of provisions
General Directive	no specific provision chosen
Pigs Directive	• weaners, rearing pigs: floor area, floor properties, manipulable material • sows, gilts: confinement/floor area/floor properties, manipulable material, dietary fibre • mutilations: castration, tail docking • inspections by public authorities
Broilers Directive	• stocking densities • climate inside housing • on-farm record keeping by farmers • monitoring/follow-up at slaughterhouses • inspections by public authorities
Calves Directive	• confinement/floor area for group housing • size and properties of individual pens • feed properties • inspections by public authorities
Laying Hens Directive	• ban of unenriched cages • transitional period • requirements for alternative systems • beak trimming • distinguishing number for egg marketing • inspections by public authorities
Transport Regulation	species: cattle, pigs, poultry means of transport: trucks, livestock vessels (less data) • properties of means of transport (related to journey time) • authorisation of transporters • training and certification of staff • approval of means of transport • journey log • non-discriminatory inspections by public authorities
Killing Regulation	species: cattle, pigs, poultry - training and certification of staff - monitoring of killing/stunning effectiveness - animal welfare officers - network for scientific support - technical aspects: electrical parameters for stunning of poultry, recording devices for electrical stunning

Having selected for each legislation the provisions to be included in the CBA, for each provision, the following steps were performed:

- Definition of BAU scenario and alternative scenarios for compliance with the provision
- Literature review of existing documents per provision to gather information of costs and benefits with a focus on those documents that provide costs and benefits for the minimum level of compliance with the respective provision
- Reliability assessment of the retrieved literature and decision, which documents are finally to be used as a basis for the monetisation of the costs (and benefits)

- Qualitative summary and monetisation of costs and benefits per provision and development of coverage scenarios to assess costs and benefits at EU level

Finally, a summing up across all provisions of a legislation was done to come up with costs and benefits for the legislation in total (or at least all analysed provisions). In the following, additional methodological details are given.

Business as usual scenario (BAU)

Business As Usual (BAU) situations were identified ex-post, that reflected the situation in the different member states (i.e. already exceeding the proposed EU legislation; equal/similar to the proposed EU legislation; below minimum requirement to be defined in the proposed EU legislation). In addition, the EU production share that adhered to any of these three situations needed to be known in order to come up with meaningful estimates regarding the calculation of the direct costs of compliance of the affected businesses.

Alternative compliance scenarios

Given that provisions were often not fully specific in how a business (farm) could comply with them, different alternatives of compliance were possible, and had to be considered in the analysis.

Stakeholders considered in the cost-benefit analysis

In this study, the following "stakeholders" are considered:

- Businesses: refer to all types of business (e.g. farms, transport companies, slaughterhouses) that are affected by a legislation
- Consumers: refer to those citizens that consume a certain product
- Public authorities: refer to EU, national or local administrations
- Animal welfare: refers to the welfare of animals
- Environment: refers to the welfare of the environment
- Public health: refers to the health of the citizens in general[364]

Even though animal welfare, environment and public health are no groups/stakeholders of the society, they are termed "stakeholder" because it is in the societal interest to understand the costs and benefits of a legislation on a larger set of dimensions. Hence, the welfare of animals, the welfare of the environment and how public health is affected, are all part of the set of "stakeholders" included in the analysis.

Literature review

The findings rely on the data and literature already available. Hence, the "data" for this study consisted of peer-reviewed publications, grey literature, and interview transcripts.

[364] Given that ultimately, all activities covered under these legislations have the objective to facilitate the safe production of food, often, the public health topics are closely related to food safety and quality.

Using a list of standardised key words for the search and based on first findings, a snowball approach, the following literature databases were screened: Scopus, EFSA database, Wageningen Economic Research database, OpenAgrar (German Federal Research Institutes).

Definition of items in cost-benefit analysis

Costs and benefits were differentiated on the cost side into direct compliance costs, enforcement costs and indirect costs, and on the benefit side, into direct and indirect benefits.
Direct costs occur due to compliance with the legislation, direct benefits are those positive impacts (increase in welfare, increase in market efficiency) that are the result of the objective of the legislation. **Indirect** costs and benefits occur in related markets or to stakeholders that are not directly targeted by the legislation but experience an, often, unintended impact of the legislation.

Regarding **direct compliance costs** (for producers/businesses), where possible, **charges** (fees, levies, taxes) **administrative costs** and **adjustment costs** were considered. Administrative costs refer to administrative obligations for example for information transfer or information availability upon request and include activities such as registration, monitoring, reporting or labelling. Adjustment costs are defined as incremental costs of compliance with the new regulation (other than charges and administrative costs) and capture cost items such as labour, material and equipment or investments into buildings. In line with other studies, changes in revenues were also included (Brouwer et al. 2011). On the **revenue** side, this meant in practice mostly, that animal productivity may have changed due to the new legislation which would affect the revenue side.

Another aspect was the **point in time at which costs (or benefits) occur**, and if they are "one-off" or "recurrent". This is particular important, when substantial adjustments for compliance with a new legislation are necessary, for example such as building a new barn or housing. Here, following the literature, the study's approach was to annualise all investment costs over the lifetime of the investment while the lifetime of the investment may differ, depending on the type of investment necessary and the assumptions of the underlying studies. Added to these annualised investment costs are then the additional recurrent costs, so that **the monetary values given in this study represent a sum of annualised one-off costs plus recurrent costs.**

Reliability assessment

A reliability assessment was carried out to finally select those studies/reviews that seemed the best fit for the CBA

Summarising the findings

Finally, per provision, the costs and benefits are qualitatively condensed out of the available studies.

Regarding the monetisation of the direct compliance costs, the following steps were performed:

- If a study contained percentage information of increase in production costs (total costs, variable costs),this information was directly included in the analysis and it was documented which cost items were included.
- If a study contained information about additional costs in [Euro/product unit] for compliance with the new legislation,
    - we searched for the remaining costs (e.g. basic costs for the respective animal type, country and year (e.g. in KTBL information).
    - If such cost figures were not available, we searched for the respective producer prices and used these as an approximation of production costs so that a percentage figure could be calculated.
    - Regarding the producer price per unit of product, we relied on Eurostat or EC producer price information and always formed a five-year average price around the year in which the analysed studies were performed.

Regarding the summary of potential benefits for consumers, often Willingness-To-Pay (WTP) values are cited. Here, it is important to keep in mind that even though consumers frequently state that they would be willing to pay more for a product that was produced under certain conditions, the reality shows that often, at the point of sale, this behaviour of buying products displaying certain characteristics at higher price is often not occurring. This is known as the consumer-citizen gap, a well-researched and debated problem with these WTP estimates. In addition, even when a higher purchase price can be realised, it is not clear, if then, along the production value chain, this additional financial value added really benefits the producers.

Main challenges

The main challenges highlighted in the CBA study relate to the following:

- Difficulties in performing an ex-post CBA on **legislation that had already been in place for at least 13 or more years**. In addition, for each legislation, the entry into force was at a **different point in time**, and, for some provisions of the legislations, transition periods were fixed. Hence, understanding the timing of the entry into force for each legislation and provision was crucial, and the costs and benefits at the respective time point had to be assessed.
- **No own data collection** was performed in the context of the study, which completely relied on available assessments and literature. This implies that studies had to be identified, that focused exactly on the provisions of the respective legislations, and that did the "with and without" comparison, so that the BAU and cost and benefits, incurred due to the entry into force of the legislation could be clearly identified. Hence, the ex-post CBA using individual points in time was dependent on the availability of studies (see also Figure 1), and no discounting over time of costs was carried out when the study time frame and the entry into force was not exactly aligning. Instead, percentage terms and hypothetical scenarios were employed.
- **EU legislation versus Member State reality:** in particular for the Council directives regulating the husbandry conditions of farm animal welfare requirements for pigs, laying hens, chickens for meat production and calves, large heterogeneity in the implementation in the Member States can be observed. This has implications for the

calculation of costs and benefits. Hence, the challenge for the calculation of costs and benefits was to make an informed assumption about the maximum distance between the EU-wide average BAU scenario and the minimum fulfilment of EU legislation on a provision per provision basis. Given the unavailability of this information, this study has used a simplified approach based on minimum and maximum compliance assumptions for the average EU stock of the respective animal category. Another limitation applies to the consideration of transition periods: Different transition periods existed and for some Member States, due to these transitions, compliance with the provision might have generated no costs (or benefits). However, again due to limitations of the available literature and the scope of the study, it was not systematically investigated for all Member States and animal categories which type of transition applies and therefore, what costs and benefits occurred. Furthermore, the focus is on cost and benefits of compliance with the minimum legislation standard, hence national "gold plating" or additional obligations required by private standards were also not considered.

- Time and budgetary constraints, combined with a large scope of the study. In particular the economic importance of the provisions in relation to production costs would have needed more attention, but also the costs and benefits for example for consumers or the environment could only be touched upon briefly. This latter part suffered strongly from the unavailability of coherent historical data (production volume, prices) for the main production activities of the farm level directives.

Limitations and reliability of data

There are difficulties to measure "animal welfare" due to the lack of agreed indicators on how to measure animal welfare and lack of EU level harmonised data collection system or relevant statistics from e.g. slaughterhouses, further aggravated by a lack of points of comparison to measure progress over time.

To mitigate the **lack of EU-wide indicators** to measure animal welfare focus has been put in the fitness check on providing a qualitative description of the points of comparison as solid as possible, based on an assessment of the extent to which the current legislation allows for the animals to express their natural behaviour (e.g. to move around in confined spaces), e.g. reflected in the prevalence of certain injuries and diseases.

In addition, raw data such as slaughterhouse statistics (e.g. rejection and mortality rates for pigs, footpad dermatitis rates for broilers) have been used to the extent possible to assess the evolution as regards the level of animal welfare. Even though these statistics are not comparable for all Member States – since no such general requirement exists at EU level - and not regularly collected and made available for all animal species, they still provide useful examples that help to illustrate the evolution of animal welfare over time.

To that end, at the EU Animal Welfare Platform's meeting on 10 November 2021, a specific call to fill existing gaps was made to Member States, business organisations and NGOs to provide data on foot-pad dermatitis rates for broilers, the number of pigs raised with intact tails, longevity trends for calves and dairy cows, somatic cell counts for dairy cows, rejection and mortality rates for pigs and poultry and the number of calves and sows kept in individual pens and stalls.

Concerning **points of comparison**, the situation before the adoption of the current legislation had to be re-constructed qualitatively, based on literature and stakeholder consultations due to the lack of specific quantitative data, and robust indicators, on the level of animal welfare and the situation as regards the competitiveness of EU business operators.

To note is that there **is no evidence on the costs of implementing the Farm Directive**, since its provisions are generally formulated. The CBA study concludes that the Directive has been linked to some administrative costs for farmers (record keeping, usually considered good practice and a norm in modern farming). However, while other implementation costs may have been generated by the Directive, e.g. to improve buildings, such changes have also been driven by other policies than animal welfare legislation (e.g. support to farmers to modernise and optimise their buildings and equipment) and as such are difficult to attribute to the Directive.

The **lack of quantitative data** on (some types of) costs – and benefits – is a general problem, common to all pieces of the EU animal welfare legislation. This made it complicated, and sometimes impossible, to assess the ratio of costs/benefits and the distribution across stakeholders, as shown in the CBA study. To some extent, this has been complemented by qualitative information provided by interviewed stakeholders.

Robustness of results

The evolution of animal welfare since the adoption of the current legislation has not been systematically recorded, evaluated or monetised. Hence, there are some challenges, mainly due to the lack of common indicators and comparable data, e.g. on rejection and mortality rates in slaughterhouses. As a result, certain assumed developments could not be concluded with certainty. However, despite the scarcity of data described above, the available literature and other evidence, including from on-site audits in the Member States, allow the fitness check findings to remain overall robust.

Overall, evidence was structured according to the judgment criteria and indicators presented in the evaluation matrix (Annex III). As not all sources of evidence are equally robust, consideration was given as to when and how the evidence was collected and whether there was any bias or uncertainty in it.

Whenever possible, triangulation of data was performed from the different data collection activities to arrive at robust and evidence-based results that could be confirmed by more than one source.

The fitness check triangulated at two different levels:

- Triangulation of data: primary data from stakeholder consultation activities and secondary data derived from the desk research.
- Triangulation of methods: desk-based research, survey, interviews, public consultation.

There were some cases where the public and targeted consultation and literature review did not produce enough robust evidence to provide a complete answer to the fitness check questions, including:

- Limited data to assess the extent to which the EU animal welfare legislation allow business operators to incorporate advances in science and innovation (fitness check question 1.3).
- Limited data to assess the consequences or effects (whether socio-economic, environmental or health-related, both positive and negative) that were not originally planned (fitness check question 4.4).

Quality of analysis

The Public Consultation contributions were quality-reviewed to see whether different respondents' assessments could be analysed in combination, to provide a more detailed analysis of views and perceptions of animal welfare. In addition, a considerable amount of literature was reviewed, and carefully compared with each other as well as with the views expressed by stakeholders in the consultation activities.

A rating of the quality of the available evidence has been provided for each fitness check question in the evaluation matrix in Annex III.

Critical assessment of work carried out by external contractor

The external study was performed with considerable time and budgetary constraints, with a very broad scope (seven legal acts to assess, from farm level to transport and slaughter) and relied on data/information already available (no own primary data collection was performed from the study team). Still, the study is based on a thorough analysis of a considerable amount of scientific and economic studies, including views from stakeholders, and therefore sufficiently robust.

The work carried out by the external contractor on the cost-effectiveness of the current EU animal welfare legislation is considered of good quality despite the limitations described above. There is a logical progression from the evidence gathered to the analysis and conclusions.

The Commission services agree broadly with the assumptions and conclusions presented.

ANNEX III. EVALUATION MATRIX AND, WHERE RELEVANT, DETAILS ON ANSWERS TO THE EVALUATION QUESTIONS (BY CRITERION)

Question	Sub-question	Judgement criteria	Indicator	Data sources/quality of evidence
Relevance • To what extent is the EU legislation on the welfare of farmed animals an appropriate EU level response to animal welfare needs and other current and future needs?	○ What are the needs, interests and expectations of stakeholders - including farmers, consumers, business operators and competent authorities - and to what extent does the current EU legislation on the welfare of farmed animals address them?	Degree to which the current EU animal welfare legislation meets the need, interests and expectations of stakeholders.	Animal welfare as business factor for farmers and food business operators. Attention paid to animal welfare by citizens and politicians in the EU.	Interviews with farmers and food business organisations; literature; Eurobarometers Quality of evidence: High *(Difficult to obtain evidence on the expectation of stakeholders in the 1990's when the current legislation was adopted)*
	○ Does the EU legislation on animal welfare remain fit for purpose in the light of the latest developments and ongoing/future challenges?	Degree to which the current EU animal welfare legislation remains fit for purpose (scientific and societal developments, including development of national legislation).	Scientific developments not taken into account in the EU legislation (see non-exhaustive list below). Member States' national legislation going beyond the EU standards (see examples below).	Interviews; targeted survey; public consultation; literature; Quality of evidence: High
	○ To what extent does the EU legislation on the welfare of farmed animals allow	Degree to which the current EU animal welfare legislation allows for the incorporation of science and innovation by operators.	Level of flexibility in adapting practices to new developments.	Targeted survey Quality of evidence: Low *(No evidence found in the public*

	business operators to incorporate advances in science and innovation?			*domain*)
Coherence • To what extent has the EU animal welfare legislation been coherent internally and with other EU and non-EU interventions related to Animal Welfare?	2.1) To what extent is the EU legislation on the welfare of farmed animals internally coherent, including all of their implementing acts? What, if any, are the inconsistencies, contradictions, unnecessary duplication, overlap or missing links between different pieces of animal welfare legislation? Are these leading to unintended results?	Degree to which the respective pieces of EU animal welfare legislation are consistent with each other. Degree to which unintended results have occurred.	Existence of provisions with conflicting objectives or outcomes. Existence of unintended results	Interviews; targeted survey; public consultation; literature. Quality of evidence: High *(No evidence found on any unintended results).*
	2.2) To what extent is the EU legislation on the welfare of farmed animals coherent with relevant OIE standards and other policy areas and pieces of legislation? What, if any, are the inconsistencies, contradictions, unnecessary duplications, overlaps or missing links between EU animal welfare legislation, OIE standards and related policies and pieces of legislation as actually	Degree to which the respective pieces of EU animal welfare legislation are consistent with legislation in other policy areas.	Existence of provisions with conflicting objectives or outcomes.	Interviews; targeted survey; public consultation; literature. Quality of evidence: High

	implemented and enforced? Are these leading to unintended results?			
Efficiency • To what extent has the EU legislation on the welfare of farmed animals been cost effective?	3.1) What are the quantifiable benefits, taking into account resources (cost, time etc.) to stakeholders, including consumers, farmers, business operators and competent authorities?	Degree to which the respective pieces of EU animal welfare legislation have brought tangible benefits and to whom.	Benefits (direct and indirect) from social, economic and environmental perspective for: • Animals • Farmers/business operators • Competent authorities (< risks for animal health/less controls) • Consumers Quantitative and qualitative evidence on benefits for: • Animals • Consumers • Environment • Public health	CBA study; interviews; targeted survey; public consultation; literature. Quality of evidence: Medium *(No evidence of the costs related specifically to the time devoted to compliance with EU animal welfare requirements by operators/authorities).*
	3.2) What are the quantifiable burdens, taking into account resources (cost, time, etc.) to stakeholders, and are there aspects that could be simplified to improve efficiency?	Degree to which the respective pieces of EU animal welfare legislation have brought tangible burdens and costs.	Compliance and administrative costs for: - Farmers/business operators, including SME's - Competent authorities (< risks for animal welfare/less controls) - consumers Quantitative and qualitative evidence on: • Investments in new infrastructure and equipment • Management practices	CBA study; interviews; targeted survey; public consultation; literature. Quality of evidence: Medium

			(mutilations etc). • Administration Potential to reduce administrative burdens (including but not limited to SMEs).	
	3.3) How cost efficient is the EU legislation on the welfare of farmed animals in ensuring animal welfare and in contributing to environmental objectives and a level playing field for EU business operators?	Degree to which the costs brought by the respective pieces of EU animal welfare legislation are outweighed by benefits.	Ratio of costs and benefits Distribution of costs and benefits across stakeholders and welfare areas	CBA study; interviews; targeted survey; public consultation; literature. Quality of evidence: Medium
Effectiveness • To what extent has the EU animal welfare legislation delivered against its intended objectives?	4.1) To what extent has the EU legislation on the welfare of farmed animals contributed to and/or hindered: A more comprehensive and uniform protection of animals across species in the EU, including farmed fish? What are the key gaps to do more? *(general objective)* The functioning of the EU market and a level playing field in the EU and at global level? *(general objective)*	Degree to which the EU animal welfare legislation have contributed to achieve the objectives. Degree to which the respective pieces of EU animal welfare legislation address all animals in need.	Animal welfare defined as by the extent to which the animals are allowed to express natural behavior, and illustrated by: • statistics on certain injuries (e.g. lameness) and mortality • statistics on diseases (e.g. mastitis and foot-pad dermatitis) • statistics on the sales of antimicrobials for veterinary use. Welfare of animal species not subjected to specific EU requirement. Differences in animal welfare standards between Member States, and	CBA study; interviews; targeted survey; public consultation; literature. Quality of evidence: Medium

	Rational production and a sustainable food chain? Meeting societal demands *(specific objective)*? Improving knowledge of key actors *(specific objective)*?		differences in the application of common requirements. Complaints raised against unfair conditions of competition caused by the EU animal welfare legislation. The level of balance between the objective of ensuring an economically viable food production and the objective of respecting animal welfare and other aspects of sustainability. Expectations of citizens/consumers as expressed in Eurobarometers and the ECI "End the Cage Age". Level of animal welfare competence among staff handling animals (as illustrated by trainings provided by the Member States to that end).	
	4.2) To what extent, why and in which aspects has the EU legislation for the welfare of farmed animals been difficult to comply with, taking into account also the interplay between different pieces of legislation including those governing animal production?	Degree to which the respective pieces of EU animal welfare legislation have been difficult to comply with due to difficulties in interpretation.	The use of open norms, such as "sufficient" and "appropriate".	CBA study; interviews; targeted survey; public consultation; literature. Quality of evidence: High

	4.3) To what extent is the EU legislation on the welfare of farmed animals effectively implemented across EU Member States (e.g. enforcement)?	Degree to which the respective pieces of EU animal welfare legislation have been difficult to enforce.	Difficulties in the application of common requirements (infringements, complaints, official control reports, audits etc).	CBA study; interviews; targeted survey; public consultation; literature; audits. Quality of evidence: High
	4.4) What are the consequences or effects (whether socio-economic, environmental or health-related, both positive and negative) that were not originally planned (for instance, unnecessary regulatory burden, obsolete measures or gaps in the legislative framework, interplay between different pieces of legislation, external factors)?	Degree to which the respective pieces of EU animal welfare legislation have had unintended effects.	The level of administrative burden related to monitoring and record-keeping. The level of (further) intensification of the food production system.	Interviews; targeted survey, CBA study. Quality of evidence: Medium
EU added value • Is there added value in regulating the welfare of farmed animals at EU level rather than at national level?	5.1) What – if any – is the EU added value of the EU legislation on the welfare of farmed animals in relation to its main objectives? What are the strength and weaknesses of regulating animal welfare at EU level? To what extent is that legislation implementable?	Degree to which the respective pieces of EU animal welfare legislation have had results that could not have been (better) achieved by the Member States alone.	The level of harmonisation/approximation of increased animal welfare standards across the EU. The level of fair(er) competition for EU farmers and other EU food business operators.	Interviews; literature. Quality of evidence: Medium

Fitness Check questions

Relevance (*To what extent is the EU legislation on the welfare of farmed animals an appropriate EU level response to animal welfare needs and other current and future needs?*):

- *What are the needs, interests and expectations of stakeholders - including farmers, consumers, business operators and competent authorities - and to what extent does the current EU legislation on the welfare of farmed animals address them?*

  As regards farmers and other food business operators, see section 4.3.1.1 and Annex V (section 2.1) of the SWD, and the evidence presented there.

  As regards consumers, see section 4.3.1.2 and Annex V (section 2.1) of the SWD, and the evidence presented there.

  As regards Member States and their authorities, see sections 4.1.1 and 4.3.1.3 and Annex V (section 2.1) of the SWD, and the evidence presented there.

- *Does the EU legislation on animal welfare remain fit for purpose in the light of the latest developments and ongoing/future challenges?*

  In addition to section 4.3.2 of the SWD, and the evidence presented there:

  Examples of scientific developments since the entry into force of the EU animal welfare legislation

  Scientific studies carried out since the Directives and Regulations came into force put forward certain animal welfare issues that are not taken into account in the existing legislation.

  Animal welfare at farm level

  The default density requirements for broilers (33 kg per m²) in the legislation are not aligned with those in a 2000 EFSA opinion (25 kg per m²). This aspect, and the broader issue of caging, is also central to recent EFSA mandates, expected to be delivered in 2022 and 2023. Experts considered that the legislation does not account enough of the importance of manipulative material for pigs, and the benefit to pigs that would come from the generalised use of straw in pig farming while controlling for hygiene risks.

  Animal welfare science has also progressed on the matter of animal tethering, the crating of sows, and the group housing of dairy calves.

  We now have further evidence that birds have leg and other disorders because of the fast growth caused by genetic selection and ad libitum food provision, which causes

poor welfare. The same goes for dairy cows, which, by producing large quantities of milk, have high levels of leg disorders, mastitis and reproductive disorders[365].

There is also further evidence that beak trimming leads to chronic pain and lower animal welfare for laying hens [366367368].

There is scientific evidence showing that sows suffer considerably from being confined and that pregnant sows suffer from hunger[369], Council Directive 98/58/EC permits tie-still systems while there is evidence that cows suffer when tethered. Cows in tie-stall systems have higher mortality rates than in loose-housing systems[370].

According to scientific evidence gathered in the context of the 2010 DG SANCO study, intensive production systems currently in use throughout the EU are associated with welfare issues (that persist, despite the existing EU animal welfare requirements):

- In the case of pigs - housing does not always meet the animals' needs. Bored and frustrated animals can exhibit stress-related behaviour, such as biting the bars of their pens and biting the tails of other pigs. To prevent pigs from damaging each other, tail docking is common. Poor housing can also give rise to respiratory and foot problems.

- In the case of laying hens - poultry housing systems should allow laying hens to forage, peck and scratch the ground, dust bathe, and move away in search of a nest and roost. Even where these conditions are met, stress-related behaviour such as feather pecking still occurs. To prevent hens from damaging each other through this behaviour, beak trimming is common.

- In the case of broilers - The main welfare issues for broiler (meat) chickens are associated with selective breeding for fast growth, aggressive mating behaviour and restricted feeding.

[365] EFSA 2010a in Broom 2017 p. 49.

[366] EFSA. The welfare aspects of various systems of keeping laying hens. EFSA J. 197, 1–23 (2005).

[367] Hughes, B. O. & Gentle, M. J. Beak trimming of poultry: its implications for welfare. Worlds. Poult. Sci. J. 51, 51–61 (2005). in Eurogroup for Animals No Animal Left Behind

[368] Sandilands, V. et al. Providing laying hens with perches: Fulfilling behavioural needs but causing injury? Br. Poult. Sci. 50, 395–406 (2009). in Eurogroup for Animals No Animal Left Behind

[369] Chapinal, N. et al. Evaluation of welfare and productivity in pregnant sows kept in stalls or in 2 different group housing systems. J. Vet. Behav. Clin. Appl. Res. 5, 82–93 (2010). in Eurogroup for Animals No Animal Left Behind

[370] Popescu, S. et al. The effect of the housing system on the welfare quality of dairy cow. Ital. J. Anim. Sci. 13, 15–22 (2014) in Eurogroup for Animals No Animal Left Behind

- In the case of dairy cows - Long term genetic selection for high milk yield is the major factor causing poor welfare in dairy cows. Some of the most important aspects of poor welfare are disease conditions, in particular foot and leg disorders and mastitis. Reproductive and behavioural problems are also relevant indicators of poor welfare.[371]

- In the case of farmed fish - Welfare of farmed fish remains a major concern for the European aquaculture industry. The main causes are to be found in environmental conditions (e.g. water quality), husbandry practices (e.g. feed and feeding regime), and the genetic make-up of the stocks."

Animal welfare during transport

In general, the Regulation is based on a scientific opinion on the welfare of animals during transport adopted by the Scientific Committee on Animal Health and Welfare on 11 March 2002. However, provisions in the Regulation which apply to transport time, resting time and space allowances were taken from the previous Directive from 1995, based on a scientific opinion from 1992[372]. Today, there is more scientific research which can assist to a better definition of the acceptable maximum journey times and recovery periods for the different species and ages of animals that are transported.

In 2010, in order to receive updated scientific evidence and to compile the present report, the Commission requested the EFSA to provide a scientific opinion on the welfare of animals during transport. The EFSA opinion was adopted on 2 December 2010[373]. In the conclusions of the opinion, scientists recognise that parts of the present Regulation – e.g. regarding thermal limits and training requirements –are not in line with current scientific knowledge, and point out specific areas where future research is recommended.

New scientific findings show that animal welfare tends to become worse as journey length increases[374]. Furthermore, more studies show that different species and age may

[371] Since 2010, dairy genetic producers have evolved, and give more importance to a multitude of animal welfare-related factors, see e.g. the Commissions audit report DG(SANTE) 2016-8760 on the welfare of cattle in dairy farms in Ireland.

[372] Council Directive 91/628/EEC of 19 November 1991 on the protection of animals during transport and amending Directives 90/425/EEC and 91/496/EEC; OJ L 340, 11.12.1991, p. 17.

[373] Published in the EFSA Journal 2011;9(1):1966. Scientific Opinion Concerning the Welfare of Animals during Transport (https://www.efsa.europa.eu/en/efsajournal/pub/1966)

[374] SCAHAW (2002).

respond very differently to the stress of transport. EFSA has suggested that animal welfare recommendations should be adapted to each type of animal[375].

New studies allowed to determine the impact of transport on animal welfare more clearly. For example, poultry face an increased likelihood of increased mortality for any journey above 4 hours[376]. It has also been shown that effective temperature during transport has a major effect on the welfare and mortality rates of poultry and pigs[377]. Researchers also suggested that young calves are not well adapted to cope with transport, which leads to high rates of morbidity and mortality (both during and in the few weeks immediately following transport).

Scientific opinions from 1999[378], 2004[379], and 2011[380] already recommend to lay down species-specific temperature limits for at least some animals. Humidity should also be taken into account.

Animal welfare at the time of killing

Since the adoption of the Killing Regulation in 2009, there is more information on welfare hazards for animals at the time of killing and how to address them[381]. For example, EFSA's 2020 scientific opinion on the welfare of pigs at slaughter identified a number of hazards, such as heat stress, prolonged hunger, and respiratory distress, that give rise to welfare issues[382].

[375] EFSA (2004).

[376] DAWC (2019)

[377] Mitchell and Kettlewell, 2009; Temple et al, 2014, in Eurogroup for Animals White Paper on the revision of Council Regulation (EC) 1/2005.

[378] EU Commission (1999): Standards for the Microclimate inside Animal Transport Road Vehicles. Report of the Scientific Committee on Animal Health and Animal Welfare. Pages 24, 25. See footnote 270.

[379] EFSA (2004): Opinion of the Scientific Panel on Animal Health and Welfare on a request from the Commission related to Standards for the microclimate inside animal road transport vehicles 1 (Question N° EFSA-Q-2003-085). The EFSA Journal 122, 1-25. Pages 2, 18, 19. Link: https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j. efsa.2004.122

[380] EFSA (2011): Scientific opinion concerning the welfare of animals during transport. Page 71. See footnote 41.

[381] For example, there is the EFSA 2020 opinion on the welfare of pigs at slaughter. Welfare of pigs at slaughter (wiley.com)

[382] EFSA Journal 2020;18(6):6148, Welfare of pigs at slaughter | EFSA (europa.eu).

In 2012, EFSA reviewed relevant new scientific references on electrical stunning of poultry. Regarding waterbath stunning, scientific evidence suggests that when it is used, it is not possible to ensure that all birds are stunned[383].

Furthermore, there have been scientific developments concerning the welfare of fish. There is scientific evidence to support the assumption that some fish species have brain structures potentially capable of experiencing pain and fear[384]. In 2009, EFSA published several opinions on the welfare aspects of the main systems of stunning and killing for the main fish species farmed in the EU[385]. These EFSA opinions have not been taken into account in the Killing Regulation. EFSA concluded that many of the methods and much of the equipment in use then resulted in poor fish welfare[386]. These scientific developments are also reflected in a Commission report on the possibility of introducing certain requirements regarding the protection of fish at the time of killing[387].

[383] EFSA Journal 2012;10(6):2757, Scientific Opinion on the electrical requirements for waterbath stunning equipment applicable for poultry, p. 34.

[384] EFSA Journal (2009) 954, General approach to fish welfare and to the concept of sentience in fish Scientific Opinion of the Panel on Animal Health and Welfare p. 12. General approach to fish welfare and to the concept of sentience in fish - - 2009 - EFSA Journal - Wiley Online Library

[385] Scientific Opinions of the Panel on Animal Health and Welfare on a request from the European Commission on Species-specific welfare aspects of the main systems of stunning and killing of farmed fish

Farmed Carp http://www.efsa.europa.eu/en/efsajournal/pub/1013

Farmed Rainbow Trout http://www.efsa.europa.eu/en/efsajournal/pub/1012

Farmed Sea Bream and Sea Bass http://www.efsa.europa.eu/en/efsajournal/pub/1010

Farmed Atlantic Salmon http://www.efsa.europa.eu/en/efsajournal/pub/1011

[386] COM(2018) 87 final, REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the possibility of introducing certain requirements regarding the protection of fish at the time of killing, p. 2., Legal provisions of COM(2018)87 - Possibility of introducing certain requirements regarding the protection of fish at the time of killing - EU monitor.

[387] COM(2018) 87 final, REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the possibility of introducing certain requirements regarding the protection of fish at the time of killing, Legal provisions of COM(2018)87 - Possibility of introducing certain requirements regarding the protection of fish at the time of killing - EU monitor

Examples of national legislation adopted since the entry into force of the EU animal welfare legislation, going beyond EU requirements:

EU directive or regulation	Member State	Member State law	Year	Description
CR (EC) No 1/2005 (Transport)	Romania	Law no. 150 of 23 July 2020 on the protection of animals intended for export to third countries	2020	Export to Third Countries: Sanitary-veterinary assistance services shall be provided on board the vessel The veterinary medical staff has the following obligations: a) performs the daily inspection of the animals regarding their health and welfare; b) provides medical-veterinary assistance for the transported animals; c) completes the daily report provided in the annex which is an integral part of this law.
CR (EC) No 1/2005 (Transport)	Germany		2021	The maximum transport time for animals to slaughter is 8 hours, and if the temperatures risk to rise over 30 degree max. 4,5 hours. Calves < 28 days cannot be transported within Germany These requirements came into force on 1 January 2022 with a transitional period of one year.
CR (EC) No 1/2005 (Transport)	Ireland	S.I. No. 356/2016 - Carriage of Livestock by Sea Regulations 2016	2016	Irish Regulation outlines specifications and equipment for vessels, covering stability requirements, fittings, design of pens/ stalls/ passageways for cattle and for sheep, electric power, ventilation, drainage, lighting, feed and water, veterinary equipment (medicines, captive bolt pistol, etc.)
CR (EC) No 1099/2009 (Killing)	Luxembourg	June 27, Act to ensure the dignity, protection of life, safety and welfare of animals	2018	Prohibition to kill or have an animal killed unnecessarily Obligation to rescue a suffering, injured or endangered animal http://legilux.public.lu/eli/etat/leg/loi/2018/06/27/a537/jo
CD 1999/74/EC (Laying hens)	Luxembourg		2007	Ban on enriched cages (in addition to a ban on conventional battery cages, as required by the Directive)
CD 1999/74/EC (Laying hens)	Czechia	Amendment of Animal Protection Act	2020	Ban on cages for laying hens and laying breeders from 2027 http://eagri.cz/public/web/en/mze/

CD 98/58/EC (General protection)	Germany		2020	"Ban on sow stalls (2028-2030) and farrowing crates after 5 days (2035-2037)" PowerPoint Presentation (animalwelfareintergroup.eu)
CD 2007/43/EC (Chickens kept for meat production	Germany	Tierschutz-Nutztierverordnung		Buildings built after 2009 are required to have openings to provide natural light equal to 3% of the floored area. Flickering lights are explicitly not permitted. This means that in practice, lights providing at least 160 Hz are used -> It is necessary to have alarms and power back-up systems to ensure the continued provision of food and water.
CD 2007/43/EC (Chickens kept for meat production	Austria			-> Maximum stocking density is 30 kg/m2 (instead of 33 kg/m2. -> Growers must comply with the requirements of Annexes I and III despite not stocking at higher densities.
CD 2007/43/EC (Chickens kept for meat production	Sweden			-> Basic maximum stocking density is 20 kg/m2 (instead of 33 kg/m2). -> Art. 3(5) is not taken up. Growers can progressively increase their stocking density from 20 kg/m2to a maximum of 36 kg/m2as long as they meet the requirements of the Animal Care Programme.
CD 2007/43/EC (Chickens kept for meat production	Germany	Tierschutz-Nutztierverordnung		The derogation under Art. 3(5) is not taken up at all and producers must follow the requirements of Annex II, irrespective of the stocking density they use.
	Netherlands			A number of Member States have introduced a scoring system for food pad dermatitis, the results from which form an additional criterion which must be met by growers. In the Netherlands for example, growers must achieve a score of less than 80 in order to use the derogation under Art. 3(5). (In other Member States, for example Denmark, Germany and Sweden, the breaching of trigger levels set against the FPD indicator can result in enforced reductions in stocking density).
	Spain			In addition to the subjects set out in Annex IV of the Directive, training courses also cover the working of equipment and legislation on sanitary issues and animal welfare.

- *To what extent does the EU legislation on the welfare of farmed animals allow business operators to incorporate advances in science and innovation?*

In the targeted survey, 36% of business or professional associations consider that the EU animal welfare legislation partially allows them to incorporate advances in science and innovation, but 27% replied that the legislation allows them to do so only mostly or totally (36% did not know).

Views expressed by stakeholders suggest that the EU animal welfare legislation does not support nor restrict business operators to incorporate advances from science and innovation. The main limitations to incorporate advances in science and innovation (such as digitalization) seems to result from economic concerns (innovations often result in higher costs).

Coherence (*To what extent has the EU animal welfare legislation been coherent internally and with other EU and non-EU interventions related to Animal Welfare?*):

2.1) To what extent is the EU legislation on the welfare of farmed animals internally coherent, including all of their implementing acts? What, if any, are the inconsistencies, contradictions, unnecessary duplication, overlap or missing links between different pieces of animal welfare legislation? Are these leading to unintended results?

See section 4.1.3.1 of the SWD, and the evidence presented there.

2.2) To what extent is the EU legislation on the welfare of farmed animals coherent with relevant OIE standards and other policy areas and pieces of legislation? What, if any, are the inconsistencies, contradictions, unnecessary duplications, overlaps or missing links between EU animal welfare legislation, OIE standards and related policies and pieces of legislation as actually implemented and enforced? Are these leading to unintended results?

In addition to section 4.1.3.2 of the SWD, and the evidence presented there, as regards the coherence between animal welfare and environmental policy:

Animal housing aspects with an impact on animal welfare can correlate also with the impact in terms of **air pollution emissions**. 39% of the ammonia emissions in the EU are from animal housing[388], notably in-doors cattle, pigs

[388] Clean Air Outlook supporting report "Measures to address air pollution from agricultural sources", December 2017, IIASA

and poultry. Main issues to consider in this respect are: manure management measures/techniques, livestock intensity, access to grazing/outdoor time and indoor air quality measures e.g. filters, air scrubbers. For these aspects, stricter animal welfare rules would also **bring co-benefits** in terms of reduced air pollution and contributions towards reaching the clean air objectives: reduced emissions/improved air quality (Directive (EU) 2016/2284; Directive 2008/50/EC). Improved animal welfare measures with clean air co-benefits will contribute to better indoor air quality thus less health hazards for farm workers; better outdoor quality (notably formation of secondary particulate matter from ammonia) with reduced negative health impacts including in European cities; and reduced pressure on ecosystems (reduced eutrophication) and thereby benefits for the Union's biodiversity objectives.

Other clean air measures notably regarding floor structure (e.g. slatted floors) and choice of floor / bedding materials can risk having a negative impact on animal welfare; animal welfare measures to promote e.g. increased use of straw for pigs may need to be accompanied by sufficient requirements for proper manure management to ensure both hygiene/cleanliness and no increase in ammonia emissions.

Efficiency (*To what extent has the EU legislation on the welfare of farmed animals been cost effective?*):

3.1) What are the quantifiable benefits, taking into account resources (cost, time etc.) to stakeholders, including consumers, farmers, business operators and competent authorities?

See section 4.1.2 and Annex VIII of the SWD, and the evidence presented there.

3.2) What are the quantifiable burdens, taking into account resources (cost, time, etc.) to stakeholders, and are there aspects that could be simplified to improve efficiency?

See section 4.1.2 and Annex VIII of the SWD, and the evidence presented there.

3.3) How cost efficient is the EU legislation on the welfare of farmed animals in ensuring animal welfare and in contributing to environmental objectives and a level playing field for EU business operators?

See section 4.1.2 and Annex VIII of the SWD, and the evidence presented there.

Effectiveness (*To what extent has the EU animal welfare legislation delivered against its intended objectives?)*:

4.1) To what extent has the EU legislation on the welfare of farmed animals contributed to and/or hindered:

- A more comprehensive and uniform protection of animals across species in the EU, including farmed fish? What are the key gaps to do more?

- The functioning of the EU market and a level playing field in the EU and at global level?

See section 4.1.1 of the SWD, and the evidence presented there.

- *Rational production and a sustainable food chain?*

See section 4.3.2.2 of the SWD, and the evidence presented there.

- *Meeting societal demands?*

See section 4.3.1.2 of the SWD, and the evidence presented there.

- *Improving knowledge of key actors?*

See section 4.1.1 of the SWD, and the evidence presented there.

4.2) To what extent, why and in which aspects has the EU legislation for the welfare of farmed animals been difficult to comply with, taking into account also the interplay between different pieces of legislation including those governing animal production?

In addition to section 4.1.1 and Annex V (section 2.2) of the SWD, and the evidence presented there:

An interviewed business organisation stressed that the proper coordination of different legislative requirements (on animal welfare, animal health, food safety, environment etc.) should be done at EU level. Otherwise, it is up to the farmers to "coherently assemble them and comply with all of it", and they are likely not prepared to do so, according to that organisation.

4.3) To what extent is the EU legislation on the welfare of farmed animals effectively implemented across EU Member States (e.g. enforcement)?

See section 4.1.1 of the SWD, and the evidence presented there.

4.4) What are the consequences or effects (whether socio-economic, environmental or health-related, both positive and negative) that were not originally planned (for instance, unnecessary regulatory burden, obsolete measures or gaps in the legislative framework, interplay between different pieces of legislation, external factors)?

Evidence of an unintended effect of the EU animal welfare legislation emerged from an interview with a business organisation representing farmers: The organisation claimed that the legislation has promoted a shift in business type from smaller to larger operations. This view is confirmed by the targeted survey, in which 80% (33 out of 41) of the respondents agreed (partially of fully) to such a statement.

EU added value (*Is there added value in regulating the welfare of farmed animals at EU level rather than at national level?)*:

5.1) What – if any – is the EU added value of the EU legislation on the welfare of farmed animals in relation to its main objectives? What are the strength and weaknesses of regulating animal welfare at EU level? To what extent is that legislation implementable?

See section 4.2 of the SWD, and the evidence presented there.

ANNEX IV. OVERVIEW OF BENEFITS AND COSTS AND TABLE ON SIMPLIFICATION AND BURDEN REDUCTION

Farm level directives

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
Pigs directive								
Costs								
Direct compliance costs[390]	Total 404,9[391][392] Of which[393]: One-off: 157,6 Recurrent: 247,3							
Enforcement costs							8,2[394]	
Indirect costs								

[389] Impacts (costs or benefits) compared to BAU: +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available

[390] Costs are the sum of annualised one-off costs (e.g. investment costs for a new housing system or their modifications) plus recurrent costs per year.

[391] The total is based on the costs of compliance for a selected number of provisions: manipulable material, floor properties and group housing. **Details can be found in section 3.2.1.9 of the CBA study.**

[392] For the Pigs Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.1 of the Annex of the study.

[393] This split is made based on a simplified approach where all costs related to the provision of manipulable material are assumed to be "recurrent costs" whereas all costs related to group housing of sows and floor properties for weaners and rearing pigs are assumed to be "one-off".

[394] These costs comprise costs for inspections by the competent authorities and are based on Rayment et al. (2010).

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
Benefits								
Direct benefits		-/+ Manipulable material may reduce tail biting and thereby, lead to cost savings and increased revenue. This may (partially) offset costs for provision of material. -/+ Group housing has the potential to result in efficiency gains but this depends on the specific circumstances 0 Castration performed at younger age and not with analgesia/anaesthesia -/0 Adjustment of slatted floors for weaner and rearing pigs only for minor share of farms 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre	-/+ Loose material better than objects but not supplied to most pigs + Likely that AW has improved due to group housing of sows, but this depends on the individual characteristics of the group housing systems (which are not specified in the legislation) and on management 0 Castration is painful at any age, shift to younger age does not reduce the pain +/0 Adjustment of slatted floors for weaner and rearing pigs required might have reduced injuries but was only required for minor share of farms 0 Floor area for weaner and rearing pigs		N.A. Effects of loose material on greenhouse gas emissions -/+ Group housing of sows (depends on system and management) 0 Castration at younger age 0 Adjustment of slatted floors for weaner and rearing pigs still allowed for good drainage 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre	-/+ Food safety: Manipulable material may transmit pathogens or contain undesirable substances; reduction of tail biting may reduce abscesses and stress-related shedding of food-borne pathogens -/+ Group housing of sows (depends on system and management) 0 Castration at younger age +/0 Adjustment of slatted floors for weaner and rearing pigs might have reduced injuries (food safety) but was only required for minor share of farms 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre		

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
			corresponded to BAU N.A. Dietary fibre					
Indirect benefits				+ There seems to be a slightly higher WTP related to some provisions (manipulable material, anaesthesia for castration, group housing of sows/gilts)				
Laying hens directive								
Costs								
Direct compliance costs	Total 592,0[395][396] Of which[397] One-off: 440,0 Recurrent: 152,0	- Ban of unenriched cages, instead: enriched cages increased costs - Requirements for unenriched cages during transitional period increased				-/0 Ban of unenriched cages: management of floor eggs is decisive and can be challenging in enriched cages and even more in alternative systems		

[395] Details can be found in section 3.2.2.6 of the CBA study.

[396] For the Laying hens Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature**. Details can be found in section 6.2 of the Annex to the CBA study.**

[397] As argued in the case of the pigs directive, with a simplified approach assuming that i) recurrent costs correspond to 40 % of costs due to the transition to enriched cages plus costs due to beak trimming and ii) that one-off costs correspond to 60 % of costs due to the transition to enriched cages plus costs due to the requirements for the transitional period and for alternative systems.

Notes[389]	Businesses (Farms)			Animal welfare		Consumers		Environment		Public Health	Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
		costs -/0 Requirements for alternative systems increased costs but only applied to minor share of farms - Beak trimming (age limit): evidence is limited but suggests cost increase										
Enforcement costs											2,8[398]	
Indirect costs												
Benefits												
Direct benefits		+ price mark-ups for eggs from alternative systems		+ The potential to express species-specific behaviour is highest in alternative systems, followed by enriched cages while unenriched cages rank last. In contrast, the risk of adverse animal health outcomes related to infectious diseases, hygiene and parasite load is higher in alternative				-/+ The risk of negative environmental impacts is higher in alternative systems and enriched cages but with appropriate mitigation strategies, emissions can be effectively reduced in these systems. N.A. Requirements for unenriched cages during transitional period		0 Nest eggs: egg shell contamination higher in alternative systems whereas no difference for unenriched/enriched cages, no difference in egg content contamination between systems N.A. Requirements for unenriched cages during transitional period		

[398] These costs comprise costs for inspections by the competent authorities and are based on Rayment et al. (2010).

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
			systems whereas both cage types rank equal in this regard. Management is a decisive factor for AW in all farming systems and as experience has accumulated over the years, similar mortality rates can be observed in indoor alternative systems and cage systems. + Requirements for unenriched cages during transitional period improved AW to limited extent N.A. Alternative systems differed too much to evaluate AW effects +/0 Beak trimming (age limit): positive effect for hot blade method, no effect for infrared which has evolved as preferred method		N.A. Alternative systems differed too much to evaluate environmental effects N.A. Beak trimming (age limit)	N.A. Alternative systems differed too much to evaluate environmental effects N.A. Beak trimming (age limit)		
Indirect benefits				+ Support for a legal ban of				

Notes[389]	Businesses (Farms)			Animal welfare		Consumers		Environment		Public Health	Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
						cages has been expressed by share of consumers at different points in time, price mark-ups are paid for eggs from alternative systems N.A. Requirements for unenriched cages during transitional period N.A. Alternative systems differed too much to evaluate environmental effects N.A. Beak trimming (age limit)						
Calves directive												
Costs												
Direct compliance costs	One-off costs[399]:	Costs depend on the type of farm (veal,										

[399] For the Calves Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.4 of the Annex of the CBA study.

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
	42,1 (adjustment costs)	beef, dairy)[400]						
Enforcement costs							9,6[401]	
Indirect costs								
Benefits								
Direct benefits			+ Larger individual pens + Group housing (depending on additional management-related factors) +/0 Hb threshold, only to be achieved *on average* + Roughage (depending on additional factors such as fibre source and particle size)					
Indirect benefits								
Broiler directive								
Costs								
Direct	Total							

[400] No information about fees or administrative costs could be found. **Detailed explanation can be found in section 3.2.4.2 of the CBA study.**

[401] These costs comprise costs for inspection by the competent authorities and is based on Rayment et al. (2010).

Notes[389]	Businesses (Farms)		Animal welfare	Consumers	Environment	Public Health	Public authorities	
	Mio. €/year	Qualitative	Qualitative	Qualitative	Qualitative	Qualitative	Mio. €/year	Qualitative
compliance costs	35,8 Of which[402] One-off: 26,9 Recurrent: 8,9							
Enforcement costs							N.A.	sporadic information could be obtained indicating that costs were limited
Indirect costs								
Benefits								
Direct benefits			+ Upper limit of stocking densities connected to climate and temperature has probably resulted in some (but limited) improvements of AW + Monitoring/follow-up at slaughterhouses (but differences between the MS are expected)					

[402] As argued in the case of the previous Directives, with a simplified approach assuming that i) recurrent costs correspond to 25 % of costs due to the transition and ii) one-off costs correspond to 75 % of costs due to the transition.

Notes[389]	Businesses (Farms)			Animal welfare		Consumers		Environment		Public Health	Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Indirect benefits												

Transport regulation

Notes[403]	Businesses (transport companies)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Transport regulation												
Costs												
Direct compliance costs	Total[404]: 1726 Of which: One off: 126 Recurrent: 1600	Of the one-off costs: Administrative costs relate to: Approval of mean of transport, authorisation of transport Of the recurrent costs: Administative costs relate to record keeping (transport planning; disinfection register)										- Administrative costs of CAs increased by 5 to 15 % (survey by Baltussen et al. 2011)

[403] Impacts (costs or benefits) compared to BAU: : +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available

[404] **Details can be found in the report in section 3.3.2 of the CBA study.**

Notes[403]	Businesses (transport companies)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Enforcement costs											14,0-15,0[405]	0 56% of the MS have made no change in inspection and approval routines for means of transport (survey by Baltussen et al. 2011)
Indirect costs												
Benefits												
Direct benefits		N.A. Positive effects on revenues possible due to less injuries and bruises but it is not yet certain whether this has been achieved in practice		N.A. Positive effects are possible as some prerequisites for better AW were introduced but assessments using animal-based indicators are lacking as was also concluded by Baltussen and Wagenberg (2018)		-/+ Positive and negative evaluations of some of the provisions have been stated by consumers						+ 50 % of CAs surveyed by Baltussen et al. (2011) indicate benefits in control activities due to navigation system
Indirect benefits												

[405] These costs comprise costs for inspection by the competent authorities and is based on Rayment et al. (2010). Details can be found in the report in section 3.3.2 of the CBA study.

Killing Regulation

Notes[406]	Businesses (slaughterhouses)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Killing regulation												
Costs												
Direct compliance costs	23,0 – 49,0[407]	-/+ Revenues due to carcass quality (PSE, haemorrhages) - Animal welfare officers, SOPs, certification of staff, equipment increased costs										
Enforcement costs											One-off: 1,9 (adjustment costs) Recurrent: 6,5 (adjustment costs for reference networks, certification,	Adjustment costs for certification of staff can be partially recovered from businesses (slaughterhouses) via fees In addition: No cost estimate for authorisation of new stunning/ killing

[406] Impacts (costs or benefits) compared to BAU: +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available

[407] There is a lack of information on the costs of the Killing Regulation to slaughterhouses. Only two aggregate figures could be obtained for the EU-level and for the UK (by Rayment et al. 2010 and DEFRA 2013). When taking a closer look at these figures, it appears that they differ with regards to some of the provisions they comprise and that there is a remarkable difference concerning the revenue side. **Details can be found in section 3.4.2 of the CBA study**. In this table, the figure by Rayment et al. (2010) is displayed.

Notes[406]	Businesses (slaughterhouses)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
											reporting duties [408]	methods. But evidence that this can be recovered from businesses (slaughterhouses) via fees[409]
Indirect costs												
Benefits												

[408] The available evidence is scarce but suggests that costs were very limited. **For details, see section 3.4.2 of the CBA study.**

[409] For details, see section 3.4.2 of the CBA study.

TABLE 2: Simplification and burden reduction (savings already achieved) *Report any simplification, burden reduction and cost savings **achieved already** by the intervention evaluated, including the points of comparison/ where available (e.g. REFIT savings predicted in the IA or other sources).*								
	Citizens/Consumers/Workers		Businesses		Administrations		[Other…] _ specify	
	Quantitative	Comment	Quantitative	Comment	Quantitative	Comment	Quantitative	Comment
		These groups are not targeted by the EU animal welfare legislation.		More harmonised rules for **slaughterhouses,** including common technical specifications, allowed for equipment to be produced in a more standardised way, hence becoming less costly for slaughterhouses.		More harmonised rules allowed for official controls to be distributed among the Member States, e.g. for cross-border animal **transports** where the inspection before departure in one Member State is valid along the entire journey.		
Type: One-off / recurrent (select)				One-off		Recurrent		
PART II: II Potential simplification and burden reduction (savings) *Identify further potential simplification and savings **that could be achieved** with a view to make the initiative more effective and efficient without prejudice to its policy objectives*[410].								

[410] This assessment is without prejudice to a possible future Impact Assessment.

	Citizens/Consumers/Workers		Businesses		Administrations		[Other…] _ specify	
	Quantitative	Comment	Quantitative	Comment	Quantitative	Comment	Quantitative	Comment
		These groups are not targeted by the EU animal welfare legislation.		Further harmonisation, and a greater digitalisation of procedures, e.g. for monitoring and reporting, could bring simplifications and further burden reductions for businesses, in the areas of welfare at farm, transport and slaughter. Provisions could also be made less complex and better adapted to SME's such as. small slaughterhouses, (for which e.g. the requirement of recording the electrical parameters for head only stunning may be disproportionally cumbersome).		Further harmonisation, and a further digitalisation, could simplify official controls on farms, on animal transports and in slaughterhouses, and reduce the administrative burden for the Member States' competent authorities (for instance by creating an on-line system for the authorisation and monitoring of animal transports).		
Description:…								

Type: One-off / recurrent (select)				Recurrent		Recurrent		

ANNEX V. STAKEHOLDER CONSULTATION - SYNOPSIS REPORT

INTRODUCTION

This synopsis report provides an overview of the results of the consultation activities carried out in the context of the fitness check supporting the revision of the EU animal welfare legislation under the Farm to Fork Strategy.

1. CONSULTATION STRATEGY

1. Overview of consultation activities

In line with the stakeholder consultation's strategy, the fitness check entailed the following consultation activities:

- roadmap published for stakeholders' feedback;
- targeted interviews;
- targeted survey and data requests;
- public consultation;
- stakeholders' conference.

The fitness check **roadmap** was published for **feedback** on 20 May 2020 to 29 July 2020. Feedback was received by 172 respondents, representing industry, trade unions, NGO's and citizens (of which many German and Italian).

A total of 10 **targeted interviews** were conducted with stakeholders from farm to fork, (i.e. organisations representing farmers, processors/transporters and retailers), as well as a consumers' organisation. These mainly exploratory interviews, which were held from 23 April 2021 to 6 July 2021, aimed in particular at collecting evidence on the costs and benefits linked to the EU animal welfare legislation. In addition, interviews were held from 23 July 2021 to 23 November 2021 with an animal welfare NGO, a professional organisation representing veterinarians and a senior Commission official in DG SANTE. These interviews were mainly focusing on the developments since the adoption of the EU animal welfare legislation, to compensate for the lack of historical (and current) animal welfare indicators. The interview guides are included in Annex VII.

A **targeted survey** was distributed on 7-8 October 2021 to the Members of the EU Animal Welfare Platform and EFSA's Farm to Fork experts' working group and aimed to collect views on the fitness of the current EU animal welfare requirements. In total, 41 replies were received, of which 14 representing the Member States, 11 representing a business/professional organisation, 10 representing an NGO and 6 were independent scientific experts. The survey questionnaire is included in Annex VII.

The **public consultation** ran from 15 October 2021 to 21 January 2022, with a total of 59 281 contributions received.

A **Stakeholder Conference** was organised on 9 December 2021. The conference provided an an occasion for stakeholders to validate the preliminary findings of the Fitness Check, as well

as to elaborate on possible improvements for the future. Almost 500 stakeholders, representing e.g. Member States, NGO's, academia, SME's and international organisations, participated in the discussions.

The fitness check engaged **around 60 000 stakeholders** through the described activities. Further details on the specific groups of stakeholders who provided data, views and experiences for fitness check of the EU animal welfare legislation are provided below.

The fitness check conducted a quantitative and qualitative analysis of information gathered through the different consultation activities. The quantitative analysis included a statistical analysis of the results of the public consultation and the targeted survey All concerned stakeholder categories were reached throughout the various consultation activities and all expressed views were analysed and taken into account as part of the evidence-base of the fitness check.

The analysis of the evidence from consultation activities was conducted first at the level of individual data collection tools. Then, to the extent possible **DG SANTE** triangulated the data with data coming from the literature review, to produce the answers to the fitness check's evaluation questions and developing overarching conclusions and recommendations.

2. Stakeholders consulted

Table "Stakeholders engaged per consultation activity" provides an overview of stakeholders consulted as part of the fitness check. The breakdown of stakeholders evidences that the consultation aimed to collect different perspectives on the issues under assessment.

Stakeholders engaged per consultation activity

Consultation activity	Stakeholder group	Nr of stakeholders targeted	Nr of stakeholders responding	Level of engagement
Public consultation	Non-governmental organisations (NGOs); EU and non-EU citizens; public authorities; academic/research institutions; company and business organisations; business associations; consumer organisations; trade unions; other	N/A	59 281	Very high
Interviews	Commission DGs (SANTE); farmers; food processors, retailers, consumers, veterinarians and animal welfare NGO's	10	10	High
Targeted survey and	Business organisations, professional organisations,	100	41	Medium

Consultation activity	Stakeholder group	Nr of stakeholders targeted	Nr of stakeholders responding	Level of engagement
information request	public authorities, animal welfare NGO´s, academia (inlcuding EFSA's expert group on the Farm to Fork Strategy)			
Stakeholders' conference	Stakeholders from all groups	654 (registered)	498	High
Feedback on the fitness check roadmap	NGOs; EU and non-EU citizens; business associations; company/business organisations; trade unions; public authorities; research institutions	N/A	172	Medium

3. Consultation challenges

Some challenges emerged during the consultation activities. These can be summarised as follows:

1. **Analysis of public consultation results**: The very high number of replies received (59 281) made it challenging to get a comprehensive picture of the outcome of the public consultation. The European Commission's IT tool "CODA" was used to identify campaigns and duplicate contributions.

2. **Evidence provided by stakeholders during interviews**: For the reasons of trade secrecy and a lack of pan-European data, stakeholders were not always in a position to share detailed information on their sector's business activities and market share. As a result, the consultation activities produced limited evidence as regards the costs of compliance with the EU animal welfare legislation. However, this was to a large extent compensated by the data gathered by the external contractor for the cost-benefit analysis performed in support of the fitness check.

The challenges emerging from the public and targeted consultations were addressed by discussing and validating the fitness check findings with scientific experts and stakeholders. For instance, the preliminary findings of the fitness check were presented in the meetings if the EU Animal Welfare Platform on 22 June 2021 and 10 November 2021, as well as at the stakeholder's conference on 9 December 2021.

2. CONSULTATION RESULTS

The results of the various stakeholder consultation activities are presented below per criterion.

- **RELEVANCE**

To what extent is the EU animal welfare legislation (still) relevant?

While stakeholders across all sectors consider that the EU animal welfare was relevant at the time of its adoption, based on the based available scientific knowledge of that day, the similarly consider that the current rules are outdated today in light of societal and scientific developments.

In the public consultation, a vast majority (87% - 51 551 of 59 281) of stakeholders did not consider the current EU animal welfare legislation fit to meet the future challenges in relation to sustainable food production, such as climate change and biodiversity loss.

This contrasted to some extent with the targeted survey where 85% (35 of 41) of the stakeholders consider that the existing EU animal welfare legislation mostly or partially meets citizens' expectations on a sustainable food production. However, in the targeted survey, one representative from the academic sector pointed out that welfare may not always equal sustainability. As example was mentioned that organic chickens are kept for longer and roam outside hence they use more feed per kg meat produced and this feed may contain imported ingredients with high carbon footprint.

It also emerged from the survey that the EU legislation is outdated. For instance, one Member State (Germany) considered that *"Farm animal husbandry regarding the legal standard is becoming less and less accepted in society. This criticism varies in the member states and has led to different national legal standards, e.g. piglet production. This leads to distortions of competition at the producer level. Therefore, husbandry, transport and slaughter conditions should be tightened and harmonized at EU level."*

Similarly, in one of the interviews, one of the professional organisations representing veterinarians expressed that: *"Most of the issues that were relevant 10 years ago are somehow still relevant today. Also, there was no new legislation for quite some time while at the same time the societal expectations on animal welfare have increased and, on top of this, there are all the scientific developments, most of which are still relevant or even more relevant today."*

Another interviewed organisation representing farmers suggested that: *"The animal welfare that we had 40 years ago is not the same that consumers and society are demanding now, in 2021, and therefore the EU legislation needs to adapt to this new reality. However, time is needed for these changes, because one of the biggest impacts animal welfare has is in the structure of the production sector. The increase on costs and on the investment needed in the farm leads many small farmers to stop production."*

Today, citizens pay increasing attention to animal welfare in the EU, but consumers lack appropriate information on animal welfare. Price is still very important and consumers are often not willing to pay for animal welfare. This emerged from the consultation activities, including the public consultation where a majority (65%-84%) felt or strongly felt that they are not sufficiently informed about the conditions under which animals are farmed, transported and slaughtered in the EU (this is reflected in the targeted survey, where the corresponding figure was even higher: 90%).

In the targeted survey, a business/professional organisation expressed that: *"The benefit that the high standards of animal welfare could bring are hindered by the fact that consumers are insufficiently aware of current EU standards. There is an urgent need to focus on consumer information to make the consumers aware of the current high standards that are already in place across Europe."*

In the interviews, one business organisation representing food processors expressed the following: *"What we see is that there is an increasing interest from the consumers and citizens for animal welfare, but we don't see that yet in the market. We don't see a return on investment in additional welfare from the consumers yet, there is not enough consumer awareness and there is a huge lack of information. Consumers are not even aware of current standards, so they don't know what they are paying for today and we also see a lag in that they are not willing to pay extra for increased animal welfare as it is for the moment, not when we look at market figures."*

Also **ethical concerns** were raised in the consultation activities. For instance, the public feedback received in 2020 on the Roadmap of the Fitness Check included calls for a ban on the killing of male animals of laying breeds, in line with current ethical concerns.

- **EFFECTIVENESS**

How effectively does the EU animal welfare legislation operate in practice and which shortcomings remain to further improving animal welfare?

Stakeholders' views suggests an improvement of animal welfare – and in the level playing field of EU business operators – if compared to the situation before the entry into force of the current EU animal welfare rules. However, more could be achieved according to the consulted stakeholders.

For instance, less than half of the stakeholders believed (36%) or strongly believed (7%) that increased animal welfare has so far contributed to a more sustainable food system, for instance by allowing healthier animals to enter the food chain.

In the public consultation, almost half of the stakeholders agreed (45% - 24 461 of 59 281) or strongly agreed (3% - 1 616 of 59 281) with the claim that compared to 25 years ago, there is

more uniform protection of farmed animals across EU countries. This view was even stronger among business associations and companies.

However, an overwhelming majority (92 % - 54 504 of 59 281) of respondents thought that the current EU animal welfare legislation does not ensure adequate and uniform protection of all animal species in need. In addition, a majority of stakeholders (66% - 39 024 of 59 281) believed the legislation does not ensure that businesses can compete fairly across the EU.

As a means to improve animal welfare in the EU:

- 92% considered it important (7%, 3 859 of 59 281) or very important (85%, 50 681 of 59 281) to provide **better information to consumers** on animal welfare conditions;

- 91% considered it important (13%, 7 441 of 59 281) or very important (78%, 45 989 of 59 281) to **increase the use of scientific indicators** to better assess the welfare of animals, such as injury rates;
- 91% considered it important (9%, 5 435 of 59 281) or very important (82%, 48 766 of 59 281) to **improve the training for people handling animals**, such as farmers, slaughterhouse staff and drivers.

(Lack of) competence of animal handlers seems to have an important role, according to stakeholders, for the compliance with the legislation. It appears from the targeted survey that less than 15% of the stakeholders manage to fully comply with the current EU legislation on animal welfare at farm level. A majority (67%) considered insufficient knowledge and training of the farm operators to be a relevant or very relevant factor for this (with the exception of transport, where only 40% considered lack of competence to be a relevant or very relevant reason).

In the public consultation, a majority (59% - 31 944 of 59 281) of stakeholders believed or strongly believed that rules and requirements on animal welfare are (too) complex for consumers to understand. This **problem of vagueness/lack of specificity** is also reflected in the interviews. For instance, by a professional organization (FVE), as follows: *"In some cases, the legislation is not 100% clear and that makes enforcement difficult. (...) The general farming directive lacks clarity and leaves room for wide interpretations".*

Most stakeholders argue that open norms such as *"appropriate"* and *"sufficient"* cause differences in application that create problems for EU food business operators in different Member States, as well as pose a challenge to enforcement. However, some business organisations consider that the legislation – at least on slaughter – is clear enough, and that some rules *"can be so specific that it becomes ridiculous"* (e.g. as regards the maximum gap of 18 mm in a slatted floor for pigs). One interviewed NGO considered that "*we think that improving clarity and clarifying the regulation is not enough*", there must also be a "*better enforcement and an implementation system that is more systematic."*

The problem of vague provisions extends to all legislative acts on animal welfare. For instance, the public feedback received on the Fitness Check Roadmap in 2020 included calls for a better differentiation of responsibilities between farmers, drivers and transport companies in the Transport Regulation.

In the public consultation, an overwhelming majority (92 % - 54 504 of 59 281) of stakeholders thought that the current EU animal welfare legislation does not ensure adequate and uniform protection of all animal species in need.

Similarly, it was suggested by stakeholders in the targeted survey that the legislation has failed to protect a wider range of species. This because of a **lack of species-specific provisions** for e.g. dairy cows, rabbits, turkeys and companion animals. One consumer organisation stressed that more attention needs to be paid to fish welfare, as this is an area of growing interest for consumers. The matter of fish welfare at the time of killing was prominent in the public feedback received on the Fitness Check Roadmap in 2020 as well as in the stakeholders' conference on 9 December 2021.

The feedback received on the Roadmap of the Fitness Check contained similar suggestions, calling for turkeys, quail, ducks, geese, pullets and parent stock to ether be included in the current Broilers Directive or be subject to separate legislation.

This lack of species-specific requirements is also addressed in the interviews. According to one NGO, this is a problem for the farm level legislation as well as for the legislation on animal transport (e.g. of fish) and slaughter (also here, fish welfare) is referred to. One professional organisation mentioned the welfare of companion animals as an "extremely important" issue for consumer, and an area where there are many welfare problems.

Judging from the targeted survey, only a very small part of the stakeholders consider that they manage to fully comply with the current EU legislation on animal welfare at farm level (17%, 7 of 41), during transport 12% (5 of 41) and at the time of killing (15%, 6 of 41). Of the stakeholders that provided a reason for this, 67% (10 of 15) considered **insufficient knowledge and training** of the farm operators to be a relevant or very relevant factor (for transport 40%, 6 of 15, and for slaughter 67%, 8 of 12).

The role of competence gained by practical experience was raised in the interviews. It was stressed by one business organisation representing the producers that although *"the training of the workers does not improve directly or by default their safety when working with the animals, the management of the animals needs to be learned practically, on a daily basis, and this practical knowledge and skills are dependent on different factors, for instance animal genetics (some sub-species are more aggressive than others) or individual reactions"*.

Problems related to **enforcement** emerged in all consultation activities. In interviews, stakeholders suggested a **lack of animal welfare indicators** as a reason behind problems of compliance by operators and enforcement by the competent authorities. Reference was made to mortality rates during transport but also to the level of use of antimicrobials. One

professional organisation considered that good indicators exist but that these are not collected and measured consistently enough.

The public feedback received on the Fitness Check Roadmap included calls for more systematic checks of foot-pad-dermatitis and other animal welfare indicators. It also contained suggestions to require remote close-circuit television (CCTV) surveillance in all slaughterhouses.

In the targeted survey, one business/professional organisation suggested that focus should be put on a more uniform enforcement rather than overregulation. An NGO deplored the differences in sanctions applied by the Member States in cases of non-compliance, which they considered to contribute to a distortion of competition for EU business operators.

- ***EFFICIENCY***

To what extent has the EU animal legislation delivered the expected benefits at proportionate costs, and what have been the administrative burdens for business operators complying with the legislation?

In the targeted survey, a vast majority (73% - 30 of 41) of the stakeholders would at least partially agree that the EU animal welfare legislation has led to increased costs, borne mainly by producers, without a sufficient market return (only 12%, or 5 of 45 would totally disagree to this). This is consistent with views expressed in the stakeholders' conference on 9 December 2021. However, one interviewed organisation (representing the consumers) considered benefits of the legislation to be higher than the costs, especially since "*the negative impacts of not complying are also costly and shouldn't be underestimated"*.

In the interviews with business organisations, reference is made to costs for infrastructure as well as for training and administration (e.g. related to licenses and authorizations, which must be obtained for the necessary farm adaptations required by law). One organisation also referred to the costs related to reputational damage following an animal welfare problem reported in the media.

One interviewed organisation representing producers had estimated that the cost of compliance with the Pigs Directive amounted (in 2013) to around 300-350 euro per sow. Another example provided, from the poultry sector, suggested that the EU animal welfare legislation has led to an increase of 2-3% of the costs per kilo of live bird (since stocking densities has been decreased). One business organisation suggested that the current administrative requirements, related to the keeping of records, are counter-productive to the welfare of animals. Another business organisation suggested that the restrictions for tail-docking of pigs have increased the cost of pig farming by 20%.

In the public consultation a clear majority (72% - 42 901 of 59 281) did not consider that complying with the EU animal welfare legislation is too burdensome and/or costly for

producers, such as farmers. Similarly, a vast majority (73% - 43 292 of 59 281) did not consider that the current EU animal welfare legislation is disproportionally burdensome and/or costly for **SME's**, such as small slaughterhouses, transporters and retailers. In the stakeholders' conference on 9 December, a vast majority (79%) of stakeholders were against the introduction of derogations for small slaughterhouses.

However, the views on this matter expressed by companies and business organisations differ a lot from the ones above. In the public consultation, only 25% (165 of 660) would agree that the current EU animal welfare legislation is not too burdensome and/or costly for farmers. And only 26% (173 of 660) would agree that the current EU animal welfare legislation is not disproportionally burdensome and/or costly for SME's. Furthermore, in the targeted survey one NGO suggested that the EU animal welfare legislation could "play against small-scale farmers who have to implement infrastructure, equipment and administration that is modelled on larger scale types of businesses, which other scale of human and capital resources".

Among the **benefits** of the EU animal welfare legislation, the interviewed stakeholders referred to increased product yields and increased product quality, better worker safety and a better work environment. Also an increased job satisfaction was mentioned.

However, in the targeted survey one business/professional organisation suggested that the benefits that the high standards of animal welfare could bring are "hindered by the fact that consumers are insufficiently aware of current EU standards". Another organisation underlined that the citizens' expectations are widely different among Member States.

- **COHERENCE**

How does the EU animal welfare legislation interact with other EU legislation and policy areas, such as trade, environment and agriculture?

In the targeted survey, more stakeholders agreed (49%, 20 of 41) than disagreed (34%, 14 of 41) that the different pieces of EU animal welfare legislation, regulating welfare at farm, during transport, and at slaughter, are generally **internally consistent** and complementary, and that there are synergies between the different areas. However, one NGO pointed to certain inconsistencies between the Farming Directive (Annex I, Point and 17) and the Transport Regulation (Article 3(h) in connection with Annex I, Chapter VI, point 2.1).

A majority (56%, 23 of 41) however consider current EU animal welfare legislation to be **inconsistent with other EU policy areas**. The main areas for which such inconsistencies were identified are environment policy, public health policy, agriculture and trade.

This is reflected in the stakeholder interviews, where e.g. one professional organisation referred to the discrepancies between the Transport Regulation and the EU social legislation

on the drivers' resting times. While the EU animal health legislation and the OIE standards were generally considered coherent, a better coordination with the CAP, trade policy and environment policy was suggested. One business organisation suggested that this coordination should be done at EU level, since requirements from different policy areas *"arrive at the farm level and the farmers are the ones that need to coherently assemble them and comply with all of it"*.

As for the relationship with the environmental policy, one interviewed business organisation pointed to necessary trade-offs: If imposing lower stock densities, there is a need to occupy bigger areas in order to maintain the same output in terms of production, and using slow growing breeds will imply higher consumption of feed and water. As for agricultural policy, it emerged from the stakeholders conference on 9 December 2021 that while the most important support measure for animal welfare is the CAP (followed by advice and training for farmers), full use is currently not made of its tools. As for trade policy, an overwhelming majority (95%) of the stakeholders at the conference on 9 December 2021 considered that the same or equivalent animal welfare standards should apply to imports.

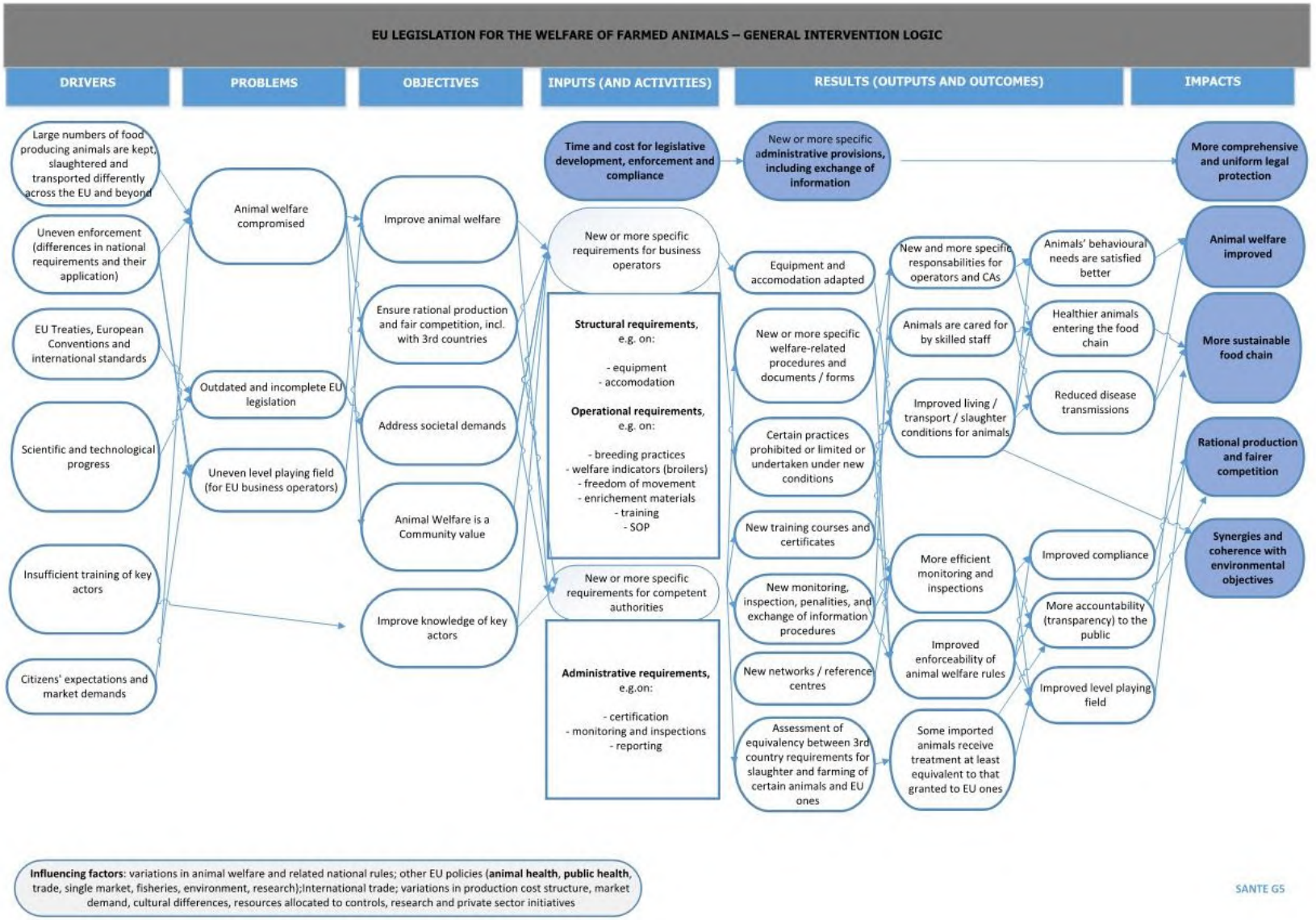
- **EU ADDED VALUE**

To what extent has the EU animal welfare legislation provided EU added value in terms of animal welfare and a more level playing field for EU business operators?

In the targeted survey, one business/professional organisation suggested that the EU animal welfare legislation has obliged some Member States to increase welfare standards in their national legislation; hence the protection level was raised and more harmonized across the EU. Or, as expressed in the interview with a professional organisation representing veterinarians: *"EU animal welfare legislation has contributed to protection of farmed animals, better health, and a better functioning of the EU market, because if the EU would have not stepped in, every country would have its own legislation. (...) If there was no EU legislation, we would have had much bigger differences, so EU legislation absolutely contributed to the degree of harmonization observed. I definitely think it leads to convergence across the EU."*

Similarly, another interviewed organisation, representing farmers, considered that *"the EU legislation creates a clear baseline for all Member States from where they can depart. (...) When there are different legislations in different countries, it creates problems for the farmers."*

ANNEX VI. INTERVENTION LOGIC



ANNEX VII. QUESTIONNAIRES USED FOR INTERVIEWS AND THE TARGETED SURVEY

FITNESS CHECK - EU ANIMAL WELFARE LEGISLATION

Exploratory interviews - stakeholders

Contextualization

The questionnaire addresses the following pieces of animal welfare legislation:

- Council Directive 98/58/EC concerning the protection of animals kept for farming purposes;
- Council Directive 1999/74/EC laying down minimum standards for the protection of laying hens;
- Council Directive 2007/43/EC laying down minimum rules for the protection of chickens kept for meat production;
- Council Directive 2008/120/EC laying down minimum standards for the protection of pigs;
- Council Directive 2008/119/EC laying down minimum standards for the protection of calves;
- Council Regulation (EC) No 1/2005 on the protection of animals during transport;
- Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing.

Questionnaire

Question number	*Body of questions*
Q. 1	Did EU animal welfare legislation address existent needs and problems when the different legislative acts were adopted and does it still adequately address those problems?
	○ Which were/are the main needs and problems? Were/are there different problems affecting areas of welfare of animals at farm, during transport and at slaughter? ○ Was there an evolution of those needs in the latest 10 years? How? Did such evolution affect animal welfare? ○ Is the existing legislation still able to address the problems in the different areas, considering the ongoing and future developments, including scientific and technological progress? Why (not)?
Q. 2	Do you consider that the EU animal welfare legislation has contributed to and/or hindered a) better protection of farmed animals in the EU, including their health, and b) better functioning of

	the EU market and a level playing field (inside and outside the EU)?
	○ Why (not)? ○ Are there any external factors (such as e.g. trade policy) which hampered the achievement of such objectives?
Q. 3	Do you consider that the current EU animal welfare legislation (at farm level, during transport, and at the time of killing) lacks clarity?
	○ How so? Are there any specific examples? ○ If yes, what problems does lack of clarity create and/or has it created in terms of animal welfare and/or competition?
Q. 4	Do you consider that the current EU legislation on animal welfare is difficult to comply with and/or implement?
	• Why (not)? • Is EU animal welfare legislation effectively implemented across EU Member States? Why (not)? • Do you consider that there are differences in compliance with EU animal welfare legislation among Member States? • If yes, do you consider these problematic? Why (not)?
Q. 5	Do you consider that EU legislation on animal welfare contributes to the convergence of animal welfare standards across the EU?
	• How and to what extent? • If yes, do you consider such convergence a positive outcome of EU legislation on the welfare of farmed animals? Why (not)? • What are the strengths and/or weaknesses of having animal welfare legislation at EU level?
Q. 6	Do you consider that there is sufficient consistency between the different pieces of animal welfare legislation at EU level, i.e. regulating welfare at farm, slaughter and during transport?
	1. Why (not)? 2. Could you identify and describe any inconsistencies and/or synergies? 3. If yes, do they lead to inefficiencies and which? 4. If yes, what are the effects of such inefficiencies?
Q. 7	Do you consider that there is sufficient consistency of EU animal welfare legislation with OIE standards?
	• Why (not)? • Could you identify and describe any inconsistencies and/or synergies? • If yes, do they lead to inefficiencies and which? • What are the effects of such inefficiencies?
Q. 8	Do you consider that there is sufficient consistency of EU animal welfare legislation with other

	related EU policies/legislations, such as environmental, agricultural, and public/animal health (e.g. trade-offs as regards green house gas emissions)?
	• Why (not)? • Could you identify any inconsistencies and/or synergies? • If yes, do they lead to inefficiencies and which? • What are the effects of such inefficiencies?
Q. 9	In your view, what have been the prominent costs and benefits (from a social, economic, and environmental perspective) linked to the implementation of the current EU animal welfare legislation? Differentiate between intensive vs. less intensive production systems if relevant
	• Do you think that costs and benefits are equally distributed across the stakeholder groups (i.e. farmers, processors, retailers and consumers)? • Who is bearing the highest costs and who is getting highest benefits? Please justify your replies, by providing figures if possible.
Q. 10	Does animal welfare legislation put EU operators at a competitive disadvantage in relation to non-EU operators?
	○ If yes, on which products? ○ To what extent? Can you quantify it (e.g. market share)?
Q. 11	In general, are practices and procedures required by EU animal welfare legislation too burdensome for stakeholders?
	• If yes, is it a matter of quantity, complexity or a combination of both? • If yes, in which aspects is it burdensome? • If yes, for which stakeholders in particular?
Q. 12	Do you consider that citizens/consumers are sufficiently aware about the mandatory animal welfare standards imposed by EU legislation?
	○ Please justify your answer and provide concrete examples if possible. ○ Is citizen/consumer awareness a relevant factor? Why (not)? ○ Has the demand for high animal welfare products been evolving (e.g. sales volumes, prices of certain AW friendly products) in the last 10 years? ○ Do you think citizens/consumers also equate higher animal welfare standards with other benefits (e.g. product quality, public/individual health, etc.)?

Targeted survey for members of the EU Animal Welfare Platform

In 2020, the European Commission adopted the Farm to Fork Strategy (F2F), to promote a shift towards a sustainable food system.

Animal welfare is a cornerstone of sustainable food production. Therefore, under the F2F, the European Commission committed to revise the current EU animal welfare legislation by 2023, and to consider options for animal welfare labelling. The purpose is to ensure a higher level of animal welfare and to broaden the scope of the respective legislation by aligning it with the latest scientific evidence, current political priorities, and citizens' expectations while making EU animal welfare legislation easier to enforce.

The EU legislation under review consists of a Directive concerning the protection of animals kept for farming purposes and four Directives laying down minimum standards for the protection of laying hens, broilers, pigs and calves; one Regulation on animal transport and one Regulation on the protection of animals at the time of killing.

This EU legislation regulates animal welfare at farm level, during transport and at slaughter, and covers animals – including fish – bred and kept for farming purposes, as well as cats and dogs. It does not cover wild animals, experimental or laboratory animals (with exception for their welfare during transport and protection at the time of killing for depopulation purposes).

The objective of this legislation is to improve the welfare of farmed animals while ensuring sustainable production and fair competition for EU business operators within the single market.

In 2020, the European Commission initiated an evaluation (fitness check) of the existing animal welfare legislation at EU level. In the context of this exercise, the Commission has undertaken a consultation of stakeholders in order to substantiate the ongoing revision.

The present survey aims at gathering further views and experiences from the members of the EU Animal Welfare Platform, in relation to the current EU acquis, with a view identify opportunities for its revision.

– – – – – – – – – – – –

I am replying on behalf of:

•	Myself/ Independent Expert
•	A Member State
•	*Sub-question: Which MS?*

•	An EEA country
•	*Sub-question: Which country?*
•	An academic/research institution
•	An international organisation
•	A business or professional association
•	A consumer organisation
•	A non-governmental organisation (NGO)
•	I want to remain anonymous

Q1: Compared to prior to its adoption, to what extent has the existing EU animal welfare legislation contributed to and/or hindered:

	Strongly contributed to	Relatively contributed to	Contributed little to	Did not contribute to	Hindered	Do not know/ Cannot answer
A better protection of farmed animals in the EU						
The protection of a wider range of animal species						
A harmonised implementation of animal welfare standards across the EU						
A better functioning of the EU market						
A levelled playing field in the EU for business operators						
Other(s):						

Open box: Please provide, if you can, any relevant examples, data or evidence in support of your above assessment.

Q2: In your view, to what extent does the existing EU legislation on the welfare of farmed animals meet citizens' expectations on a sustainable food production?

Not at all	Partially	Mostly	Totally	Do not know/ Cannot answer

If not TOTALLY, which are the unmet expectations?

Q3: To what extent does the existing EU animal welfare legislation provide sufficient information to consumers to make sustainable food choices as regards the below?

	Not at all	Partially	Totally	Do not know/ Cannot answer
Farming conditions				
Transport conditions				
Slaughter conditions				

Q4: To what extent does the existing EU animal welfare legislation allow business operators (farmers, slaughter houses, transporters etc.) to incorporate advances in science and innovation – e.g. as regards digitalisation – in their daily activities?

Not at all	Partially	Mostly	Totally	Do not know/ Cannot answer

Q5: To what extent would you agree to the following statements?

	Not at all	Partially	Mostly	Totally	Do not know/ Cannot answer
The EU animal welfare legislation has promoted a shift in					

business type, from smaller to larger operations.					
The EU animal welfare legislation has led to increased costs, borne mainly by producers, without a sufficient market return.					
Animal welfare is an important "selling point" to most third countries.					

Q6: Regarding the different pieces of EU animal welfare legislation, regulating welfare at farm, during transport, and at slaughter, are the provisions contained current EU legislation consistent/complementary and are there synergies between the different areas (e.g. Council Directive 98/58/EC vs. Council Regulation (EC) No 1/2005)?

•	Yes
•	No
•	Do not know

IF NO, please explain which inconsistencies, by referring to the concrete cases/pieces of legislation:

Q7: Is the current EU animal welfare legislation consistent with other EU policy areas, for instance as regards environmental legislation (e.g. density requirements vs building permits and use of more land)?

•	Yes

•	No
•	Do not know

IF NO, with which areas were inconsistencies found? (Multiple options can be indicated)

Public health	•
Animal Health	•
Environment	•
Agriculture	•
Trade	•
Other(s):	•

Please specify, if possible, by giving examples and referring to the concrete cases/pieces of legislation:

Q8: To what extent do you/ the organisation or sector that you represent manage to comply with the current EU legislation on animal welfare at farm level?

Not at all	Partially	Mostly	Totally	Do not know/ Not applicable
•	•	•	•	•

If not TOTALLY, how relevant are the below reasons for the existent compliance issues?

	Not relevant	Somewhat relevant	Relevant	Very relevant	Do not know/ Cannot answer
Unclear provisions (e.g. "routine" tail-docking)					
Requirements not species- specific enough (e.g. Directive 98/58/EC)					
Highly complex set of different requirements					
Insufficient knowledge/training of operators					
Lack of control resources (e.g. financial, staff, equipment)					

Lack of cooperation between competent authorities in different Member States					
Other(s):					

Q9: To what extent do you/ the organisation or sector that you represent manage to comply with the current EU legislation on the protection of animals during transport difficult?

Not at all	Partially	Mostly	Totally	Do not know/ Not applicable

If not TOTALLY, how relevant are the below reasons for the difficulties in compliance identified?

	Not relevant	Somewhat relevant	Relevant	Very relevant	Do not know/ Cannot answer
Unclear provisions (e.g. roles and responsibilities of transporters and organizers; legal loopholes)					
Requirements not species- specific enough					
Highly complex set of different requirements					
Insufficient knowledge/training of operators					
Lack of control resources (e.g. financial, staff, equipment)					
Lack of cooperation between competent authorities in different Member States					
Other(s):					

Q10: To what extent do you / the organisation or sector that you represent manage to comply with the current EU animal legislation on the protection of animals at the time of killing?

Not at all	Partially	Mostly	Totally	Do not know/ Not applicable

If not TOTALLY, how relevant are the below reasons for the difficulties in compliance identified?

	Not relevant	Somewhat relevant	Relevant	Very relevant	Do not know/ Cannot answer
Unclear provisions (e.g. "adequate" thermal conditions)					
Highly complex set of different requirements					
Requirements not species- specific enough					
Insufficient knowledge/training of operators					
Lack of control resources (e.g. financial, staff, equipment)					
Lack of cooperation between competent authorities in different Member States					
Other(s):					

Q11: Do you consider that the requirements of Council Regulation (EC) No 1099/2009, and specifically the ones relating to monitoring requirements, could be simplified for small and local slaughterhouses without compromising animal welfare standards?

•	Yes
•	No

Please specify, if possible, by giving examples/experiences with the application of such requirements by SME's:

IF YES, in which area(s) do you think that the current requirements could be simplified?

	Not important	Somewhat important	Important	Do not know/ Cannot answer
Monitoring and registration				
Indication in pens of date/time of arrival				
Calibration of equipment				
Other(s):				

Q12: Do you consider that the costs (e.g. related to infrastructure, equipment, administration) of compliance with the EU animal welfare legislation are outweighed by the benefits (e.g. higher yield, greater market value) for the respective categories of operators?

	Yes	No	Do not know/ Cannot answer
Farmers			
Transporters			
Slaughter houses			
Retailers			

Please indicate below which types of requirements that are most costly to comply with or enforce , for the categories of operators listed above, by ranking them from 1 (most costly) to 5 (less costly):

	Requirements related to infrastructure	Requirements related to equipment	Requirements related to administration	Requirements related to training	Other requirements	Do not know/ Cannot answer
Farmers						
Transporters						
Slaughter houses						
Retailers						
Competent authorities (inspection costs)						

If OTHER, please specify:

Q13: <u>For Member States</u>: Is enforcement of the current EU animal welfare legislation cost efficient (relation of the cost to the output/outcome) for competent authorities?

	Yes	No	Do not know/ Cannot answer
Farm level legislation			
Transport legislation			
Slaughter legislation			

<u>For Member States:</u> Please give examples of the current animal welfare provisions/requirements/practices identified as cost-efficient to enforce, as well as of those that are not cost-efficient, if possible broken down by the areas listed above:

Q14: Is there any other comment you would like to add?

Cost-Benefit Analysis of EU Animal Welfare Legislation

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Executive summary

Objective

The objective of this study is to carry out an ex-post cost-benefit assessment for the EU animal welfare legislations at farm, transport and slaughter level that entered into force between the years 1998 and 2009.

Approach

The methodological approach was based on the CBA guidelines of the EU Better Regulation Tool. A complexity in the assessment emerged from the fact that the EU member states were at very different starting points when the legislation came into force. This had to be assessed provision per provisions, as an average across the full legislation would have caused too great a loss of accuracy. For this purpose, a number of provisions were selected that deemed to be the most important and/or costly ones (in terms of compliance costs).

For the approach, this meant that for each provision, Business As Usual (BAU) situations had to be identified ex-post, that reflected the situation in the different member states (i.e. already exceeding the proposed EU legislation; equal/similar to the proposed EU legislation; below minimum requirement to be defined in the proposed EU legislation). In addition, the EU production share that adhered to any of these three situations needed to be known in order to come up with meaningful estimates regarding the calculation of the direct costs of compliance of the affected businesses.

The study relied on already available information that was gathered by means of a systematic literature review. The costs and benefits were assessed for the following stakeholders: Businesses, consumers, public authorities, and regarding the dimensions animal welfare, environment and public health. The latter three are no stakeholders in the traditional sense, but it is in the societal interest to understand the costs and benefits of the legislations in these dimensions.

Results

The results show that a certain amount of direct **costs of compliance** occurred for businesses and the public administrations (see the **following tables for details**).

Farm level directives

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Pigs directive												
Costs												
Direct compliance costs[412]	Total 404,9[413][414] Of which[415]: One-off: 157,6 Recurrent: 247,3											
Enforcement costs											8,2[416]	
Indirect costs												
Benefits												
Direct benefits		-/+ Manipulable material may reduce tail biting and thereby, lead to cost savings and increased revenue. This may (partially) offset costs for provision of		+/0 Loose material better than objects but not supplied to most pigs + Likely that AW has improved due to group housing of sows, but this depends on the individual characteristics of the				N.A. Effects of loose material on greenhouse gas emissions -/+ Group housing of sows (depends on system and management) 0 Castration at younger age		-/+ Food safety Manipulable material may transmit pathogens or contain undesirable substances; reduction of tail biting may reduce abscesses and stress-related shedding of food-borne pathogens but		

[411] Impacts (costs or benefits) compared to BAU: +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available

[412] Costs are the sum of annualised one-off costs (e.g. investment costs for a new housing system or their modifications) plus recurrent costs per year.

[413] The total is based on the costs of compliance for a selected number of provisions: manipulable material, floor properties and group housing. Details can be found in section 3.2.1.9.

[414] For the Pigs Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.1 of the Annex.

[415] This split is made based on a simplified approach where all costs related to the provision of manipulable material are assumed to be "recurrent costs" whereas all costs related to group housing of sows and floor properties for weaners and rearing pigs are assumed to be "one-off".

[416] These costs comprise costs for inspections by the competent authorities and are based on Rayment et al. (2010).

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
		material. -/+ Group housing has the potential to result in efficiency gains but this depends on the specific circumstances 0 Castration performed at younger age and not with analgesia/anaesthesia -/0 Adjustment of slatted floors for weaner and rearing pigs only for minor share of farms 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre		group housing systems (which are not specified in the legislation) and on management 0 Castration is painful at any age, shift to younger age does not reduce the pain +/0 Adjustment of slatted floors for weaner and rearing pigs might have reduced injuries but was only required for minor share of farms 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre				0 Adjustment of slatted floors for weaner and rearing pigs still allowed for good drainage 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre		information on the effects achieved in practice is N.A. -/+ Group housing of sows (depends on system and management) 0 Castration at younger age +/0 Adjustment of slatted floors for weaner and rearing pigs might have reduced injuries (food safety) but was only required for minor share of farms 0 Floor area for weaner and rearing pigs corresponded to BAU N.A. Dietary fibre		
Indirect benefits						+ There seems to be a slightly higher WTP related to some provisions						

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
						(manipulable material, anaesthesia for castration, group housing of sows/gilts)						
Laying hens directive												
Costs												
Direct compliance costs	Total 592,0[417][418] Of which[419] One-off: 440,0 Recurrent: 152,0	- Ban of unenriched cages, instead: enriched cages increased costs - Requirements for unenriched cages during transitional period increased costs -/0 Requirements for alternative systems increased costs								-/0 Ban of unenriched cages: management of floor eggs is decisive and can be challenging in enriched cages and even more in alternative systems		

[417] Details can be found in section 3.2.2.6.

[418] For the Laying hens Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.2 of the Annex.

[419] As argued in the case of the pigs directive, with a simplified approach assuming that i) recurrent costs correspond to 40 % of costs due to the transition to enriched cages plus costs due to beak trimming and ii) that one-off costs correspond to 60 % of costs due to the transition to enriched cages plus costs due to the requirements for the transitional period and for alternative systems.

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
		but only applied to minor share of farms - Beak trimming (age limit): evidence is limited but suggests cost increase										
Enforcement costs											2,8[420]	
Indirect costs												
Benefits												
Direct benefits		+ price mark-ups for eggs from alternative systems		+ The potential to express species-specific behaviour is highest in alternative systems, followed by enriched cages while unenriched cages rank last. In contrast, the risk of adverse animal health outcomes related to infectious diseases, hygiene and parasite load is higher in alternative systems whereas both cage types rank equal in this regard. Management is a				-/+ The risk of negative environmental impacts is higher in alternative systems and enriched cages but with appropriate mitigation strategies, emissions can be effectively reduced in these systems. N.A. Requirements for unenriched cages during transitional period N.A. Alternative		0 Nest eggs: egg shell contamination higher in alternative systems whereas no difference for unenriched/enriched cages, no difference in egg content contamination between systems N.A. Requirements for unenriched cages during transitional period		

[420] These costs comprise costs for inspections by the competent authorities and are based on Rayment et al. (2010).

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
				decisive factor for AW in all farming systems and as experience has accumulated over the years, similar mortality rates can be observed in indoor alternative systems and cage systems. + Requirements for unenriched cages during transitional period improved AW to limited extent N.A. Alternative systems differed too much to evaluate AW effects +/0 Beak trimming (age limit): positive effect for hot blade method, no effect for infrared which has evolved as preferred method				systems differed too much to evaluate environmental effects N.A. Beak trimming (age limit)		N.A. Alternative systems differed too much to evaluate public health effects N.A. Beak trimming (age limit)		
Indirect benefits						+ Support for a legal ban of cages has been expressed by share of consumers at different points in time, price mark-ups are paid for						

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
						eggs from alternative systems N.A. Requirements for unenriched cages during transitional period N.A. Alternative systems differed too much to evaluate effects N.A. Beak trimming (age limit)						
Calves directive												
Costs												
Direct compliance costs	One-off costs[421]: 42,1 (adjustment costs)	Costs depend on the type of farm (veal, beef, dairy)[422]										
Enforcement costs											9,6[423]	
Indirect costs												

[421] For the Calves Directive, the cost items included in direct compliance costs only relate to the category adjustment costs, no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.4 of the Annex.

[422] No information about fees or administrative costs could be found. Detailed explanations can be found in section 3.2.4.2.

[423] These costs comprise costs for inspections by competent authorities and are based on Rayment et al. (2010).

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Benefits												
Direct benefits				+ Larger individual pens + Group housing (depending on additional management-related factors) +/0 Hb threshold, only to be achieved *on average* + Roughage (depending on additional factors such as fibre source and particle size)								
Indirect benefits						+ Better reputation of veal production but public concern likely remains an issue 0 White colour of veal meat can still be achieved (and consumer demand for this is an economic incentive for low Hb levels)						
Broiler directive												
Costs												
Direct compliance costs	Total 35,8											

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
	Of which[424] One-off: 26,9 Recurrent: 8,9											
Enforcement costs											N.A.	sporadic information could be obtained indicating that costs were limited
Indirect costs												
Benefits												
Direct benefits				+ Upper limit of stocking densities connected to climate and temperature has probably resulted in some (but limited) improvements of AW + Monitoring/follow-up at slaughterhouses (but differences between the MS are expected)								
Indirect benefits						++ Large stated WTP for the directive was reported for the						

[424] As argued in the case of the previous directives, with a simplified approach assuming that i) recurrent costs correspond to 25 % of costs due to the transition and ii) one-off costs correspond to 75 % of costs due to the transition.

Notes[411]	Businesses (Farms)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
						UK 0 Lack of knowledge on monitoring/follow-up at slaughterhouses in several MS						

Transport regulation

Notes[425]	Businesses (transport companies)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Transport regulation												
Costs												
Direct compliance costs	Total[426]: 1726 Of which: One off: 126 Recurrent: 1600	Of the one-off costs: Administrative costs relate to: Approval of means of transport, transporter authorisation Of the recurrent costs: Administrative costs relate to record keeping (transport planning/journey log; disinfection register)										- Administrative costs of CAs increased by 5 to 15 % (survey by Baltussen et al. 2011)
Enforcement costs											14,0-15,0[427]	0 56% of the MS have made no change in

[425] Impacts (costs or benefits) compared to BAU: : +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available
[426] The figures are taken from Rayment et al. (2010). Details can be found in the report in section 3.3.2.

[427] These costs comprise costs for inspections by the competent authorities and are based on Rayment et al. (2010). Details can be found in the report in section 3.3.2

Notes[425]	Businesses (transport companies)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
												inspection and approval routines for means of transport (survey by Baltussen et al. 2011)
Indirect costs												
Benefits												
Direct benefits		+ Positive effects on revenues are possible due to less injuries and bruises but it is not certain whether this has been achieved in practice because information in this regard is N.A.		+ Positive effects are possible as some prerequisites for better AW were introduced (training/certification, equipment of vehicles) but assessments using animal-based indicators are N.A. and therefore, it is uncertain to what extent the provisions have actually influenced AW outcomes in practice (as was also concluded by Baltussen and Wagenberg 2018)								+ 50 % of CAs surveyed by Baltussen et al. (2011) indicate benefits in control activities due to navigation system
Indirect benefits				+ Indirect positive effects due to the journey log are possible but information on actual benefits in practice is N.A. (see above)		+ Indirect positive effects are possible as consumers care about AW during transport but information on actual benefits in practice is N.A. and current studies report mostly negative attitudes of consumers towards transport						

Slaughter regulation

Notes[428]	Businesses (slaughterhouses)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Slaughter regulation												
Costs												
Direct compliance costs	23,0 – 49,0[429]	-/+ Revenues due to carcass quality (PSE, haemorrhages) - Animal welfare officers, SOPs, certification of staff, equipment increased costs										
Enforcement costs											One-off: 1,9 (adjustment costs) Recurrent: 6,5 (adjustment costs for reference networks, certification, reporting duties [430]	Adjustment costs for certification of staff can be partially recovered from businesses (slaughterhouses) via fees In addition: No cost estimate for authorisation of new

[428] Impacts (costs or benefits) compared to BAU: +, ++ positive effect; -, -- negative effect; -/+ mixed; 0 no impact; N.A./blank cell: information is not available

[429] There is a lack of information on the costs of the Slaughter Regulation to slaughterhouses. Only two aggregate figures could be obtained for the EU-level and for the UK (by Rayment et al. 2010 and DEFRA 2013). When taking a closer look at these figures, it appears that they differ with regards to some of the provisions they comprise and that there is a remarkable difference concerning the revenue side. Details can be found in section 3.4.2 of the report. In this table, the figure by Rayment et al. (2010) is displayed.

[430] The available evidence is scarce but suggests that costs were very limited. For details, see section 3.4.2.

Notes[428]	Businesses (slaughterhouses)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
												stunning/ killing methods. But evidence that this can be recovered from businesses (slaughterhouses) via fees[431]
Indirect costs												
Benefits												
Direct benefits				+ Positive effects are possible as some prerequisites for better AW were introduced (animal welfare officers, SOPs, training, electric parameters for poultry waterbath stunning) but the extent to which positive effects have been achieved in practice depends on the mode of implementation (e.g. legal status of AWOs, contents of SOPs and training) for which systematic information is N.A. and on enforcement which was reported to be an issue for waterbath stunning						

[431] Details see section 3.4.2.

Notes[428]	Businesses (slaughterhouses)		Animal welfare		Consumers		Environment		Public Health		Public authorities	
	Mio. €/year	Qualitative		Qualitative		Qualitative		Qualitative		Qualitative	Mio. €/year	Qualitative
Indirect benefits				+ Indirect positive effects due to recording devices on equipment for electrical stunning are possible but information on actual benefits in practice is N.A.								

Economic importance

In terms of economic importance of the costs and benefits, only costs of compliance for businesses and administrative/enforcement costs of public authorities could be monetised. Even though this does not provide a full picture, this allows trying to assess the **economic importance** of the legislations for the different stages of the production process. According to our estimations, the direct costs of compliance for the respective legislations account to about

- 1,47% of an annual average pig production value for the **pigs** directive
- 10,95% of an annual average laying hens production value for the **laying hens** directive
- 1,23% of an annual average veal production value for the **calves** directive
- 0,26% of an annual average broiler meat production value for the **broiler** directive
- Less than 0,11% of an annual average production value for the **slaughterhouses** for the slaughter regulation.
- Due to lack of data, for the **transport directive**, no percentage estimate of compliance costs in relation to economic importance could be estimated.

Even though some of the percentages sound small, it is important to note that the **profit margins** for businesses involved in these sectors are also **often small**, hence also small additional compliance costs can have a large impact on the viability of a business.

These calculated values have to be taken with **utmost care**, as they are based on average annual values, **contain many assumptions** (as laid out in the study), and are only one snapshot in time. The lack of coherent production and price data for the directive-relevant production activities was a major impediment in this effort. But nevertheless, they show that the **cost burden** of improving animal welfare **differed** considerably between **the different actors** in the production process.

These findings are also in line with studies by the European Parliamentary Research Service (EPRS 2021) and others (Mitchell et al. 2017; Brouwer et al. 2011; Henningsen et al. 2018; Menghi et al. 2014). Nevertheless, **some provisions were costly to comply** with (e.g. group housing of sows) and although a longer transition period allowed for some flexibility, the investment sums can be very hard to shoulder for farmers (Brouwer et al. 2011; Baltussen et al. 2010).

On the benefit side, many issues could be identified where potential benefits for the animals, consumers, the environment or public health could be generated, but often, due to lack of animal-related indicators, or clear evidence on what had been achieved in practice, these **benefits could not be quantified** and safely attributed to the change in legislation. Hence, it remains the impression, that a large body of legislative text has been developed, implemented and enforced, but that **more effort is still needed to demonstrate and quantify systematically the resulting positive benefits** for the animals, consumers, the environment or public health (or the farmers).

Overall assessment

We assume as a **normative guideline** regarding animal welfare in the agricultural sector that the welfare of farm animals should be guaranteed from the day of birth to the day of slaughter.

The question is then, if the EU animal welfare legislation does effectively achieve this objective in an efficient and coherent way, and what parts of the legislative framework lead to costs and benefits within this overall normative guideline.

In order to ensure animal welfare from birth to slaughter, all actors along the **production value chain** (**farmers**, **transporters** and **slaughterhouses)** have to take responsibility for their part of the value chain (and consumers need to be willing to pay accordingly for this animal welfare standard). In this regard, the EU legislative framework that was evaluated in this study is effective, as it provides an EU wide minimum standard for each part of the production value chain. However, the restriction must be made, that there are still important farm animals that are not covered by EU legislation (e.g. dairy cows, turkeys, sheep and goats).

Then, a next question must be, if the **benefits** of this minimum standard **for the animals** are sufficient from an animal welfare standpoint to warrant such a large legislation package. Here, the evaluation is less clear, because the animal welfare benefits are not systematically recorded, evaluated or monetised. The assessment in this study showed that only in some instances, EU legislation has contributed to raising animal welfare standards (e.g. ban of gestation and veal crates, ban of unenriched cages). In many cases, it rather unified patchy national legislations or defined common husbandry practices as the new legislative minimum standard. Furthermore, we also observe large differences in the national implementation of the legislation which may be due to "loopholes and unclearly defined provisions" (EPRS 2021) or problems in enforcement. Contrary to the intention, a number of practices, e.g. mutilations, lack of loose materials for manipulation, could not be abolished by the legislation. On the other hand, one must also consider the developments that could potentially have occurred over time if EU legislation had not been introduced. In this regard, the regulations might have served as a safeguard against management practices that might otherwise have worsened animal welfare.

In addition, not only benefits for the animals were analysed, but also potential **benefits for consumers, the environment and public health**. Given that consumers frequently emphasise that animal welfare is of high importance, any legislative improvement in animal welfare may be considered beneficial for them. However, the studies also show that consumers do not consider the current level to be sufficient. Hence, consumers' actual benefits from the studied legislative changes are likely rather small. The same holds for environment and public health. Some small positive benefits could be detected, but the relationships were vague and not quantifiable.

When the **costs** of the studied legislations for businesses (farms, transporters, slaughterhouses) and public authorities are presented as percentage terms of total production costs, they might not appear substantial. However, given the small profit margins and fierce competition, also small increases in total costs can be tough to offset by the businesses and large investment sums can be hard to shoulder. Taking into account that the available data for the calculations of percentage terms is often very limited, there still seems to be a larger burden at the farm level although a comparison across the value chain actors is probably not appropriate, as the duration of animal care differs between the actors, and thus, also the related costs differ. The objective should be that animal welfare is guaranteed at all stages in the value chain and that the actors take responsibility for the whole time that the animal is under their responsibility. When focusing on the costs of different provisions of

the legislations, it seemed that more substantial adjustments had to be made at the farm level. In particular, the pigs directive, the laying hens directive and the calves directive (although only for veal production) implied structural changes (ban of gestation and veal crates, ban of unenriched cages). The broilers directive implied a fundamental change in the principle of animal welfare regulation by introducing the systematic monitoring of animal-based indicators at slaughterhouses but cost estimates for this particular provision are scarce and the available studies suggest that costs might have been limited. At the farm level, the broilers directive led to mostly incremental changes. Costs due to the slaughter regulation can be considered limited compared to the output of the sector. An assessment of the impacts of the transport regulation would entail a high level of uncertainty because no information could be obtained on the cost structure of this sector.

To conclude, our **overall assessment of the studied legislative package is positive** as we recognise that an EU-wide minimum standard was established even if some challenges remain concerning the level of animal welfare, harmonised implementation and enforcement.

Not all animal welfare issues could be eliminated with the current EU legislation but it has to be acknowledged that the legislations offered protection against a deterioration of the animal welfare situation (for whatever reason). Hence, in order to achieve the aforementioned normative guideline that animal welfare should be ensured from birth to slaughter for each farm animal, a minimum legislative standard is necessary. This is what the current legislative package offers, at least for a number of relevant parameters. Without regulation, one would have to trust the market to regulate animal welfare. Indeed, better animal welfare very much depends on market actors and consumers, but it is clear that this does not work in all countries and not for all animals because market-driven animal welfare improvements often only cover limited production shares and market segments. Hence, a legislative minimum standard is a more effective approach to ensure a minimum level of animal welfare, at least for all those farm animals that fall under the scope of the analysed legislations.

Caveats

Clearly this study comes along with several caveats: an extremely tight time budget combined with a large scope of the study made this study a very challenging endeavour which did not allow to investigate with much detail and time some issues that would have needed more attention. In particular the economic importance of the provisions in relation to production costs would have needed more attention, but also the costs and benefits for example for consumers or the environment could only be touched upon briefly. This latter part suffered strongly from the unavailability of coherent historical data (production volume, prices) for the main production activities of the farm level directives. The analysis of the consumer impacts relies heavily on willingness to pay estimates (WTP), but the often voiced critique in these estimates (see e.g. Lagerkvist and Hess 2011) could not really be picked up and be reflected in the related assessment of the (costs and) benefits. Similar things could be said about the impacts on animal welfare, as the improvement of this is at the center of the set of studied legislations. Hence, an even better, also quantitative elaboration of the changes in animal welfare would have been desirable, but has to be left for future research.

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Introduction

Background

The welfare of food producing farm animals during breeding, transport and slaughtering is a topic that has gathered considerable attention for many years. Over the years, a number of evaluations of the European Union (EU) of different aspects of EU farm animal welfare were carried out (Rayment et al. 2010; European Commission 2021b; EPRS 2021). In the Farm to Fork Strategy, published by the European Commission (EC) within the framework of the European Green Deal package, the EC announced that "the Commission will revise the animal welfare legislation, including on animal transport and the slaughter of animals" (European Commission 2020). When revising a regulation, according to the Better Regulation approach of the EC, a "Fitness Check" of the existing regulation is needed (European Commission n.d.). One element of the fitness check is a cost-benefit analysis (CBA) to understand the costs and benefits that the implementation of the legislations has generated.

Objective

The objective of this study is to carry out a CBA in line with the Better Regulation Guidelines and Toolbox of the current EU animal welfare legislations. The CBA is done for the following directives and legislations (in order as they entered into force):

- Council Directive 98/58/EC of 20 July 1998 concerning the **protection of animals** kept for **farming purposes**;
- Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of **laying hens**;
- Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during **transport**; and
- Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of **chickens** kept for meat production;
- Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of **calves**;
- Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of **pigs**.
- Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of **killing**.

Hence, when looking along the food value chain from a farming perspective, five legislations focus on the **farming level** (general directive, laying hens, broiler, calves and pigs) and one legislation each focusses on the **transport** and the **slaughterhouse** level. All legislations dealing with the **downstream food value chain**, i.e. with the **marketing** of the final product or animal by-products were not considered in this analysis.

Scope

The scope of this study has to be narrowed down in several ways. The focus lies on the costs and benefits of the EU legislative acts, a further analysis of national legislation going beyond the EU requirements ("gold plating") is out of the scope of this study. In the assessment of the legislations' costs and benefits, the focus lies only on those food producing farm animals that are mentioned in the legislations above. In addition, when calculating the coverage of the legislation, no distinction is made between animals kept on organic farms versus those that are kept on conventional farms. This is justified by the fact, that when the above legislation came into force, the share of organic farms in the EU Members States was very low.[432] Further details regarding the time period for the calculations of costs and benefits of the legislations, the transition periods, and specific provisions in the legislations, issues of enforcement, and Member State heterogeneity in implementation have been considered in the study and will be further discussed in the next section.

[432] As, in 2010, only 1,6% of the farm holdings were organic in EU-27 (European Commission 2013).

Methodological approach

With the Better Regulation Toolbox of the EC, a guideline (and toolbox) for impact analysis and CBA has been provided (European Commission 2021a). In Tool #56, a typology of costs and benefits is laid out, and in Tool #63, features and implementation steps for a CBA, are discussed. These guidelines are the basis for the methodology used in this study. Overall, similar approaches, as the one used in this study for the calculations of costs and benefits can be found for example in the studies by Brouwer et al. (2011) and the Scientific Advisory Board of the German Ministry of Agriculture (WBA 2015).

Conceptual challenges

Even though the above-mentioned guidelines provide the basis for the methodological approach, several assumptions and adjustments were necessary, in order to take account of specificities of the EU animal welfare legislation. These assumptions and adjustments are discussed in the following.

Implementing an ex-post CBA

One of the first differences with an ex-ante CBA is, that this CBA is not performed for legislation that is projected to enter into force in the future, but that has already been in place for at least 13 or more years. In addition, for each legislation, the entry into force was at a different point in time, and, for some provisions of the legislations, transition periods were fixed. Hence, understanding the timing of the entry into force for each legislation and provision was crucial, and the costs and benefits at the respective time point had to be assessed.

This implied that for the "Business As Usual" ('BAU) scenario, the situation when still no legislation was in place ("without") had to be defined accordingly. Thus, when for example assessing the costs of the implementation of the legislation for farmers, one had to compare the implementation with the legislation in place ("with" scenario) with the farming practices that were established before the legislations came into force. This follows the "with and without principle", usually applied in CBAs.

Figure 1 Illustration of ex-post CBA

Source: Own presentation.

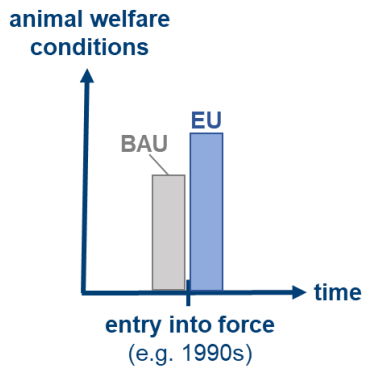
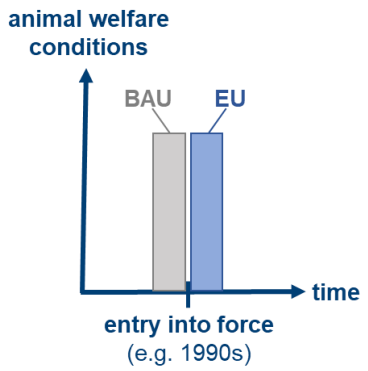
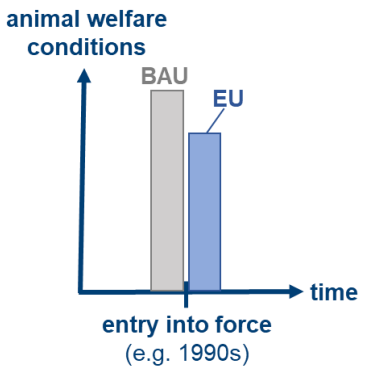
In addition, this study performed no own data collection but completely relied on available assessments and literature. This implies that studies had to be identified, that focused exactly on the provisions of the respective legislations, and that did the "with and without"

comparison, so that the BAU and cost and benefits, incurred due to the entry into force of the legislation could be clearly identified. Hence, the ex-post CBA using individual points in time was dependent on the availability of studies (see also Figure 1), and no discounting over time of costs was carried out when the study time frame and the entry into force was not exactly aligning. Instead, percentage terms and hypothetical scenarios were employed (see Section 2.2).

EU legislation versus Member State reality

In particular for the council directives regulating the husbandry conditions of farm animal welfare requirements for pigs, laying hens, chickens for meat production and calves, large heterogeneity in the implementation in the Member States can be observed. This has implications for the calculation of costs and benefits. As Figure 2 shows, in principle three states can be observed. Only in State A, an increase in animal welfare can be expected, accompanied by an increase in costs. For States B and C, no new costs but also no new animal welfare benefits can be expected from new legislation.

Figure 2 States of possible Member State heterogeneity versus new EU legislation

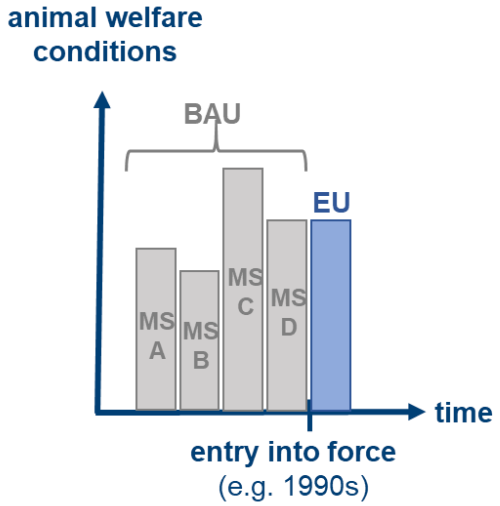
State A: additional costs and benefits due to EU legislation	State B: no additional costs or benefits due to EU legislation	State B: no additional costs or benefits due to EU legislation
		

Source: Own presentation.

When taking the situation across all EU Member States together, for each provision of the farm-related animal welfare legislation, a situation like the following arises (Figure 3).

Hence, the challenge for the calculation of costs and benefits is to make an informed assumption about the maximum distance between the EU wide average BAU scenario and the minimum fulfilment of EU legislation on a provision per provision basis. In addition, where possible, in the optimal case, one could weight the average with the size of the affected population of animals in the respective Member State – but again, also for this, literature must be available that differentiates the state of compliance for each respective provision and the number of the livestock that are affected by this.

Figure 3 Exemplary state for a BAU Scenario for analysing costs and benefits an EU provision



Source: Own presentation.

Given the unavailability of this information, this study has used a simplified approach based on minimum and maximum compliance assumptions for the average EU stock of the respective animal category. Another limitation applies to the consideration of transition periods: Different transition periods existed and for some Member States, due to these transitions, compliance with the provision might have generated no costs (or benefits). However, again due to limitations of the available literature and the scope of the study, it was not systematically investigated for all Member States and animal categories which type of transition applies and therefore, what costs and benefits occurred.

Furthermore, the focus is on cost and benefits of compliance with the minimum legislation standard, hence national "gold plating" or additional obligations required by private standards were also not considered.

Selection of provisions for analysis

Given the size of the legislations, a selection had to be made regarding which provisions may be included in the analysis. The following selection criteria guided the choice of the provisions for the CBA analysis:

- relevance (for stakeholders and the legislation revision process)
- specificity of provisions (sufficiently specific so that a CBA is possible)
- data availability (literature)

In particular the criteria relevance and specificity may lead to a bias in the selection towards those provisions, that may have had an impact on producers (or other stakeholders), as in particular the costs of compliance are usually a controversial topic in the debate preceding the political decision making. Consequently, in accordance with EC guidance, Table 1 presents the final set of provisions chosen for the CBA.

Table 2 Provisions chosen for cost benefit assessment

Legislation	Selection of provisions
General Directive	no specific provision chosen
Pigs Directive	- weaners, rearing pigs: floor area, floor properties, manipulable material - sows, gilts: confinement/floor area/floor properties, manipulable material, dietary fibre - mutilations: castration, tail docking - inspections by public authorities
Broilers Directive	- stocking densities - climate inside housing - on-farm record keeping by farmers - monitoring/follow-up at slaughterhouses - inspections by public authorities
Calves Directive	- confinement/floor area for group housing - size and properties of individual pens - feed properties - inspections by public authorities
Laying Hens Directive	- ban of unenriched cages - transitional period - requirements for alternative systems - beak trimming - distinguishing number for egg marketing - inspections by public authorities
Transport Regulation	**species:** cattle, pigs, poultry **means of transport:** trucks, marine vessels (less data) - properties of means of transport (related to journey time) - authorisation of transporters - training and certification of staff - approval of means of transport - journey log - non-discriminatory inspections by public authorities
Slaughter Regulation	**species:** cattle, pigs, poultry - training and certification of staff - monitoring of killing/stunning effectiveness - animal welfare officers - network for scientific support - technical aspects: electrical parameters for stunning of poultry, recording devices for electrical stunning

Source: Own compilation.

Approach

Having selected for each legislation the provisions to be included in the CBA, for each provision, the following steps were performed:

11. Definition of BAU scenario and alternative scenarios for compliance with the provision
12. Literature review of existing documents per provision to gather information of costs and benefits with a focus on those documents that provide costs and benefits for the minimum level of compliance with the respective provision

13. Reliability assessment of the retrieved literature and decision, which documents are finally to be used as a basis for the monetisation of the costs (and benefits)
14. Qualitative summary and monetisation of costs and benefits per provision and development of coverage scenarios to assess costs and benefits at EU level

Finally, a summing up across all provisions of a legislation was done to come up with costs and benefits for the legislation in total (or at least all analysed provisions). In the following, additional methodological details are given.

Business as usual scenario (BAU)

See the conceptual debate in section 2.1.

Alternative compliance scenarios

Given that provisions were often not fully specific in how a business (farm) could comply with them, different alternatives of compliance were possible, and had to be considered in the analysis.

Stakeholders considered in the cost-benefit analysis

As pointed out in the Better Regulation Guideline, costs of a legislation often concentrate on specific stakeholders whereas benefits are often more broadly distributed over the society. In this study, the following "stakeholders" are considered:

- Businesses: refer to all types of business (e.g. farms, transport companies, slaughterhouses) that are affected by a legislation
- Consumers: refer to those citizens that consume a certain product
- Public authorities: refer to EU, national or local administrations
- Animal welfare: refers to the welfare of animals
- Environment: refers to the welfare of the environment
- Public health: refers to the health of the citizens in general[433]

Even though animal welfare, environment and public health are no groups/stakeholders of the society, they are termed "stakeholder" because it is in the societal interest to understand the costs and benefits of a legislation on a larger set of dimensions. Hence, the welfare of animals, the welfare of the environment and how public health is affected, are all part of the set of "stakeholders" to be included in the analysis.

Literature review

Given that this is a pure desk-based study, the findings rely on the data and literature already available. Hence, the "data" for this study consisted of peer-reviewed publications, grey literature, and interview transcripts. The following selection criteria were applied in searching for this literature:

[433] Given that ultimately, all activities covered under these legislations have the objective to facilitate the safe production of food, often, the public health topics are closely related to food safety and quality.

- Must contain a comparison of the provisions with BAU
- Must focus on EU Member States
- Must be in of the following languages: English, German, French
- Regarding producers' costs of compliance: studies with only a small number of observations were also acceptable, as for certain requirements not much was available, but larger literature reviews preferable
- Regarding costs, benefits and trade-offs between animal welfare, environment, consumers, etc.: Stronger focus on peer-review literature reviews, because in these usually all relevant scientifically established trade-offs are covered.

Using a list of standardised key words for the search and based on first findings, a snowball approach, the following literature databases were screened: Scopus, EFSA database, Wageningen Economic Research database, OpenAgrar (German Federal Research Institutes).

Definition of items in cost-benefit analysis

Following the guidelines of the Better Regulation Tool, costs and benefits were differentiated on the cost side into direct compliance costs, enforcement costs and indirect costs, and on the benefit side, into direct and indirect benefits.

Direct costs occur due to compliance with the legislation, direct benefits are those positive impacts (increase in welfare, increase in market efficiency) that are the result of the objective of the legislation. **Indirect** costs and benefits occur in related markets or to stakeholders that are not directly targeted by the legislation but experience an, often, unintended impact of the legislation.

Regarding **direct compliance costs** (for producers/businesses), where possible, **charges** (fees, levies, taxes) **administrative costs** and **adjustment costs** were considered. Administrative costs refer to administrative obligations for example for information transfer or information availability upon request and include activities such as registration, monitoring, reporting or labelling. Adjustment costs are defined as incremental costs of compliance with the new regulation (other than charges and administrative costs) and capture cost items such as labour, material and equipment or investments into buildings. In line with other studies, changes in revenues were also included (Brouwer et al. 2011). On the **revenue** side, this meant in practice mostly, that animal productivity may have changed due to the new legislation which would affect the revenue side.

Another aspect to consider is the **point in time at which costs (or benefits) occur**, and if they are "one-off" or "recurrent". This is particular important, when substantial adjustments for compliance with a new legislation are necessary, for example such as building a new barn or housing. Here, following the literature, the study's approach is to annualise all investment costs over the lifetime of the investment while the lifetime of the investment may differ, depending on the type of investment necessary and the assumptions of the underlying studies. Added to these annualised investment costs are then the additional recurrent costs, so that **the monetary values given in this study represent a sum of annualised one-off costs plus recurrent costs.**

The information on which cost items exactly are included in these cost figures, and whether the assumption is an investment into a new building or "just" the modification of an existing building is given in the detailed description of the different studies used for this analysis, and can be **found in the annex**.

Reliability assessment

Afterwards, having condensed the findings from the available studies in the literature, a reliability assessment was carried out to finally select those studies/reviews that seemed the best fit for the CBA. Criteria in this analysis of the "best fit" were the following:

- How close is the study design to the exact specification of the legislative provision?
- How many observations are used for the findings of the study?
- Quality of the publication? Is it peer-reviewed?
- Does the study reflect the production conditions in one of the big producer countries of the EU, respectively?

Based on this, the most reliable studies were identified, and used for the summary and monetisation of the costs and benefits. In the results section, when presenting the costs of compliance calculations for the producers, this reliability decision is reflected in the blue shadowing in the cells.

Summarising the findings

Finally, per provision, the costs and benefits are qualitatively condensed out of the available studies.

Regarding the monetisation of the direct compliance costs, the following steps were performed:

5. If a study contained percentage information of increase in production costs (total costs, variable costs..),this information was directly included in the analysis and it was documented which cost items were included.
6. If a study contained information about additional costs in [Euro/product unit] for compliance with the new legislation,
    a. we searched for the remaining costs (e.g. basic costs for the respective animal type, country and year (e.g. in KTBL information).
    b. If such cost figures were not available, we searched for the respective producer prices and used these as an approximation of production costs so that a percentage figure could be calculated.
    c. Regarding the producer price per unit of product, we relied on Eurostat or EC producer price information and always formed a five-year average price around the year in which the analysed studies were performed.

Regarding the summary of potential benefits for consumers, often Willingness-To-Pay (WTP) values are cited. Here, it is important to keep in mind that even though consumers frequently state that they would be willing to pay more for a product that was produced under certain conditions, the reality shows that often, at the point of sale, this behaviour of buying products displaying certain characteristics at higher price is often not occurring. This is known as the

consumer-citizen gap, a well-researched and debated problem with these WTP estimates. In addition, even when a higher purchase price can be realised, it is not clear, if then, along the production value chain, this additional financial value added really benefits the producers.

Results[434]

Overview of costs and benefits identified in the evaluation of the general directive

Regarding a potential CBA of this directive, the European Parliamentary Research Service stated the following in its recent ex-post evaluation of the EU animal welfare legislation (EPRS 2021): “Given the absence of clear criteria for implementation and the delegation to MS of key decisions (including on mutilations), the directive has been seen as relatively ineffective and there are too few elements available to offer here a robust description of its different kinds of impacts that would clearly differentiate them from those of other legislation or other initiatives.” (p. 62). In addition, they concluded that: “There is no evidence on the costs of implementing the general directive. The directive has been linked to some administrative costs for farmers (record keeping, usually considered good practice and a norm in modern farming). While other implementation costs may have been generated by the directive, e.g. to improve buildings, such changes have also been driven by other policies than AW legislation (e.g. support to farmers to modernise and optimise their buildings and equipment) and as such are difficult to attribute to the directive.” (p. 65)

Thus, the conclusion for the present study is that no stand-alone CBA can be performed.

[434] The source for all tables in the results section is: Own presentation.

Overview of costs and benefits identified in the evaluation of the farm level legislation

Pigs directive

In the following, separate CBAs for each provision will be provided. In these CBAs, the compliance costs for businesses (farmers) were calculated, based on information extracted from the literature. Regarding the cost estimation, the following assumptions were made:

Assumptions	
baseline value for total production volume of pigmeat [1000 tonnes/year] (Eurostat)[435]	**20 000**
baseline value for total production costs of pigmeat [€/kg carcass weight Grade E] (5-year average of EU+UK weighted average annual prices from 2003-2007) (European Commission 2022e)	**1,37**

Provision: manipulable material for weaners and rearing pigs

BAU

The current provisions have applied since 2001 with a transitional period until 2003. (Before, similar provisions had applied under Directive 91/630/EEC but these provisions were more vague and granted exceptions according to environment and stocking density.)

As said before, first, the business as usual scenario (BAU) had to be identified. Given the diversity in the EU member states, already in the situation up to 2001, differences in the provision of manipulable material could be observed. Some member states exceeded the foreseen EU legislation while others were similar/equal in their national regulatory approach or did not prescribe anything. For the latter, the (at that time) new legislation meant an actual tightening of the situation, and thus involved costs of compliance.

BAU	
exceeding EU legislation	e.g. straw-based systems with solid concrete floor or deep litter for growing-finishing pigs: EU average of 12 MS: 6 %; range 4 % (BE) - 25 % (UK) (Hendriks and Weerdhof 1999)
similar/equal to EU legislation	e.g. DE: national legislation (Schweinehaltungsverordnung 1988)
no supply of materials or objects	e.g. NL: 57 % of farms (all pig categories) in 2000 (EC Audit Report 2005-7512) absence of materials or objects after 2003: e.g. NL: 6 % of farms (all pig categories) in 2005 (EC Audit Report 2005-7512) IT: 69 % of farms sampled by Scollo et al. (2016) (n=67) *estimates for EU average by EFSA (2007c):* 1-15 % of weaners up to 10 weeks of age (most likely estimate: 10 %; high level of uncertainty) 1-15 % of rearing pigs from 10 weeks onwards (most likely estimate: 10 %; medium level of uncertainty) 1-15 % of rearing pigs > 110 kg (most likely estimate: 10 %; medium level of uncertainty)

[435] Slaughtering in slaughterhouses - annual data; APRO_MT_PANN.

Given that provisions were often not fully specific in how a business (farm) could comply with it, different alternatives of compliance were possible, and had to be considered in the analysis.

Alternatives of compliance considered in the analysis	
supply of loose materials	e.g. straw SE: 99 % of farms surveyed by Wallgren et al. (2016) (n=84) IT: 0 % of farms sampled by Scollo et al. (2016) (n=67) *estimates for EU average by EFSA (2007c):* too little amount of enrichments such as straw rack, straw dispenser 80-96 % of weaners up to 10 weeks of age (most likely estimate: 92 %; medium level of uncertainty) 80-95 % of rearing pigs from 10 weeks onwards (most likely estimate: 90 %; low level of uncertainty) 80-95 % of rearing pigs > 110 kg (most likely estimate: 90 %; low level of uncertainty)
supply of objects	e.g. metal chains ± objects accepted by competent authorities in NL, DE, FR, CZ, AT (EC Audit Reports 2005-7512, 2001-3382, 2010-8390, 2010-8384, 2011-6096) IT: chains or plastic objects as the only enrichments in 25 % of farms sampled by Scollo et al. (2016) (n=67) NL: chains as the only enrichments in the majority of farms (all pig categories) (EC Audit Report 2005-7512) *estimates for EU average by EFSA (2007c):* 80-96 % of weaners up to 10 weeks of age (most likely estimate: 92 %; medium level of uncertainty) 85-97 % of rearing pigs from 10 weeks onwards (most likely estimate: 92 %; low level of uncertainty) 85-97 % of rearing pigs > 110 kg (most likely estimate: 92 %; low level of uncertainty)

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Elements of provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
loose material	**0,5**	**1,7**	**2,9**	**116,5**	**232,4**	**349,4**	**465,8**
objects	**0,03**	**0,5**	**0,9**	**31,9**	**63,7**	**95,6**	**127,4**

As described in the methodology section, the direct cost estimates are derived from the literature. A detailed overview on the findings in the literature can be found in the respective subsection of the annex at the end of the report.

The range of cost estimates results from the reviewed literature and in most cases, the central value corresponds to the mean value between the minimum and maximum value.

The blue shadowing in the cells indicates the values that are considered to be the most likely ones, based on the BAU coverage across Member States and on the quality of the studies.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

In addition to the costs of compliance for businesses (farms), also costs and benefits for other stakeholders were analysed, based on findings in the literature.

	Costs and benefits (direct and indirect)
animals	ranking of enrichments (examples) according to their potential AW benefits (descending order; EFSA 2014): - straw ± edible components (e.g. beet roots) - ropes, wooden objects - plastic objects, metal chains - Although it is a pragmatic approach to rank enrichments according to their classes (e.g. straw, plastic objects), attention should be attributed to the fact that enrichments from the same class may differ in their individual properties and therefore, in their AW benefits (e.g. straw may be of variable quality and contain mycotoxins or pathogens; plastic objects may foster the transmission of pathogens between batches if they are not replaced or cleaned appropriately) (EFSA 2014). Hence, EFSA (2014) recommends to assess the AW benefits of enrichments according to their individual properties. Furthermore, when assessing the AW benefits of enrichments, the husbandry system should be taken into account (e.g. materials with long fibres can potentially obstruct slatted floors and thereby decrease hygiene, air quality and in consequence, animal welfare). - Peer-reviewed literature reviews by D'Eath et al. (2014) and Buijs and Muns (2019b) provide further support for the ranks assigned to the enrichments. In addition, both reviews underline the fact that even the more effective enrichments often fail to fully eliminate tail biting as tail biting is known to be a multifactorial animal welfare issue. With regards to objects made of processed wood, plastic or metal, Buijs and Muns (2019b) point out that these objects only significantly reduce tail biting if exchanged regularly. - The recent peer-reviewed literature adds further insights into the AW benefits of enrichments and further supports the ranking described above (Kalies et al. 2021; Ocepek et al. 2020; Staaveren et al. 2019; Lahrmann et al. 2019; Larsen et al. 2018). Evidence on the additional benefits of wood remains mixed (Heinonen et al. 2021; Telkänranta 2020; Nannoni et al. 2019) and confounding factors regarding the husbandry system should be considered. The effects of compressed straw blocks, in theory an intermediate between loose material and object, are also mixed and merit further investigation (Haigh et al. 2019; Zwicker et al. 2013). Similar to previous findings, even the provision of straw may not fully prevent tail biting due to the multifactorial nature of the issue (Kalies et al. 2021; Kauselmann et al. 2021; Larsen et al. 2018; Lahrmann et al. 2017). Furthermore, it has been demonstrated that providing loose materials can be feasible on partially slatted floors (Wallgren et al. 2020) and fully slatted floors (Kalies et al. 2021; Kauselmann et al. 2021; Chou et al. 2019a) without detrimental effects on pen hygiene when suitable management practices are employed and adapted modes of provision are chosen.
consumers	- The available evidence on consumers' preferences of different enrichments is limited and mixed. Schütz et al. (2020) demonstrate in a picture-based survey that German consumers' stated preferences were in line with the ranking established above. However, in a text-based discrete choice experiment Latacz-Lohmann and Schreiner (2019) find that German consumers' stated preferences deviate from this ranking, with an additional WTP [per kg carcass weight of slaughter pig] of: **+ 4,2 %*** for three pieces of manipulable material, **+ 3,6 %*** for straw bedding in part of the barn area, **+ 2,0 %*** for one piece of manipulable material plus material for rooting (Latacz-Lohmann and Schreiner 2019). The authors do not indicate the type of manipulable material.
environment	- There is no evidence available on the effects of providing objects, however no

	relevant impacts are expected. - The evidence on the effects of providing organic loose materials in small quantities (i.e. as enrichments, not as bedding) is limited. In general, these materials may decrease NH_3 emissions (more assimilation, crust as physical barrier) and increase N_2O emissions (aerobic-anaerobic conditions in crust) and CH_4 emissions (bacterial fermentation) (Blanes-Vidal et al. 2008). In a recent study by Hansen et al. (2020), it was demonstrated that NH_3 emissions from partially slatted systems with straw enrichment and additional emission mitigation measures were lower than in the control system without straw. Furthermore, it has been demonstrated that providing loose materials as enrichments can be feasible on partially slatted floors (Wallgren et al. 2020) and fully slatted floors (Kalies et al. 2021; Kauselmann et al. 2021; Chou et al. 2019a) without detrimental effects on pen hygiene when suitable management practices are employed and adapted modes of provision are chosen. This is an indication that increased emissions due to pen fouling can be avoided in these systems.
public health	- As reviewed by EFSA (2007a), there is a lack of evidence on the effects of enrichment materials on the safety of pigmeat. When different pigs use the same enrichment material, this could possibly increase the transmission of pathogens between animals. In general, stress can facilitate the propagation of food-borne pathogens. Furthermore, abscesses and carcass condemnation due to tail biting pose a risk to food safety. (EFSA 2007a) - In a peer-reviewed literature review, Lahrssen-Wiederholt et al. (2016) suggest that loose materials as well as objects may contain undesirable substances (e.g. toxic metals, dioxins in loose materials and BPA or phthalates in plastic objects). The authors point out that it cannot be excluded that this poses a food safety risk in practice. More recent evidence underlines the importance of considering these issues (Koch et al. 2022; Koch et al. 2021). - Regarding the use of antimicrobial substances, Stygar et al. (2020) show that insufficient enrichment (among other factors) was associated with an increased number of antimicrobial treatments for tail biting and musculoskeletal diseases.

*Own calculations based on data from the source.

CBA summary

- The most beneficial enrichments in terms of AW are associated with higher costs to producers compared to the less beneficial enrichments.
- The AW benefits of enrichments have been shown to (partially) translate into costs savings and increased revenue for producers due to reduced tail biting damages. However, this is expected to offset the costs of providing the more beneficial (and more costly) enrichments only if high levels of tail biting damage prevail and if a high efficacy of the enrichments is assumed. The costs of providing the less beneficial (and less costly) enrichments are more easily offset by cost savings and increased revenue.
- Consumers have stated an additional willingness to pay for enrichments under experimental conditions. Further investigations are needed to establish whether consumers' preferences are in line with the enrichments' AW benefits.
- The effects of different enrichments on the environment have not yet been clearly established.
- Possible positive and negative effects of different enrichments on public health exist and remain to be further investigated.

Tail docking

BAU

The current provisions (no routine tail docking and if carried out on piglets > 7 days of age only under anaesthesia and prolonged analgesia by veterinarian) have applied since 2001 with a transitional period until 2003. Before that, routine tail docking had already been prohibited under Directive 91/630/EEC (since 1991 with a transitional period until 1994).

BAU	
exceeding EU legislation	e.g. SE: complete ban due to national legislation (SFS 1988:534; Wallgren et al. 2019)
similar/equal to EU legislation	-
routine tail docking	- routine tail docking continued to be a common practice in the majority of MS after the legislation came into force in 2003 (Briyne et al. 2018; EFSA 2007d) - proportion of pigs tail docked in 2017: ES (95 %), DE (89 %), DK (98 %), NL (92 %), FR (95 %), PL (95 %), IT (95 %) (Briyne et al. 2018) - intervention before 7 days of age is conventional husbandry practice (Buijs and Muns 2019a)

Alternatives of compliance considered in the analysis	
no routine tail docking	- achieved in SE, FI, LT (Briyne et al. 2018; EFSA 2007d) with, in 2017, 0 % tail-docked pigs in SE and 1,5 % tail-docked pigs in FI (Briyne et al. 2018) - not achieved in the majority of MS (see above; Briyne et al. 2018; EFSA 2007d) because the provision contains "loopholes" (EPRS 2021) that are used to circumvent the phasing out of tail docking

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
tail docking	- Tail docking is a measure carried out in order to prevent tail biting. The costs and benefits of phasing out tail docking are therefore connected to the substitute measures employed to prevent tail biting and to the damage caused if these measures are not effective. - The current EU legislation mainly contains vague requirements on measures to prevent tail biting. The single most specific measure that is currently required is the supply of manipulable material. Therefore, the costs and benefits of supplying manipulable material (at least partially) reflect the costs and benefits of phasing out tail docking (see previous section).						

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- There is consensus that tail docking induces acute pain in piglets and several studies have reported behavioural alterations suggestive of persisting discomfort in the days following the intervention (Prunier et al. 2020; D'Eath et al. 2016). Tail docking is usually performed on all piglets and it effectively prevents tail biting but cannot fully eliminate it (reviewed by Prunier et al. 2020). - Tail biting can have detrimental consequences for the victims but not all animals become tail biting victims during their lifetime (D'Eath et al. 2016). - Following a utilitarian approach and assuming a tail biting incidence of 3,1 % for

	docked pigs and 17,3 % for undocked pigs, D'Eath et al. (2016) calculate that the AW benefits of phasing out tail docking without employing any *additional* measures[436] to prevent tail biting would outweigh the AW costs of tail docking if tail docking caused seven times less suffering than tail biting [$suffering_{biting} = 7 \times suffering_{docking}$]. However, these are theoretical considerations and it is of course not feasible to empirically assess and to express in numerical figures how much less suffering tail docking actually causes compared to tail biting (D'Eath et al. 2016). Nevertheless, these theoretical considerations give an impression of the AW cost-benefit relation when routine tail docking is phased out and tail biting increases because no additional measures are employed to reduce tail biting.
consumers	In a discrete choice experiment, Latacz-Lohmann and Schreiner (2019) elicit an additional WTP of **+ 4,8 %*** [per kg carcass weight of slaughter pig] among German consumers for phasing out surgical procedures (both tail docking and castration together) compared to when both procedures are carried out without anaesthesia. In a discrete choice experiment conducted by Lagerkvist et al. (2006), Swedish consumers have stated a negative WTP (i.e. the desire for a price discount) of **- 4,7 %*** [per kg carcass weight of slaughter pig] if tail docking is not performed and tail biting is not prevented. However, in the same study consumers also stated an additional WTP of **+ 3,5 %*** [per kg carcass weight of slaughter pig] if tail docking is not performed but tail biting is prevented by other (unspecified) means. Consumers' preferences with regards to manipulable materials are summarised in section 3.2.1.1.
environment	Consequences for the environment are expected to arise mainly due to the substitute measures employed to prevent tail biting (see section 3.2.1.1).
public health	In general, stress can facilitate the propagation of food-borne pathogens (EFSA 2007a) and both tail docking and tail biting induce stress. Furthermore, abscesses and carcass condemnation due to tail biting pose a risk to food safety (EFSA 2007a). The food safety risks associated with manipulable materials as substitute measures to prevent tail biting are summarised in section 3.2.1.1.

*Own calculations based on data from the source.

CBA summary

- In the majority of EU MS, phasing out tail docking has not yet been accomplished. Therefore, the costs and benefits of phasing out tail docking are mainly hypothetical.
- Because tail docking is carried out in order to prevent tail biting, the costs and benefits of phasing out tail docking are connected to the substitute measures employed to prevent tail biting. The single most specific measure currently required by EU legislation to prevent tail biting is the supply of manipulable material (see section 3.2.1.1). However, experiences from MS where tail docking was successfully phased out suggest that further changes in husbandry practices are required to successfully phase out tail docking. These changes are expected to entail substantial costs and benefits but an assessment is out of the scope of this study.

[436] In the scenarios investigated by D'Eath et al. (2016), basic enrichments (wood on chain or holder) are supplied to both docked and undocked pigs but undocked pigs are not supplied with any *additional* enrichments.

- If routine tail docking is phased out, all animals are spared a painful intervention but if no substitute measures are employed to effectively prevent tail biting, the number of tail biting victims will most likely increase. There has been a first attempt to weigh up 'less suffering for all' vs. 'more suffering for few' but clearly this is a rather theoretical approach and it does not capture the intention of the provision which is to effectively prevent tail biting by other means than tail docking.
- In experimental settings, consumers have stated an additional WTP for phasing out surgical procedures including tail docking but research in this regard is scarce.
- The effects of phasing out routine tail docking on the environment are expected to be related to the substitute measures employed to prevent tail biting (see section 3.2.1.1).
- If tail docking is phased out and tail biting is not effectively prevented by other means, this can have negative consequences for food safety.

Castration

BAU

The current provisions (surgical castration of piglets > 7 days of age only under anaesthesia and prolonged analgesia by veterinarian) have applied since 2001 with a transitional period until 2003. Before that, an age limit of 4 weeks under Directive 91/630/EEC (since 1991 with a transitional period until 1994) was in place.

BAU	
exceeding EU legislation	no castration (instead raising of entire males): IE (100 %), UK (100 %), ES (58 %), PT (58 %), DK (5 %) (figures from 2000; EFSA 2004)
similar/equal to EU legislation	**-**
surgical castration without anaesthesia and analgesia	surgical castration without anaesthesia and analgesia was carried out on piglets before and after 7 days of age (EFSA 2004; SVC 1997) but no quantitative information is available regarding the age distribution

Alternatives of compliance considered in the analysis	
surgical castration with anaesthesia and analgesia carried out by veterinarian on piglets > 7 days of age	- small minority of pigs in the MS where surgical castration is commonly practiced and no further national legislation exists (Briyne et al. 2016; Alleweldt et al. 2013; Fredriksen et al. 2009) - e.g. DE (< 1 %), DK (0 %), FR (0 %), IT (0,5 %) (Briyne et al. 2016)
surgical castration without anaesthesia and analgesia on piglets ≤ 7 days of age	- In the majority of MS where surgical castration is commonly practiced and no further national legislation exists, male pigs are either castrated without anaesthesia and analgesia or with analgesia only (Briyne et al. 2016; Alleweldt et al. 2013; Fredriksen et al. 2009). - castration without anaesthesia and analgesia: e.g. DE (0 %), DK (5 %), FR (50 %), IT (97 %) (Briyne et al. 2016) - castration with analgesia only: e.g. DE (99 %), DK (95 % due to national

	legislation), FR (50 %), IT (2,5 %) (Briyne et al. 2016)

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
castration	No cost estimates, as no real additional costs due to compliance with minimum requirements of legislation compared to BAU could be identified						

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- There is consensus that castration is painful at any age (Prunier et al. 2020; Aluwé et al. 2016; Rault et al. 2011; Borell et al. 2009; Prunier et al. 2006). Limited recent evidence on tail docking suggests that pain perception might be less intense in the first 7 days of age compared to 10-15 days of age (Kells et al. 2019; reviewed by Prunier et al. 2020). Furthermore, there is some (but limited) evidence indicating that wound healing might be better during the first days of life compared to the first weeks (reviewed by Prunier et al. 2020; Rault et al. 2011). - As reviewed by Prunier et al. (2020), local anaesthesia and general anaesthesia (via injection or inhalation of isoflurane) in combination with analgesia can be expected to alleviate pain compared to castration without anaesthesia and analgesia. However, Prunier et al. (2020) underline that full pain and stress relief cannot be expected. Potential drawbacks of anaesthesia have been described such as hypothermia for general anaesthesia via injection and increased bleeding for general anaesthesia via inhalation (isoflurane) (reviewed by Prunier et al. 2020). As reviewed by Aluwé et al. (2016), there is some evidence that this might result in additional piglet losses.
consumers	In a literature review, Font-i-Furnols et al. (2019) conclude that consumers (from different EU MS and third countries) are mostly not well informed about the castration of piglets but that the acceptance of castration with anaesthesia is generally higher than of castration without anaesthesia. In a recent internet survey, Aluwé et al. (2020) find that 87 % of laypersons (from different EU MS) consider castration with anaesthesia acceptable while only 27 % indicate that they find castration without anaesthesia acceptable. In a discrete choice experiment, Latacz-Lohmann and Schreiner (2019) elicit an additional WTP of **+ 8,5 %*** [per kg carcass weight of slaughter pig] among German consumers for the use of anaesthesia during surgical procedures (for both, castration and tail docking) as compared to surgery without anaesthesia. Integrating information on EU consumers' WTP and theoretical considerations from the Welfare Quality® Assessment Protocol, Alleweldt et al. (2013) provide an estimate of the AW benefits 'for society' of castration with anaesthesia and analgesia. This estimate corresponds to **+ 0,7 %*** [per kg carcass weight of slaughter pig] compared to castration without anaesthesia and analgesia.
environment	Isoflurane is a greenhouse gas and therefore, a trade-off exists regarding its use for general anaesthesia via inhalation.

public health	- So far, it has not been reported that the use of anaesthesia and analgesia might have effects on the quality of pigmeat (reviewed by Aluwé et al. 2016). - Adverse health effects have been reported by staff administering isoflurane for general anaesthesia via inhalation (reviewed by Aluwé et al. 2016) and precautions need to be taken to avoid inhalation.

*Own calculations based on data from the source.

CBA summary

- The proportion of producers who performed castration on piglets older than 7 days of age before the provision came into force is unknown. These producers either had the choice to shift to a younger age or to have a veterinarian perform the intervention under anaesthesia and analgesia. In view of the additional costs if castration is carried out by a veterinarian, it is not surprising that this alternative of compliance is rarely practiced.
- Performing castration with anaesthesia and analgesia is expected to be beneficial to animal welfare. The weight of evidence indicates that for castration without anaesthesia and analgesia, the shift to a younger age does not have relevant benefits regarding pain. However, limited evidence suggests that wound healing might be better at a younger age.
- Consumers are mostly not well informed about castration but in a number of studies they have consistently preferred castration with anaesthesia and analgesia over castration without. Furthermore, in experimental settings consumers have stated an additional WTP for the use of anaesthesia and analgesia.

Floor properties for weaners and rearing pigs

BAU

The current provisions have applied since 2003 with a transitional period until 2013. The details of the provision were as follows: max. opening width of 14 mm (weaners) / 18 mm (rearing pigs) and min. slat width of 50 mm (weaners) / 80 mm (rearing pigs). Before that, there were no provisions in place regarding properties of slatted floors.

BAU	
exceeding EU legislation	**-**
similar/equal to EU legislation	- conventional husbandry practice for rearing pigs: slat openings typically measure between 17-20 mm (EFSA 2007c) which complies with EU legislation when taking into account tolerance levels of 2-3 mm
concrete slatted floors with a larger opening width and/or smaller slat width	estimates for EU average by EFSA (2007c): 5-15 % of weaners up to 10 weeks of age (most likely estimate: 10 %; high level of uncertainty) 5-20 % of rearing pigs from 10 weeks onwards (most likely estimate: 10 %; high level of uncertainty) 10-30 % of rearing pigs > 110 kg (most likely estimate: 15 %; high level of uncertainty)

Alternatives of compliance considered in the analysis	
concrete slatted floors with an opening width and slat width according to the provision	Most likely, only a minority of producers had to adjust their premises in order to comply with the provision (see above).

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
floor properties weaners / rearing pigs	**0**	**0,8**	**1,6**	**54,8**	**109,6**	**164,4**	**219,2**

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	The effects of slatted floors on the incidence of claw injuries do not only depend on the width of slats and openings but also on further parameters such as the abrasiveness of the surface and the sharpness of edges (reviewed by EFSA 2005a). Moreover, the effect of the same slat width and opening width on pen hygiene may differ when the floor is fully slatted or partially slatted (reviewed by Vermeij et al. 2009). The available literature is often confounded by these factors (reviewed by Vermeij et al. 2009; EFSA 2005a) and the more recent literature has rarely investigated the effects of slatted floors with limits that are less strict than those in EU legislation (Devillers et al. 2019). These limitations should be taken into account but nevertheless, it seems appropriate to conclude that injuries would be more likely if the slat width was smaller and/or the opening width larger than provided by EU legislation (reviewed by Vermeij et al. 2009; EFSA 2005a). Regarding pen hygiene, larger openings are generally associated with better hygiene (reviewed by Philippe et al. 2011b; EFSA 2005a) but the limits set in the provision are in the range of what is recommended to ensure good pen hygiene (reviewed by Vermeij et al. 2009).
consumers	No data could be obtained on how consumers perceive the introduction of limits for slat width and opening width.
environment	Generally, larger openings facilitate drainage and thereby, decrease NH_3 emissions from slatted floors (reviewed by Philippe et al. 2011b) but the limits set in the provision are in the range of what is recommended to ensure good drainage (reviewed by Vermeij et al. 2009). Other factors affect drainage and emissions as well (e.g. shape of slats) and should not be neglected (reviewed by Philippe et al. 2011b; Vermeij et al. 2009). With the available evidence, it is not possible to assess the effects of slat width and opening width on CH_4, N_2O and CO_2 emissions separately from other factors (e.g. whether the floor is fully or partially slatted) (reviewed by Philippe and Nicks 2015).
public health	In general, injuries can cause stress and thereby, facilitate the propagation of food-borne pathogens (EFSA 2007a). Injuries may also result in carcass condemnation which is a potential risk to food safety (EFSA 2007a). Furthermore, poor pen hygiene due to insufficient drainage can increase the survival and transmission of pathogens (EFSA 2007a).

CBA summary

- When the provision was introduced, the large majority of farms were already compliant because the requirements (taking into account tolerance levels) were considered conventional husbandry practice.

- Cost estimates for those producers who had to adjust their premises are scarce. Based on limited data, the costs for complying with the requirements when constructing a new building are probably negligible but when an old building had to be transformed, costs were likely substantial.
- The provision only covers a single aspect that is important when assessing the effects of slatted floors on animal welfare and the environment. It can be concluded, that increasing the slat width or reducing the opening width in order to comply with the requirements most likely had positive effects on animal welfare and no relevant effects on drainage, pen hygiene and ammonia emissions.

Floor area for weaners and rearing pigs

BAU

The current provisions (minimum floor area for weaners and rearing pigs, dependent on live weight) have applied since 1994 with a transitional period until 1998. Before that, no provisions regarding minimum floor area were in place.

BAU	
exceeding EU legislation	As reviewed by SVC (1997), the minimum floor area required by EU legislation corresponds to the threshold below which a decline in animal productivity can be expected. Therefore, it is unlikely that producers would deliberately choose floor areas below the EU minimum as this would counteract their economic interests.[437] Examples from the MS support this argument: - German expert guidelines on barn construction from 1979 suggest that it was conventional husbandry practice to provide similar floor areas even before they were required by German national legislation in 1988 and later by EU legislation (KTBL 1979; Schweinehaltungsverordnung 1988). - In Denmark, it appears to be conventional husbandry practice to provide a floor area of 0,7 m² in the finishing stage although only 0,65 m² are required by legislation (D'Eath et al. 2016).
similar/equal to EU legislation	
floor area below minimum requirements	

Alternatives of compliance considered in the analysis	
floor area according to minimum requirements	Most likely, the minimum floor areas required by EU legislation correspond to conventional husbandry practices in intensive pig farming.

[437] In this connection it should be noted that for laying hens, Lusk and Norwood (2011) propose the following: Rather than to maximise the productivity of the individual animal, producers maximise the farm's total profitability which could possibly lead to incentives to increase the stocking density although this decreases the individual animal's productivity. However, whether this applies to rearing pigs as well is uncertain because the authors' argumentation heavily relies on the context-specific numerical figures used in the example calculations.

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
Floor area	Most likely, producers do not face relevant additional costs due to the minimum floor areas required by EU legislation because the requirements correspond to conventional husbandry practices						

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	Most likely, the minimum limits for floor areas required by EU legislation have no relevant effect on AW, consumers, the environment and public health as they correspond to conventional husbandry practices.
consumers	
environment	
public health	

CBA summary

The requirements for minimum floor areas most likely correspond to conventional husbandry practices in intensive pig farming. In consequence, no relevant effects on producers' costs, AW, consumers, the environment and public health are expected.

Group housing for gestation sows

BAU

The current provisions (group housing starting from four weeks after service until one week before expected farrowing) have applied since 2003 with a transitional period until 2013. Before that, no time limits for confinement in gestation crates were in place.

BAU	
exceeding EU legislation	SE (since 1994), UK (since 1999) (Mul et al. 2010; Lay and Marchant-Forde 2009) NL (since 1998 with transitional period until 2008) (Vermeer et al. 1999)
similar/equal to EU legislation	EU average of 11 MS: 25 %; range 4 % (BE) - 70 % (FI) (Hendriks and Weerdhof 1999)
confinement in gestation crates or tethering during the whole gestation period	EU average of 11 MS: 75 %; range 30 % (FI) - 96 % (BE) (Hendriks and Weerdhof 1999)

Alternatives of compliance considered in the analysis	
group housing	Group housing was successfully implemented in all MS (EPRS 2021; ECA

starting from four weeks after service until one week before expected farrowing	2018). However, a large variety of systems exist that differ especially with regards to feeding technology (e.g. ESF – electronic sow feeder, trickle feeder) and flooring (e.g. slatted, deep litter). Currently, no quantitative information is available on the distribution of these systems in the MS. The European Agricultural Census 2020 is expected to contain information on flooring but it is not going to be published until the second half of 2022 (European Commission 2022a). Census data from Germany was obtained in advance and indicates that the proportion of sows[438] reared in systems with fully or partially floor has increased since 2010 and amounts to about 92 % in 2020 (Statistisches Bundesamt 2021, 2011). Therefore, the following analysis focuses on systems with slatted floor.

Businesses (farm) compliance costs (direct and indirect)

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
Group housing for gestating sows	**-2,9**	**0,5**	**1,5**	**34,3**	**68,5**	**102,8**	**137,0**

Note: In this case, the central value does not constitute the mean value between minimum and maximum value. There was only one study that displayed due to the provision, these rather impressive cost savings. However, even there, the authors highlightd that this was an exceptionally well managed farm and not representative of the farms in the sector. In this case, an "informed choice" based on the remaining studies has been made for the central value.

Generally, equal levels of reproductive performance can be achieved in group housing systems as compared to individual confinement in crates (reviewed by Spoolder and Vermeer 2015; McGlone 2013). However, whether this potential is actually reached in practice depends on (among other factors) the individual characteristics of the group housing system (especially with regards to feeding technology) and on management practices (particularly in connection to the mixing of sows) (reviewed by Salak-Johnson 2017; Peltoniemi et al. 2016). In general, management is more challenging for group housing systems than for confinement in crates (reviewed by Peltoniemi et al. 2021) but learning effects over time have been observed and have resulted in positive effects on overall economic performance (Mitchell et al. 2017).

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	There is consensus that group housing of sows during gestation has the potential to increase AW compared to confinement in crates because group housing is closer to the sows' physiological and social needs (e.g. free movement, social interaction with other sows) (reviewed by Schubbert et al. 2020; Maes et al. 2016;

[438] Aggregate figures comprising sows during mating, gestation and lactation.

	Spoolder and Vermeer 2015). However, there is also consensus that group housing does not automatically increase AW and that in practice, the actual AW outcomes are highly dependent on (among other factors) the individual characteristics of the group housing systems (e.g. with regards to flooring, space allowance, feeding technology) and management practices (e.g. related to mixing of sows) (reviewed by Schubbert et al. 2020; Maes et al. 2016; Spoolder and Vermeer 2015; Verdon et al. 2015). In view of this, it is not surprising that in the past, as reviewed by McGlone (2013), often no benefits to AW were found when group housing was compared to confinement in gestation crates. In general, management is more challenging in group housing systems than in individual crates (reviewed by Peltoniemi et al. 2021) but learning effects over time are expected to occur and to result in benefits to AW (Mitchell et al. 2017).
consumers	- By means of the European Citizens' Initiative 'End the Cage Age', European consumers from different MS have recently expressed their prefer-ence to phase out cages and confinement crates for a variety of species, including sows. - In a discrete choice experiment conducted by Lagerkvist et al. (2006), Swedish consumers have stated an additional WTP of **+ 21,6 %*** [per kg carcass weight of slaughter pig] for the transition from permanent confinement of sows to confinement only during farrowing.
environment	Group housing systems can be associated with higher, lower or unchanged NH_3 emissions compared to individual confinement in crates (Santonja et al. 2017; Mosquera et al. 2010; Groenestein et al. 2001). The emission profile in group housing depends on factors such as slurry management, presence of bedding and diet (Santonja et al. 2017; Philippe et al. 2011a; Philippe et al. 2011b). Comparative data on emissions of other greenhouse gases and dust is scarce and does not allow for definite conclusions to be drawn (Santonja et al. 2017; Mosquera et al. 2010).
public health	- Evidence on the relationship between group housing and disease is scarce (reviewed by Maes et al. 2016). In general, stress can facilitate the propagation of food-borne pathogens (Maes et al. 2016; EFSA 2007a) but if group housing systems are appropriately constructed, stress can be managed successfully (reviewed by Schubbert et al. 2020; Maes et al. 2016; Spoolder and Vermeer 2015). There are few studies available that have investigated the sows' immune response in group housing systems compared to confinement in crates and these studies did not find relevant differences between the systems (reviewed by Maes et al. 2016). It has been hypothesised that nose-to-nose contact between sows and oral contact with excrements in group housing (if no separate areas for lying and defecation are available) could facilitate the transmission of pathogens but as reviewed by Maes et al. (2016), no research is available in this regard. More recently, comparative studies on group housing vs. confinement are not a research priority anymore. - Generally, injuries can result in carcass condemnation which is a potential risk to food safety (EFSA 2007a). The incidence of injuries in group housing systems depends on the individual characteristics of the housing environment and on management practices (reviewed by Schubbert et al. 2020; Maes et al. 2016; Spoolder and Vermeer 2015; McGlone 2013) and therefore, no definite conclusions can be drawn in this regard.

*Own calculations based on data from the source.

CBA summary

- Producers' costs of introducing group housing depend on whether the investments were made at the end of the depreciation period of the existing building or whether investments had to be shouldered on top of the ongoing depreciation which would

have led to additional disinvestments. Unfortunately, the available studies often do not contain detailed information in this regard. The transitional period of 10 years is expected to have decreased the share of producers who faced disinvestments.

- For the transition to group housing on slatted floors, total cost changes in the range of - 2,9 % to + 1,5 % [per kg carcass weight of slaughter pig] have been reported, dependent on the type of modification (new building, transformation of old building, feeding technology etc.) and on the cost and revenue items that were taken into account. Therefore, the transition to group housing has the potential to result in efficiency gains and cost reductions.
- Group housing has the potential to improve AW compared to confinement in crates. However, the AW outcomes achieved in practice depend to a great extent on the individual characteristics of the group housing systems and on management for which no detailed requirements are laid down in EU legislation.
- In an experimental setting, consumers have stated an additional WTP for group housing of sows compared to confinement in crates. However, research in the European context is scarce.
- The effects of group housing on the environment and public health depend on how these systems are constructed and managed in practice. Therefore, no general relationship exists between the transition to group housing and environmental or public health outcomes.

Dietary fibre content

BAU

The current provisions have applied since 2001 with a transitional period until 2003. The details of the provisions are the following: sufficient quantity of bulky or high-fibre food as well as high-energy food for dry pregnant sows and gilts in order to satisfy their hunger and their need to chew. Before, no provisions regarding dietary fibre content were in place.

BAU	
exceeding EU legislation	**-**
similar/equal to EU legislation	**-**
insufficient quantity of high-fibre food	estimates for EU average by EFSA (2007b): 50-98 % of pregnant sows (most likely estimate: 60 %; high level of uncertainty) are offered a diet with < 20 % crude fibre content and do not have access to appropriate foraging material as compensation

Alternatives of compliance considered in the analysis	
sufficient quantity of high-fibre food	As the provision does not set a specific threshold, there is room for interpretation regarding compliance. In a Scientific Report from 2007, the EFSA AHAW panel points out that at the time, it was not even clear from a scientific standpoint how a diet would have to be formulated in order to comply with the

	provision. For the purpose of carrying out surveys and risk assessments, a threshold of 20 % crude fibre content was proposed (EFSA 2007b).

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
Dietary fibre content	- In the external study by Menghi et al. (2014), compliance with the provision on high-fibre food was associated with additional costs to producers. However, the study only gives a joint cost estimate for the provisions on high-fibre food, group housing, slatted floors and manipulable material altogether. This cost estimate amounts to **+ 0,6 % to + 3,55 %** [per kg carcass weight of slaughter pig] depending on the MS (see Table in the Annex). No further information is given with regards to the individual cost items that were the drivers for this cost increase. - No further data could be obtained to quantify the costs of providing high-fibre food to gestating sows. A qualitative assessment of the costs is difficult as many factors have to be considered: High-fibre diets may be associated with additional costs for suitable feeding equipment or for labour if roughage is distributed manually. Furthermore, the effects on feed costs may be positive or negative as high-fibre food itself can be a comparatively low-cost feed component (reviewed by Woyengo et al. 2014) but its contribution to energy supply is limited (reviewed by Meunier-Salaün and Bolhuis 2015) and the digestibility of other nutrients may be reduced in high-fibre diets (reviewed by Trottier et al. 2015). Similarly, the effects of high-fibre diets on revenue are difficult to predict because it has not yet been clearly established how high-fibre diets affect the reproductive performance of sows (reviewed by Jarrett and Ashworth 2018; Meunier-Salaün and Bolhuis 2015).						

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- High-fibre diets have frequently been reported to contribute to animal welfare by increasing satiety and thereby decreasing feeding motivation and stereotypical behaviours (reviewed by Jarrett and Ashworth 2018; Meunier-Salaün and Bolhuis 2015; Verdon et al. 2015; EFSA 2007b). Furthermore, high-fibre diets contribute to the prevention of gastric ulcers (reviewed by EFSA 2007b). However, the extent of these effects depends on additional factors that are not part of the provision such as fibre quantity, fibre source, physicochemical properties of the fibres and parity of the sow (reviewed by Meunier-Salaün and Bolhuis 2015; Verdon et al. 2015; EFSA 2007b). - Dietary fibre can act as a prebiotic with beneficial effects on the gut microbiome (reviewed by Lindberg 2014).
consumers	**-**
environment	- The net effects of high-fibre diets on NH_3 emission may differ under practical conditions as high-fibre diets may on the one hand decrease NH_3 emissions (urea transfer from urine to faeces; lower slurry pH due to volatile fatty acids from fibre fermentation) but may also increase NH_3 emissions (pen fouling due to higher viscosity of faeces) (Philippe et al. 2011b). As reviewed by Philippe and Nicks

	(2015), CH_4 emissions are generally believed to increase when high-fibre diets are supplied (bacterial fermentation). The effects of high-fibre diets on N_2O emissions depend on the presence of bedding material and the effects on CO_2 emissions have not yet been clearly established (reviewed by Philippe and Nicks 2015). - Under practical conditions, the effects of high-fibre diets for sows on emissions have rarely been investigated. Philippe et al. (2015) find that a high-fibre diet is associated with a reduction in total NH_3 emissions from pens and with an increase in CH_4 emissions but has no effect on N_2O and CO_2 emissions. Ebertz et al. (2020) observe poorer pen hygiene when a high-fibre diet is supplied but do not measure emissions.
public health	In general, if stress occurs e.g. due to a lack of satiety, this can facilitate the propagation of food-borne pathogens and pose a risk to food safety (EFSA 2007a).

CBA summary

- In order to reliably assess costs and benefits of the provision, it would have to be known how exactly high-fibre diets are formulated in practice in the MS and to take into account factors such as fibre quantity, physicochemical properties of fibres and fibre source. However, these data are not available.
- Producers' costs have been quantified in the past on an aggregate level together with other provisions. Further quantitative or qualitative estimates cannot be provided because information is lacking regarding the individual cost and revenue items that drive producers' costs.
- High-fibre diets are generally expected to improve animal welfare but the actual effects depend on the above-mentioned factors that are currently not regulated in EU legislation and for which no data could be obtained.
- It is not possible to draw definite conclusions regarding the effects of the provision on cumulative greenhouse gas emissions.

Manipulable material for group-housed sows and nesting material for sows around farrowing

BAU

The current provisions have applied since 2001 with a transitional period until 2003. Before, similar provisions had applied under Directive 91/630/EEC.

BAU	
exceeding EU legislation	e.g. straw-based systems or outdoor systems EU average of 12 MS: 10 % (Hendriks and Weerdhof 1999)
similar/equal to EU legislation	e.g. DE: national legislation (Schweinehaltungs-VO 1988)
no supply of materials or objects	e.g. NL: 57 % of farms (all pig categories) in 2000 (EC Audit Report 2005-7512) estimates for EU average by EFSA (2007b): *lack of foraging/exploration material:* 30-80 % of dry sows (most likely estimate: 60 %; medium level of uncertainty) 50-80 % of pregnant sows (most likely estimate: 70 %; high level of uncertainty) 85-98 % of farrowing sows (most likely estimate: 90 %; low level of uncertainty)

	lack of nest-building material: 85-98 % of farrowing sows (most likely estimate: 90 %; low level of uncertainty)

Alternatives of compliance considered in the analysis	
supply of loose materials	estimates for EU average by EFSA (2007b): *access to substrates for foraging/exploration but in quantity < 100 g per sow:* 10-30 % of dry sows (most likely estimate: 20 %; medium level of uncertainty) 10-40 % of pregnant sows (most likely estimate: 20 %; high level of uncertainty) 1-10 % of farrowing sows (most likely estimate: 5 %; low level of uncertainty) *access to substrates for nest building but in quantity < 2,5 kg per sow:* 1-10 % of farrowing sows (most likely estimate: 5 %; low level of uncertainty)
supply of objects	e.g. metal chains ± objects accepted by competent authorities in NL, DE, CZ, AT (EC Audit Reports 2005-7512, 2008-7980, 2010-8384, 2011-6096) NL: chains as the only enrichments in the majority of farms (all pig categories) (EC Audit Report 2005-7512) estimates for EU average by EFSA (2007b): *access to materials such as chains, tyres for foraging/exploration:* 1-5 % of dry sows (most likely estimate: 2 %; medium level of uncertainty) 1-5 % of pregnant sows (most likely estimate: 2 %; high level of uncertainty) 1-5 % of farrowing sows (most likely estimate: 3 %; medium level of uncertainty) *access to materials such as chains, tyres for nest building:* 1-5 % of farrowing sows (most likely estimate: 3 %; medium level of uncertainty)

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** *hypothetical scenarios: share of production volume for which production practices were adjusted*			
Provision	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
Loose material	**0,08**	**0,3**	**0,5**	**19,4**	**38,8**	**58,2**	**77,6**
Objects	**0,005**	**0,08**	**0,2**	**5,3**	**10,6**	**15,9**	**21,2**

In addition, the following observations can be made, based on the literature:

- Estimates of the costs of providing enrichments specifically to sows and gilts could not be obtained. However, the same materials/objects as for weaners and rearing pigs can be used for sows and gilts as well. Assuming that these materials/objects are available every day to all sows and gilts at a breeding unit and that further technical parameters[439] apply, the following approximation holds: $costs_{sows+gilts} = \frac{1}{6} \cdot$

[439] In brief, the costs per sow/gilt are distributed to the offspring as the unit of interest is *kg carcass weight of slaughter pig*. Assumptions: piglet is sold to fattening farm at costs = prices; mortality at fattening farm = 0 %; duration of material supply for which $costs_{rearing\ pig}$ is calculated = 122 d; number of replacement gilts per productive sow and year = 0,42; number of weaned piglets per productive sow and year = 26,36 (based on KTBL 2020).

$costs_{rearing\ pigs}$ [per kg carcass weight of slaughter pig]. Tail biting is an issue for rearing gilts as well (Ursinus et al. 2014) and it is expected to lead to foregone revenue and increased costs but for breeding units, no quantifications exist.

- With regards to enrichments for sows, the research priority has been the supply of nest-building material prepartum while only few studies have focused on enrichments during lactation and gestation (reviewed by Weerd and Ison 2019; Galli et al. 2021).
- In general, the expression of nest-building behaviour has been associated with positive effects on the reproductive performance of sows (reviewed by Peltoniemi et al. 2021; Peltoniemi and Oliviero 2015; EFSA 2014; Wischner et al. 2009). However, when sows are confined in farrowing crates (which is a common husbandry practice in the EU) their ability to perform nest-building behaviour is restricted even if nest-building material is supplied (reviewed by Peltoniemi et al. 2021; Peltoniemi and Oliviero 2015; EFSA 2014; Vanheukelom et al. 2012; Wischner et al. 2009). To date, it has not been systematically reviewed whether the supply of nest-building materials in farrowing crates can lead to productivity gains that could possibly offset the costs of the materials.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Additional costs and benefits
animals	- In general, the same ranking of enrichments according to their potential AW benefits as established for weaners and rearing pigs is believed to apply for sows and gilts as well although the body of research for these pig categories is smaller (reviewed by EFSA 2014). - With regards to enrichments for sows, the research priority has been the supply of nest-building materials prepartum while only few studies have focused on enrichments during lactation and gestation (reviewed by Weerd and Ison 2019; Galli et al. 2021). - There is consensus that the expression of nest-building behaviour prepartum is of high importance for AW (reviewed by Peltoniemi et al. 2021; Peltoniemi and Oliviero 2015; EFSA 2014; Vanheukelom et al. 2012; Wischner et al. 2009). Although nest-building behaviour cannot be fully expressed in farrowing crates due to confinement, the supply of nest-building materials is nevertheless considered to improve AW (reviewed by Vanheukelom et al. 2012). Regarding the relative AW benefits of different nest-building materials in farrowing crates, research is limited compared to weaners and rearing pigs. Materials have to stay in reach of the confined sows which makes it difficult to provide loose materials in an attractive way (reviewed by EFSA 2014) and could explain why in recent studies, jute sacks (Bolhuis et al. 2018) and newspaper (Swan et al. 2018) were preferred over straw. - During gestation, when sows are fed restrictively, the motivation to explore enrichments is generally high and loose materials with edible components are considered to be most suitable (reviewed by EFSA 2014; Verdon et al. 2015). The role that enrichments can play in group housing systems to reduce aggressive behaviours during mixing is not yet clearly established (reviewed by Verdon et al. 2015). If enrichments are not managed appropriately, additional competition over these resources can occur (reviewed by Schubbert et al. 2020; Verdon et al. 2015).
consumers	From studies on rearing pigs, evidence on consumers' WTP for enrichments is available (see section 3.2.1.1) but the extent to which these findings can be transferred to sows in group housing and in farrowing crates is uncertain.
environment	- There is no evidence available on the effects of providing objects, however no relevant impacts are expected.

	- Research on the effects of providing organic loose materials in small quantities (i.e. as enrichments, not as bedding) is scarce. In general, these materials may decrease NH_3 emissions (more assimilation, crust as physical barrier) and increase N_2O emissions (aerobic-anaerobic conditions in crust) and CH_4 emissions (bacterial fermentation) (Blanes-Vidal et al. 2008). - Further limited evidence is available from studies in fattening units (see section 3.2.1.1) but the extent to which these findings can be transferred to sows in group housing and in farrowing crates is uncertain.
public health	- As reviewed by EFSA (2007a), there is a lack of evidence on the effects of enrichment materials on the safety of pigmeat. When different pigs use the same enrichment material, this could possibly increase the transmission of pathogens between animals. In general, stress can facilitate the propagation of food-borne pathogens. Furthermore, abscesses and carcass condemnation due to tail biting pose a risk to food safety. (EFSA 2007a) - In a peer-reviewed literature review, Lahrssen-Wiederholt et al. (2016) suggest that loose materials as well as objects may contain undesirable substances (e.g. toxic metals, dioxins in loose materials and BPA or phthalates in plastic objects). The authors point out that it cannot be excluded that this poses a food safety risk in practice. More recent evidence underlines the importance of considering these issues (Koch et al. 2022; Koch et al. 2021).

CBA summary

- While a large body of research is available on enrichments for weaners and rearing pigs, less is known about enrichments for sows and gilts in group housing during gestation and in farrowing crates.
- In general, the same ranking of enrichments according to potential AW benefits as established for weaners and rearing pigs is expected to apply for sows and gilts as well. However, in farrowing crates where nest-building behaviour is generally restricted and the supply of loose materials in reach of the sows is challenging, jute sacks and newspapers have recently been reported to be more beneficial than straw. This remains to be further investigated.
- Estimates of producers' costs of supplying enrichments specifically to sows and rearing gilts could not be obtained. However, as the same objects and materials can be used for rearing pigs and sows/gilts, producers' costs can be approximated with the help of a cost factor. In view of the available evidence, it is not possible to determine to what extent the costs of enrichments can be offset by potential productivity gains.
- The effects of different enrichments on the environment have not yet been clearly established.
- Possible positive and negative effects of different enrichments on public health exist and remain to be further investigated.

Provisions in total

This provides a summary of the above, plus additional information that was found on inspection costs of public authorities.

Business (farm) direct compliance costs

	change in total production costs compared to BAU [**%** per kg pig meat]			**change in total production costs** compared to BAU **[Mio. €/year]** hypothetical scenarios: share of production volume for which production practices were adjusted			
Provisions	**min**	**central**	**max**	**25 %**	**50 %**	**75 %**	**100 %**
manipulable material weaners / rearing pigs: loose material	**0,5**	**1,7**	**2,9**	**116,5**	**232,4**	**349,4**	**465,8**
manipulable material weaners / rearing pigs: object	**0,03**	**0,5**	**0,9**	**31,9**	**63,7**	**95,6**	**127,4**
floor properties weaners / rearing pigs	**0**	**0,8**	**1,6**	**54,8**	**109,6**	**164,4**	**219,2**
group housing for gestating sows	**-2,9**	**0,5**	**1,5**	**34,3**	**68,5**	**102,8**	**137,0**
manipulable material sows / gilts: loose material	**0,08**	**0,3**	**0,5**	**19,4**	**38,8**	**58,2**	**77,6**
manipulable material sows / gilts: object	**0,005**	**0,08**	**0,2**	**5,3**	**10,6**	**15,9**	**21,2**
Provisions in total [Mio. €/year] [sum of the highlighted production costs]				**404,9**			
For comparison: Legislation in total based on literature estimates (see Annex 6.1.5)	**0,65**	**2,1**	**3,55**	**143,9**	**287,7**	**431,6**	**575,5**

Hence, as a result, considering the above listed provisions, and the assumed coverage ratios regarding the share of production volume in the EU for which production practices had to be adjusted, **the costs of compliance with the pigs directive are estimated to be at 404,9 Mio. Euro per year**.

The cost items that are included in direct compliance costs **only relate to the category adjustment costs**, as no charges or administrative costs for businesses could be found in the literature. Details can be found in section 6.1 of the Annex.

If one may want to **split up the direct compliance costs into one-off and recurrent costs**, a *simplified* approach could be to assume that all costs related to the provision of manipulable material are assumed to be "recurrent costs" whereas all costs related to provisions that require a conversion of buildings could be assumed to be "one-off". If one accepts this simplified approach, the total sum of costs of the provisions above could be split up into 247,3 Mio. Euro per year recurrent costs and 157,6 Mio. Euro one-off costs.

If one assumes that the average production value (according to our assumptions made at the beginning of the chapter) is roughly 27,4 Mrd. Euro per year, then the **direct costs of compliance** constitute about **1,47% of the production value**.

Public authorities' direct compliance costs

In addition, the costs of inspections of public authorities for this legislation were assessed by a report from 2010 to be at 8,2 Mio. Euro per year.

Public authorities' costs of inspections (application of the EU Standard Cost Model)

		On-farm inspections [Mio. €/year]
Source	**Source type**	**pigs**
Rayment et al. (2010)[440]	report, theoretical scenarios	**8,2** (EU-27)

Regarding inspections, it has to be noted (and this holds for all animal types), that inspections lead to benefits for animals, consumers, the environment and public health via two paths:

- if non-compliances are detected and corrected in consequence and
- if the perceived probability of being controlled and sanctioned is sufficiently high to prevent non-compliances.

At farm level, during the period from 2013 to 2016, non-compliances were detected on average in 20 % of inspected laying hen farms (range: 7 % in IT to 51 % in FR), in 26 % of inspected pig farms (range: 11% IT to 57% FR) and in 23 % of inspected farms with calves (range: 10% IT to 39% RO) (ECA 2018).

[440] Rayment et al. (2010) present calculations that correspond to the EU Standard Cost Model. However, the authors do not subtract baseline costs of inspections that would be carried out in the MS even if no EU legislation existed.

Laying hens directive

For the CBA of the provisions of the laying hens directive, the following assumptions were made for the calculation of compliance costs for businesses (farmers):

Assumptions	
baseline value for total production volume of eggs for consumption [1000 tonnes/year] (European Commission 2022c)	**6 000**
baseline value for total production costs of eggs from **unenriched cages** with 550 cm²/hen [€/kg] (average of NL, FR, ES, IT, UK, PL, DK; Horne 2012)	**0,85**
baseline value for total production costs of eggs from **barn and free-range systems** [€/kg] (EU-15 weighted average based on relative size of national egg sector; AGRA CEAS 2004)	**1,19**

Ban of unenriched cages

BAU

Unenriched cages have been banned since 2003 with a transitional period until 2012. During the transitional period, the construction of new unenriched cages was prohibited and old unenriched cages had to fulfil additional requirements. Before that, requirements for unenriched cages were laid down in Directive 88/166/EEC.

BAU	
exceeding or similar/equal to EU legislation	- SE: prohibition of unenriched cages since 1988 with a transitional period of 10 years (Horne et al. 2007; Appleby 2003) - EU-14 (excl. LU) average in 1996: 7 % of laying hens were kept in alternative systems (aviary, deep litter or semi-intense/free-range). Main producers with share of national production: FR (5 %), DE (9 %), IT (1 %) (COM(1998) 135 final)
battery cages	EU-14 (excl. LU) average in 1996: 93 % of laying hens were kept in battery cages. Main producers with share of national production: FR (95 %), DE (91 %), IT (99 %) (COM(1998) 135 final)

Alternatives of compliance considered in the analysis	
enriched cages	EU-27 average in 2020: 48,0% of laying hens were kept in enriched cages. Main producers with share of national production: PL 81,1%, ES 77,6% and FR 54,1% (European Commission 2022c)
alternative – barn, aviary	EU-27 average in 2020: 33,9 % of laying hens were kept in barn or aviary systems. Main producers with share of national production: NL 60,6%, DE 60,1% and IT 49,5% (European Commission 2022c)
alternative – free-range	EU-27 average in 2020: 11,9% of laying hens were kept in free-range systems. Main producers with share of national production: FR 23,0%, DE 21,3% and NL 17,8% (European Commission 2022c)

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg egg]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
ban of unenriched cages, instead: enriched cages	**6**	**10,4**	**14,8**	**-**	**-**	**-**	**116,5**	**265,2**	**397,8**	**530,4**

At the level of packing stations, the EU-27 average price mark-up in 2021 was + 13,4 % for barn eggs and + 91,7 % for free-range eggs compared to cage eggs (European Commission 2022d).[441]

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	*Behaviour:* - In unenriched cages, the behavioural repertoire is restricted especially due to a lack of space and litter substrate (reviewed by Hemsworth 2021; Hemsworth and Edwards 2021; Lay et al. 2011). The extent to which these behavioural restrictions also occur in enriched cages, where space allowance is larger and enrichments such as litter substrates and perches are supplied, is not yet clearly established (reviewed by Hemsworth 2021). Group size may be an important confounding factor in this regard (reviewed by Hemsworth 2021) and this parameter is currently not regulated in EU legislation. - In alternative systems, the potential to express species-specific behaviour is generally higher than in cage systems (reviewed by Hemsworth 2021; Lay et al. 2011). - As reviewed by Cronin and Glatz (2021), severe feather pecking can occur unpredictably in all housing systems but may be more difficult to manage in alternative systems with larger flock sizes. The supply of litter substrates and further enrichments in cages has consistently been shown to reduce severe feather pecking (reviewed by Schreiter et al. 2019). *Health:* - Regarding stress levels, the variation between individual studies is large and no definite relationship with housing system can be inferred due to many confounding factors (reviewed by Hemsworth 2021; Lay et al. 2011). Taking this into account, Hemsworth (2021) proposes the tentative conclusion that stress levels can be lower or similar in cages compared to alternative systems. Furthermore, stress levels in unenriched cages can be similar or higher compared to enriched cages, depending on the stress indicator that is considered (reviewed by Hemsworth 2021). - Alternative systems are associated with lower levels of hygiene (due to contact with faecal material), higher risks for infectious diseases and higher parasite loads compared to conventional or enriched cages (which are equally beneficial in this

[441] Unfortunately, historical prices differentiated by farming practices are currently not made publicly available by the European Commission.

	regard) (reviewed by Hemsworth 2021; Lay et al. 2011). As a result, animal health outcomes in alternative systems show a greater variation compared to cage systems and Hemsworth (2021) concludes that the health status is generally better in cage systems. - Due to limited space and higher flock size, health inspections and interventions are easier to carry out in cage systems compared to alternative systems (reviewed by Hemsworth 2021; Lay et al. 2011). - Generally, the greater ability to move in enriched cages and in alternative systems reduces the risk for osteoporosis compared to conventional cages (reviewed by Hemsworth 2021; Lay et al. 2011). However, in more complex environments the risk of colliding with enrichment items may be greater which can lead to a higher prevalence of keel bone fractures in these systems compared to conventional cages (reviewed by Hemsworth 2021; Rufener and Makagon 2020; Lay et al. 2011). In this context, it should be noted that skeletal health is a multifactorial issue that cannot be explained by housing factors alone (reviewed by Rufener and Makagon 2020). *Mortality:* - For a long time, it has generally been accepted that mortality is higher in alternative systems compared to cage systems (reviewed by Hemsworth 2021; Schuck-Paim et al. 2021; Lay et al. 2011; EFSA 2005b). - However, recently Schuck-Paim et al. (2021) have demonstrated in a cross-country meta-analysis that mortality rates in indoor alternative systems have decreased over the last 20 years as experience with these systems has accumulated. The authors show that in current years, no significant difference between mortality rates in enriched cages and indoor alternative systems can be detected any more. With regards to mortality rates in cage systems, Schuck-Paim et al. (2021) find that enriched cages perform similar or better than conventional cages.
consumers	- By means of the European Citizens' Initiative 'End the Cage Age', European consumers from different MS have recently expressed their preference to phase out cages for a variety of species, including laying hens. - At the time when the ban of unenriched cages was still in discussion in the EU, Bennett (1997)[442] conducted a contingent valuation study among UK consumers and found that 79 % of respondents supported the ban while only 7 % did not. The mean WTP to support the cage ban was £0,43 per dozen eggs at the retail level which corresponds to approximately **+ 30,7 %*** [per kg egg]. - Carlsson et al. (2007b) criticise that in Bennett's study, consumers did not have the choice between a legal ban and a market-based solution. In a choice experiment among Swedish consumers, Carlsson et al. (2007b) elicit an additional WTP of **+ 54,9 %*** [per kg egg] for a legal ban of laying cages[443] and rearing in free-range systems instead. Furthermore, the authors elicit an additional WTP of **+ 20 %*** [per kg egg] for the purchase of free-range eggs in a situation where laying cages are still permitted. For both scenarios, the variation in the respondents' answers is high and confidence intervals are large so that statistically, the WTP figures do not differ significantly. In consequence, the authors conclude that a legal ban of enriched cages is not justified because respondents do not value the ban significantly more than a market-based solution. - Several studies have been carried out in different MS to elicit consumers' stated WTP for eggs from different husbandry practices under experimental conditions. In a choice experiment with Spanish consumers, Rahmani et al. (2019) find that on

[442] Further background information for the same study was published by Bennett and Blaney in 2003.

[443] It should be noted that at the time, unenriched cages were already completely banned in Sweden and only enriched cages were still permitted.

	average participants state an additional WTP for free-range eggs compared to eggs from enriched cages, but not for barn eggs. In a different choice experiment with Spanish consumers, Gracia et al. (2014) elicit an additional WTP for barn eggs and free-range eggs compared to eggs from unenriched or enriched cages (cage < barn < free-range). The same preference ordering was reported by Żakowska-Biemans and Tekień (2017) in a choice experiment among Polish consumers. - As eggs are systematically labelled according to farming practices, which is unique in the field of animal products, the opportunity exists to link real prices to consumers' actual purchase behaviour i.e., to observe consumers' revealed WTP for different farming practices. However, research in this regard is still limited. Andersen (2011) use GfK purchase data from Denmark and find that on average, the revealed WTP for barn eggs is higher than for free-range eggs which could be explained by the fact that consumers either confuse both farming practices or that those consumers who are interested in free-range husbandry rather buy organic eggs. The same preference ordering for Danish consumers was found by Baltzer (2004). - Farming practices are only one of many attributes that consumers take into account when buying eggs. For example, sensory properties such as egg size and shell colour also play an important role for purchasing decisions (reviewed by Rondoni et al. 2020).
environment	Generally, if animal numbers remain equal, enriched cages and alternative systems bear a higher risk for negative environmental impacts compared to unenriched cages: - The supply of litter material, which hens use for scratching and dustbathing, increases dust emissions (reviewed by Mench and Rodenburg 2018; Santonja et al. 2017; David et al. 2015b; Xin et al. 2011) and this can contribute to global warming. However, dust mitigation strategies for poultry farming (e.g. electrostatic precipitation) are currently a research priority and show promising results (Knight et al. 2021). - Generally, the larger the surface area per animal and the lower the frequency of manure removal, the greater the NH_3 emissions. In consequence, if no appropriate mitigation strategies are employed, it can be expected that NH_3 emissions are higher in enriched cages and even more so in alternative systems compared to unenriched cages (reviewed by Mench and Rodenburg 2018; Santonja et al. 2017; David et al. 2015a; Xin et al. 2011). However, if appropriate mitigation strategies (e.g. regular manure removal via belt system, adapted ventilation) are employed, NH_3 emissions from alternative systems can be effectively reduced (reviewed by Naseem and King 2018; David et al. 2015a) and in some cases, even reach the same range as in enriched cages (reviewed by Santonja et al. 2017; Eurich-Menden et al. 2011). - In their review, Mench and Rodenburg (2018) refer to several studies with comparative life cycle assessments for laying hen systems that were published until 2014. In brief, alternative systems performed worse in these life cycle assessments than unenriched cages while enriched cages performed slightly better (reviewed by Mench and Rodenburg 2018). More recent comparative life cycle assessments could not be obtained but it would be interesting to investigate whether modern emission mitigation strategies have relevant impacts on such assessments.
public health	*Microbial contamination* - The microbial load of egg shells and egg content depends on (among other factors that are not housing-related): *i)* whether the eggs are laid in nests or on the wire/litter floor and *ii)* on the dust levels in the ambient air (reviewed by Mench and Rodenburg 2018; Cepero and Hernandiz 2015; Holt et al. 2011; Reu et al. 2008). The management to encourage nest laying can be challenging in alternative systems and enriched cages (reviewed by Mench and Rodenburg 2018; Cepero and Hernandiz 2015). - Even if only nest eggs are considered, the egg *shell* contamination is generally higher in alternative systems while no differences can be found between unenriched and enriched cages (reviewed by Cepero and Hernandiz 2015; Reu et al. 2008). Food

	safety risks from egg shell contamination are usually prevented through the separate collection of floor/soiled eggs which are then downgraded and pasteurised for use as liquid or dried egg (reviewed by Mench and Rodenburg 2018). Furthermore, the microbial load of egg shells automatically diminishes during the storage period (reviewed by Mench and Rodenburg 2018; Cepero and Hernandiz 2015). - Regarding egg *content* contamination, much less data is available but it appears that no relevant differences exist between nest eggs from alternative systems and cage systems (reviewed by Cepero and Hernandiz 2015; Reu et al. 2008). *Chemical contamination* - The presence of litter substrates and outdoor runs increases the risk that hens may come into contact with chemical contaminants such as dioxins, PCB and heavy metals (reviewed by Mench and Rodenburg 2018; Cepero and Hernandiz 2015; Holt et al. 2011).

* Own calculations based on data from the source

CBA Summary

- Over the last 20 years, the share of hens kept in alternative husbandry systems has increased considerably. However, it is uncertain whether these developments have resulted from the legal ban of unenriched cages (i.e., whether hens were moved from unenriched cages to alternative systems) or whether independent market dynamics were the driving forces.
- In the available literature, total production costs are consistently higher in alternative systems compared to enriched cages. For the cost-benefit assessment of the legal ban of unenriched cages, only the costs of the transition to enriched cages are taken into account because: *i)* This transition corresponds to the minimum that producers had to achieve and any further changes depend on producers' individual preferences and general market dynamics. *ii)* Eggs from alternative systems receive price mark-ups to cover (at least partially) the additional production costs while eggs from enriched cages have become the new minimum standard and are frequently used for processed products. Therefore, it is unlikely (although no systematic data is available in this regard) that relevant price mark-ups can be obtained for these eggs compared to eggs from unenriched cages. In consequence, producers' margins would have decreased.
- The transition to enriched cages is expected to have increased total production costs by **+ 6 % to + 14,8 %** [per kg egg], depending on whether cages with 450 cm²/hen or 550 cm²/hen are considered as the baseline and on the cost and revenue items that are included in the calculations. Unfortunately, none of the available studies take into account that in addition, disinvestments could have occurred if the transition had to be made before the end of the depreciation period of the existing buildings and equipment. However, the transitional period of 10 years is expected to have decreased the share of producers who faced disinvestments.
- The potential to express species-specific behaviour is highest in alternative systems, followed by enriched cages while unenriched cages rank last. In contrast, the risk of adverse animal health outcomes related to infectious diseases, hygiene and parasite load is higher in alternative systems whereas both cage types rank equal in this regard. Management is a decisive factor for AW in all farming systems and as

experience has accumulated over the years, similar mortality rates can be observed in indoor alternative systems and cage systems.

- Producers receive price mark-ups for barn and free-range eggs compared to cage eggs (cage < barn < free-range). The limited available research for consumers indicates that stated and revealed preferences/WTP are not always congruent with the price mark-ups received by producers. Support for a legal ban of cages has been expressed by a share of consumers at different points in time.
- The risk of negative environmental impacts is higher in alternative systems and enriched cages but with appropriate mitigation strategies, emissions can be effectively reduced in these systems. Only few Life Cycle Assessments have been carried out for laying hen husbandry but it appears that enriched cages perform slightly better than unenriched cages whereas alternative systems perform worse. The impacts of modern emission mitigation strategies on the results of Life Cycle Assessments remain to be investigated.
- Microbial *shell* contamination of nest eggs is generally higher in alternative systems while no difference can be found between enriched and unenriched cages. The evidence on microbial egg *content* contamination is limited but suggests that no relevant difference exists between nest eggs from alternative systems and cage systems. The risk of chemical contamination of eggs is higher when litter substrate is provided or outdoor access is available.

Additional requirements for unenriched cages during the transitional period

BAU

Unenriched cages have been banned since 2003 with a transitional period until 2012. During the transitional period, the construction of new unenriched cages was prohibited and old unenriched cages had to fulfil additional requirements. In particular, the space allowance was increased to 550 cm²/hen and cages had to be fitted with claw-shortening devices. Before that, the requirements for unenriched cages were laid down in Directive 88/166/EEC.

BAU	
exceeding or similar/equal to EU legislation	*national legislation implementing Directive 88/166/EEC with additional space requirements (COM(1998) 135 final):* - BE, UK: 1000 cm²/hen for 1 hen per cage, 750 cm²/hen for 2 hens per cage, 550 cm²/hen for 3 hens per cage, otherwise 450 cm²/hen - DK: 600 cm²/hen - DE: 550 cm²/hen for hens > 2 kg - SE: 600 cm²/hen
unenriched cages with < 550 cm²/hen and without claw-shortening devices	- most common space allowance in the EU in 1996: 450-500 cm²/hen (SVC 1996) - cages were frequently manufactured to a size of 50 cm x 50 cm (2500 cm²) and stocked with 5 hens providing each hen with 500 cm² (including the area occupied by protrusions such as drinker pipes and drip troughs) (SVC 1996) - claw-shortening devices were not regularly supplied in conventional cage systems (SVC 1996)

Alternatives of compliance considered in the analysis	
unenriched cages with ≥ 550 cm²/hen and with claw-shortening devices	*In order to meet the space requirement of 550 cm²/hen, three options were possible to modify existing cages (reviewed by Elson 2004):* - conventional 50 cm x 50 cm cages could be stocked with 4 hens instead of 5 hens (20 % reduction) - two conventional 50 cm x 50 cm cages could be connected with popholes and stocked with 9 hens instead of 10 hens (10 % reduction) - the fronts of conventional 50 cm x 50 cm cages could be fitted with bowed-out extensions (no reduction in flock size) *It could not be determined which of these options was most commonly implemented in practice and whether non-compliances were a relevant issue in the MS.* *A large variety of claw-shortening devices was available at the time (reviewed by Glatz 2002):* - abrasive tape - abrasive paint - abrasive perforated baffles - metal plates with abrasive iron filings *It could not be determined which of these options was most commonly implemented in practice and whether non-compliances were a relevant issue in the MS.*

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg egg]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
additional requirements during the transitional period	**4**	**7**	**10**	**-**	**-**	**-**	**89,3**	**178,5**	**267,8**	**357,0**

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- The relationship between increases in the space allowance in conventional cages and animal welfare parameters can be conceptualised as a curvilinear continuum (reviewed by Hemsworth 2021; Appleby 2019; Widowski et al. 2016). Space allowances of 550-600 cm²/hen (as required by EU legislation) are at the lower end of this continuum. Decreases below this threshold result in restrictions of very basic behaviours such as turning and standing (reviewed by Widowski et al. 2016) and have been associated with increased mortality rates (reviewed by Hemsworth 2021; Widowski et al. 2016). Furthermore, several (but not all) studies have demonstrated that at the lower end of the continuum, stress levels are higher but immune function did not appear to be compromised (reviewed by Hemsworth 2021). In conclusion, some positive effects on AW are likely to have occurred due to the increase in space allowance required by EU legislation but the magnitude of these effects is expected to be rather limited as the space allowance of 550 cm²/hen lies at the lower end of the spectrum.

	- When assessing the effects of increasing the space allowance on animal welfare, it is important to take into account that group size can be an influential confounding factor i.e., that the same space allowance per hen might be associated with different AW outcomes depending on group size (reviewed by Hemsworth 2021; Widowski et al. 2016). It should be noted that group size in conventional cages was not regulated by EU legislation. - Overgrowing claws can get trapped in cages and break or bleed which is detrimental to AW (reviewed by Hester 2017; Glatz 2002). Claw-shortening devices can contribute to preventing negative AW outcomes but they are not all equally effective (reviewed by EFSA 2005b; Glatz 2002) and for some, negative side-effects (e.g. more toe wounds due to contact of foot pad with abrasive material) have been described (reviewed by Hester 2017; Glatz 2002).
consumers **environment** **public health**	No information could be obtained on the effects of the changes required by EU legislation on consumers, the environment and public health. Research in these fields has focussed on comparisons between different husbandry systems rather than incremental changes within the same system.

CBA Summary

- Increasing the space allowance in conventional cages during the transitional period entailed additional costs to producers in the range of + 3,8 % to 9,3 % [per kg egg], depending on the modifications employed to achieve higher space allowances and on the cost and revenue items considered in the calculations. The evidence on producers' costs of supplying claw-shortening devices is limited but suggests that these were in the range of + 0,2 to + 0,7 % [per kg egg].
- The increase of space allowance in conventional cages during the transitional period is expected to have resulted in some AW benefits. However, these benefits are expected to be rather limited because the required space allowance of 550 cm²/hen lies at the lower end of a continuum along which increases in space allowance lead to improved animal welfare. The supply of claw-shortening devices is expected to have contributed to improved AW but adequate care had to be taken when choosing and installing the devices in order to avoid potential negative side-effects.
- No information could be obtained on the effects of the changes required by EU legislation during the transitional period on consumers, the environment and public health.

Provisions for alternative systems

BAU

The current provisions have applied since 2002 with a transitional period until 2007 (or under certain conditions until 2012). The details of the current provisions are as follows: alternative systems have to meet various requirements on e.g. stocking density, feeders, drinkers, nests, perches, littered areas and access to open runs. Before that, no requirements for alternative systems applied, except if eggs were marketed with additional attributes (e.g. 'free

range') on a voluntary basis (regulated in a separate body of legislation on EU marketing standards for eggs).[444]

BAU	
EU-14 (excl. LU) average in 1996: 7 % of laying hens were kept in alternative systems (aviary, deep litter or semi-intense/free-range). Main producers with share of national production: FR (5 %), DE (9 %), IT (1 %) (COM(1998) 135 final). The extent to which husbandry practices in alternative systems already corresponded to the requirements later introduced by the Laying Hens Directive is difficult to ascertain because a large variety of systems existed at the time (reviewed by SVC 1996).	
exceeding EU legislation	- If eggs were marketed as 'free range', 'semi-intensive' and 'deep litter' according to Regulation (EEC) No 1274/91, the requirements on stocking densities exceeded the requirements laid down in the Laying Hens Directive.
similar/equal to EU legislation	- If eggs were marketed as 'perchery eggs (barn eggs)' according to Regulation (EEC) No 1274/91, the perch space available per hen was equal to the requirements laid down in the Laying Hens Directive. - As reviewed by SVC (1996), the stocking densities commonly found in alternative systems varied between 6,4 to 10,9 hens per 1 m² usable area which is in the range of (or slightly above/below) the requirements of the Laying Hens Directive (max. 9 hens per 1 m² usable area).
alternative systems	- In a regulatory impact assessment published by the Welsh Parliament (2002), it was assumed that stocking densities had to be reduced from 12 to 9 hens per m² for 23 % of laying hens kept in alternative systems. Implicitly, it can be concluded that the rest of alternative systems were either already compliant at the time or would drop out of business at the end of the transitional period. - Regarding the supply of equipment (feeders, drinkers, nests), no common standards were established in alternative husbandry systems (reviewed by SVC 1996).

Alternatives of compliance considered in the analysis	
alternative systems according to the requirements	- The extent to which the requirements in the Laying Hens Directive correspond to common husbandry practices in alternative systems (i.e. whether farmers would deliberately offer these conditions regardless of whether the legislation exists) cannot be determined for certain. - As indicated by SVC (1996), the stocking densities laid down in the Laying Hens Directive were in the range of (or slightly above/below) common husbandry practices at the time but for equipment (feeders, drinkers, nests), no common standards were established (see above). - From a regulatory impact assessment published by the Welsh Parliament (2002), it can be concluded that stocking densities had to be reduced for 23 % of laying hens kept in alternative systems while the rest were either already compliant (most likely) or would drop out of business at the end of the transitional period (see above). - In a recent report by EPRS (2021), it is pointed out that non-compliances exist in several MS regarding pecking and scratching areas and stocking densities but it is not further specified whether this applies to alternative systems or enriched cages.

[444] Regulation (EEC) No 1274/91 of 15 May 1991 introducing detailed rules for implementing Regulation (EEC) No 1907/90 on certain marketing standards for eggs, OJ No L 121, 16.5.1991, p. 11.

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg egg]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
alternative systems	**8**	**9,2**	**10,4**	**13,1**	**32,8**	**46,0**	**-**	**-**	**-**	**-**

Due to the large variety of alternative systems, the changes that had to be made in practice in order to fulfil the requirements of the Laying Hens Directive are expected to vary considerably between the different systems. Unfortunately, no systematic information is available in this regard and collecting such information is out of the scope of this study.

The limited evidence that could be obtained focuses on stocking densities but the Directive also covers further aspects such as the supply of feeders, drinkers and nests. Therefore, any assessment based on the available evidence would give an incomplete picture of the changes that had to be made in practice.

In the UK, it is estimated that stocking densities had to be reduced for 23 % of laying hens in alternative systems (Welsh Parliament 2002). Although in these cases compliance costs were substantial, it has to be noted that this corresponded to only 6,1 % of the total flock in the UK at the time (Welsh Parliament 2002). Within the scope of this study, it does not appear proportional to focus on such a minor share of producers.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

Not further investigated due to the outlined reasons above.

CBA Summary

- The limited evidence that could be obtained on stocking densities suggests that compliance costs were substantial but only a minor share of producers was affected.
- Regarding the benefits, systematic information that adequately reflects the variety of alternative systems was not available.

Beak trimming

BAU

The current provision according to which beak trimming must be performed before the age of 10 days has applied since 1999 with a transitional period until 2002. Before, beak trimming was permitted at any age.

BAU	
exceeding EU legislation	complete ban: FI (since 1986), SE (since 1988) (Rodenburg et al. 2020)

similar/equal to EU legislation	-
beak trimming at any age	beak trimming was carried out routinely on day-old chicks and chickens of one to eight weeks of age (SVC 1996) but no quantitative information is available regarding the age distribution

Alternatives of compliance considered in the analysis	
beak trimming only at less than 10 days of age	- no systematic data on the prevalence of beak trimming in the EU is available but it is expected that beak trimming is performed on all laying hens except in organic systems and in the MS where bans are in place (Spoolder et al. 2016) - EPRS (2021) indicates that non-compliances with the provision occur in FR, DE, NL, ES. However, it is not further explained what exactly the non-compliances refer to and several options are conceivable e.g. age at first trimming, retrimming in the case of beak regrowth and training of staff.

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg egg]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
beak trimming	**-**	**1,2**	**-**	**-**	**-**	**-**	**15,3**	**30,6**	**45,9**	**61,2**

While Horne (2019) assumes that the restriction of beak trimming to an age of less than 10 days results in higher feed costs, Glatz and Underwood (2021) report in their review that beak trimming at a younger age can also be associated with better feed conversion rates and additionally, better laying performance.

Horne (2019) does not indicate why he assumes that the age limit of 10 days results in higher mortality rates. An explanation could be that retrimming of the beak at an older age in the case of beak regrowth is prohibited even if deleterious feather pecking occurs. However, as reviewed by Glatz and Underwood (2021) regrowth of the beak only occurs if the remaining part of the beak is too large and this is preventable if adequate care is taken during the intervention.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- In the EU, two methods of beak trimming are routinely used: hot blade and infrared beak trimming (reviewed by Janczak and Riber 2015). In some MS, the use of hot blade has recently strongly declined in favour of infrared beak trimming (Spindler et al. 2016; DEFRA 2010b). - If beak trimming is performed by means of a hot blade, the shift to an age of less than 10 days is beneficial to AW because at that age, the persistence of painful neuromas can be prevented (reviewed by Glatz and Underwood 2021; Janczak and Riber 2015) under the condition that trimming does not exceed a certain proportion of the beak (reviewed by Janczak and Riber 2015), more specifically if not more than half of the beak is trimmed (reviewed by Glatz and Underwood 2021). This is also the length at which regrowth of the beak usually does not occur (regardless of the method employed) (reviewed by Glatz and Underwood 2021). - Due to technical restraints, the infrared method can currently only be applied in the hatchery stage (reviewed by Glatz and Underwood 2021; Janczak and Riber 2015) i.e. on chickens that are approximately one day old. Therefore, the age limit imposed by the provision does not affect the AW outcomes of this method.
consumers	No information could be obtained on whether consumers value the transition to a younger age.
environment	No information could be obtained on the effects of beak trimming at an age of less than 10 days compared to an older age on the environment and public health.
public health	

CBA Summary

- The proportion of producers who performed beak trimming on laying hens older than 10 days of age before the provision came into force is unknown. These producers had to switch to an earlier time point.

- Evidence on the effects of this transition on producers' costs is scarce. The only quantitative estimate that could be obtained indicates an increase in production costs of + 1,2 %* [per kg egg] but this should be interpreted with care as contradictory qualitative information exists.
- When beak trimming is performed with a hot blade, the age limit imposed by EU legislation is expected have positive effects on AW. In contrast, when the infrared method is used, the age limit does not have an influence on AW because due to technical restraints, this method can currently only be practiced on very young chicks in the hatchery.
- Regarding consumers, the environment and public health, no information could be obtained on the effects of performing beak trimming at an age of less than 10 days compared to an older age.

Distinguishing number for egg marketing

BAU

The Laying hens Directive requires farms that exceed a certain production volume to be registered by the competent authority (CA) in the MS and to be given a distinguishing number. This distinguishing number is a prerequisite for the labelling of eggs according to farming practices as part of the EU marketing standards for eggs.

The EU marketing standards for eggs form a closely integrated package that comprises numerous additional requirements regarding e.g. quality grading of eggs, packaging and indication of the date of minimum durability. These requirements are laid down in a separate body of legislation and they do not only serve animal welfare purposes but also further objectives such as food safety. Due to numerous interdependencies between the individual requirements, it is out of the scope of this study to attempt to separately assess costs and benefits of the Laying hens Directive in this context.

A cost-benefit assessment for the *entire body* of EU marketing standards for eggs has recently been carried out in an external study commissioned by DG AGRI (Gentile et al. 2019). The study is based on data from a stakeholder survey with food business operators, competent authorities in the MS and consumer associations. The main findings consist of a brief qualitative assessment of the cost-benefit ratio and an analysis of the factors that impeded any more detailed or quantitative assessments. The findings of this study are reported below:

Food business operators direct compliance costs

According to Gentile et al. (2019), the most substantial costs were the one-off adaptation costs that occurred decades ago. These costs became part of the businesses' general costs of depreciation and have been written off long ago so that they cannot be traced back any more. The on-going costs are limited/negligible and cannot be isolated from costs due to other regulatory requirements and/or private marketing standards.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

According to Gentile et al. (2019), there is a lack of detailed information regarding the effects on consumers. For public authorities, the most substantial costs are on-going costs for compliance checks. Historical records on the costs of compliance checks are not available in the MS and estimations are not feasible because typically, several different control bodies are responsible. Usually, these official controls consist of compliance checks for multiple different regulatory obligations at the same time. In consequence, it is not possible to separately assess the costs of checking compliance with marketing standards.

CBA Summary

According to Gentile et al. (2019), the costs and benefits for food business operators, public authorities and consumers are generally proportional.

Provisions in total

This provides a summary of the above plus additional information that was found on inspection costs of public authorities.

Business (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg egg]			**change in total production costs** compared to BAU [Mio. €/year] *hypothetical scenarios: share of production volume for which production practices were adjusted*						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
ban of unenriched cages, instead: enriched cages	**6**	**10,4**	**14,8**	**-**	**-**	**-**	**116,5**	**265,2**	**397,8**	**530,4**
additional requirements during the transitional period	**4**	**7**	**10**	**-**	**-**	**-**	**89,3**	**178,5**	**267,8**	**357,0**
alternative systems	**8**	**9,2**	**10,4**	**13,1**	**32,8**	**46,0**	**-**	**-**	**-**	**-**
beak trimming	**-**	**1,2**	**-**	**-**	**-**	**-**	**15,3**	**30,6**	**45,9**	**61,2**
Provisions in total [Mio. €/year] [sum of the highlighted production costs]				**592,0**						
Legislation in total based on literature estimates (See Annex 6.2.5)	**9**	**11,3**	**13,5**	**-**	**-**	**-**	**143,4**	**286,9**	**430,3**	**573,8**

Hence, in total for the above provisions the direct costs of compliance amount to about 592 Mio. Euro per year, assuming the production volume shares for each legislation as indicated by the blue shades in the table (and as sampled in the BAU table).

As argued in the case of the pigs directive, with a simplified approach we assume that i) recurrent costs correspond to 40 % of costs due to the transition to enriched cages plus costs due to beak trimming and ii) that one-off costs correspond to 60 % of costs due to the transition to enriched cages plus costs due to the requirements for the transitional period and for alternative systems. This leads to annual one-off costs of 440 Mio. Euro and annual recurrent costs of 152 Mio. Euro. If one assumes a yearly average production value of eggs of about 5,4 Mrd. Euro, these direct **costs of compliance amount to about 10,95% of the production value**.

Public authorities' direct compliance costs

In addition, the costs of inspections of public authorities for this legislation were assessed by a report from 2010 to be at 2,8 Mio. Euro per year.

Public authorities' costs of inspections (application of the EU Standard Cost Model)

		On-farm inspections [Mio. €/year]
Source	**Source type**	**Laying hens**
Rayment et al. (2010)[445]	report, theoretical scenarios	**2,8** (EU-27)

Broilers directive (chickens kept for meat production)

Regarding the broilers directive, four provisions were studied in detail: stocking densities, climate, on-farm record keeping and monitoring/follow-up at slaughterhouses. In order to come up with quantitative estimates, the following assumptions were made regarding production volume and production costs at the time before the legislation entered into force.

Assumptions	
baseline value for total production volume[446] of broiler meat [1000 tonnes/year] (Caspari et al. 2010)	**8 970**
baseline value for total production costs [€/kg] (carcass weight; Caspari et al. 2010)	**1,07**

It is important to note:

[445] Rayment et al. (2010) present calculations that correspond to the EU Standard Cost Model. However, the authors do not subtract baseline costs of inspections that would be carried out in the MS even if no EU legislation existed.

[446] The production volume refers to the year 2009 (see Figure 4 of Eurostat 2014).

1) For EU-27, in the study by Caspari et al. (2010, p.18), poultry meat production is

Selected provisions		
climate inside housing	**record keeping**	**slaughterhouse follow-up**
stocking density 33 kg/m²		

displayed as about 11,5 Mio tonnes. Hence, assuming that broiler meat represents about 78% of the total poultry meat production value, this results in broiler meat production for the EU of about 8,97 Mio tons for the year 2008.

2) Also in the study by Caspari et al. (2010, p.55), production costs for broilers for the year 2007 are presented for different EU countries. Taking an average of the presented values, an estimate of 0,75 Euro/kg live weight of broiler is reasonable. Assuming a killing out percentage of 70% (based on information by (Horne 2018)), this results in carcass weight production costs of 1,07 Euro/kg.

Overview of the provisions considered in the analysis

The provisions have applied since 2010. The Directive 2007/43/EC was the first piece of legislation for broilers at the EU level. The provisions on climate inside the housing, record keeping and slaughterhouse follow-up differ depending on the stocking density that is chosen by the farmers. The most relevant aspects are summarised below.

basic requirements	*record for each house of a holding:* - for each control: number of birds found dead, cause of death, number of birds culled, cause of culling and other - early removal of chickens for sale, slaughter	*on arrival and under supervision of official veterinarian:* - check and recording of accompanying documents - number of birds dead on arrival - plausibility check *post-mortem inspection:* - evaluation of welfare-relevant results by official veterinarian *communication to owner/keeper and competent authority if mortality rates or post-mortem inspection indicate poor AW*
stocking density 39 kg/m²		
additionally: ventilation and heating/cooling system to ensure: - NH_3 ≤ 20 ppm - CO_2 ≤ 3000 ppm - temperature inside ≤ 33 °C when outside temperature in the shade > 30 °C - humidity inside during 48 h ≤ 70 % when outside temperature < 10 °C	*additionally:* - detailed compilation of technical details on housing and equipment (incl. ventilation, alarm and backup system, litter type and other) - records of technical inspections of ventilation and alarm system - accompanying documents for slaughter: daily mortality rate, cumulative daily mortality rate, breed/hybrid of the animals	*additionally:* - check and recording of more detailed accompanying documents (see left)
stocking density 42 kg/m²		
	additionally: - no deficiencies in controls carried out by the competent authorities in the last 2 years - owner/keeper practices on-site monitoring according to MS' good practices - cumulative daily mortality rate in at least 7 consecutive flocks from a house below [1 %] + [0,06 %] x [slaughter age in d] (exceptional circumstances may justify higher cumulative daily mortality rate)	

Provision: stocking densities and climate and temperature inside housing

BAU

BAU for stocking densities	
exceeding EU legislation	- AT: max. stocking density of 30 kg/m² was required by national legislation (FCEC 2017) - SE: max. stocking density of 20 kg/m² was required by national legislation but

	could be increased to 36 kg/m² if voluntary agreement was followed (Berg and Algers 2004)
similar/equal to EU legislation	- ES, DK, FR, DE, IT, UK: similar stocking densities were either common husbandry practice or required by national legislation (FCEC 2017) - IT: 33 kg/m² were typically practiced (Menghi et al. 2014) - DE: voluntary agreement (35 kg/m²) (BML 1999) but a typical farm analysed by Menghi et al. (2014) practiced 42 kg/m² - FR: large differences in stocking densities between farms (22,5-42,5 kg/m²) (SCAHAW 2000) - DK: 40-42 kg/m² were considered as upper limit (SCAHAW 2000) - SE: voluntary agreement (≤ 36 kg/m²) (Berg and Algers 2004; SCAHAW 2000) - UK: 80 % of broilers at 30-38 kg/m², 16 % at > 38 kg/m² and 4 % at < 30 kg/m²
stocking densities above the maximum required by EU legislation	- FI: stocking densities of 39-45 kg/m² were common husbandry practice (FCEC 2017) - NL: stocking densities of 45-50 kg/m² were common husbandry practice (FCEC 2017); broiler sector in BE likely similar (Caspari et al. 2010) - FR: 27 % of farms > 42 kg/m² (Caspari et al. 2010)

Alternatives of compliance considered in the analysis	
General remarks - NL, PL: non-compliances with regards to stocking densities were reported by CAs as a common problem (FCEC 2017)	
max. stocking density of 33 kg/m²	- EU-28 average in 2013: 34 % of broilers were kept at stock densities ≤ 33 kg/m² (100 % in BG, AT, GR, LV, LU, PT) (FCEC 2017)
max. stocking density of 39 kg/m²	- EU-28 average in 2013: 40 % of broilers were kept at stock densities between 34 and 39 kg/m² (FCEC 2017)
max. stocking density of 42 kg/m²	- EU-28 average in 2013: 26 % of broilers were kept at stock densities between 39 and 42 kg/m² (96 % in FI, 93 % in DK and NL, 82 % in FR) (FCEC 2017)
Only transitions from > 42 kg/m² to ≤ 42 kg/m² are considered in the further analysis because this is the minimum that producers had to achieve in order to comply with the legislation.	

BAU for climate	
exceeding or similar/equal to EU legislation	*Climate* - DE: voluntary agreement required NH_3 ≤ 20 ppm but recommended NH_3 ≤ 10 ppm; ventilation system had to maintain air throughput of 4,5 m³ per kg live weight (also for open building) (BML 1999)
climate does not correspond to the requirements	*Climate* - DE: voluntary agreement did not include max. temperature levels (BML 1999) - UK: 20-60 % of producers did not already fulfil the requirements before the legislation came into force (DEFRA 2010a)

Alternatives of compliance considered in the analysis	
climate according to the requirements or non-compliance	- DE: heat stress was reported as a common problem by CAs (FCEC 2017) - lack of information

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg carcass weight]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
Stocking densities, climate and temperature	-	-	-	-	-	-	-	-	-	-

No cost estimates could be found, as estimates for producers' costs of reducing stocking densities from > 42 kg/m² to 42 kg/m² are scarce because research has focused **primarily on stocking densities below this threshold**.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Additional costs and benefits
animals	- EU legislation takes into account that the effects of stocking densities on AW depend on additional factors such as temperature, gas concentrations and humidity (reviewed by Jong et al. 2012; SCAHAW 2000). At higher stocking densities, maintaining adequate climatic conditions is expected to be more challenging (reviewed by Jong et al. 2012). Therefore, the Directive sets limits for NH_3 and CO_2 to be maintained at higher stocking densities and these are expected to have improved AW but only to a limited extent as even lower NH_3 limits are preferred by broilers (reviewed by Jong et al. 2012). The temperature limit required by the Directive can only be seen as a basic safeguard mechanism as it does not take into account that broilers' risk of heat stress increases over the fattening period and that lower temperatures are recommended towards the end (reviewed by Jong et al. 2012). - The expression of species-specific behaviour is expected to be more restricted at higher densities (reviewed by Jong et al. 2012; SCAHAW 2000) which implies that the threshold of 42 kg/m² has contributed to some improvements in this regard.
consumers	- A contingent valuation study among UK households was carried out by Moran and McVittie (2008) to support the ex-ante impact assessment by DEFRA (2010a). In this study, respondents' WTP for the introduction of the Broilers Directive was more than 10-fold higher than the estimated costs to producers, even if a maximum stocking density of 42 kg/m² was assumed instead of 39 kg/m². A similar study was prepared by Bennett et al. (2019) to support the post-implementation review by DEFRA (2017) and the WTP was again in a similar range relative to the costs. Both studies rely on *stated* preferences with the caveats mentioned in Section 2.2. - With the exception of the aforementioned commissioned studies, the peer-reviewed literature has mostly focused on stocking densities below the threshold of 42 kg/m² and on additional features such as outdoor access.
environment	- NH_3 and CO_2 limits in the ambient air contribute to climate protection as these are greenhouse gases. However, the actual environmental outcomes achieved in practice depend on whether volatilisation can be prevented throughout the whole life cycle. Furthermore, the effects of limits on stocking densities on the environment depend on the type of modification chosen by farmers i.e. whether the same number of animals is maintained in extended existing or new buildings or whether the flock size is reduced.
public	- NH_3 limits in the ambient air contribute to work place safety and the threshold of 20

health	ppm appears to be in line with the thresholds for humans at work (reviewed by Jong et al. 2012). - If carcass lesions could be reduced due to the limits on stocking densities and climate, this is expected to have contributed to food safety but no definite conclusions can be drawn.

CBA summary

- Estimates for producers' costs of reducing stocking densities from > 42 kg/m² to 42 kg/m² are scarce because research has focused primarily on stocking densities below this threshold.
- The provisions on stocking densities and climate are linked which appears to be the right approach in principle to ensure AW. It is expected that AW has improved to a limited extent due to the threshold of 42 kg/m² in connection with the requirements for climate.
- Evidence on consumers' valuation of the provisions is scarce. UK consumers have **stated** a WTP for the Broilers Directive that exceeds the expected costs by ca. 10-fold.
- With the available literature it is not possible to draw definite conclusions regarding the effects of stocking densities and climate requirements on the environment and public health.

Provision: On-farm record keeping and monitoring/follow-up at slaughterhouses

BAU

BAU	
exceeding or similar/equal to EU legislation	- DE: voluntary agreement required on-farm records of technical details including the ventilation system (BML 1999) - SE since 1994: slaughterhouse monitoring and follow-up of footpad dermatitis (FPD) had been part of a voluntary agreement (participation of 98 % of producers) (Berg and Algers 2004; Algers and Berg 2001) - DK since 2002: slaughterhouse monitoring and follow-up have been required by national legislation, a sample of 100 feet per flock has to be evaluated manually (Nielsen 2009)
monitoring/follow-up at slaughterhouses not according to the requirements	- records on mortality already had to be maintained under Directive 92/116/EEC[447] but recording was not required on a daily basis and did not have to include details such as cause of death and number of birds culled - mortality already had to be checked prior to slaughter under Directive 92/116/EEC but less details were available (see Section Record keeping) - large variety in reporting of mortality in *field studies*: mostly only one figure is provided for the whole production cycle (corresponding to the difference of the number of animals placed and the number delivered to slaughter) and culling is often not reported separately (SCAHAW 2000)

[447] Council Directive 92/116/EEC of 17 December 1992 amending and updating Directive 71 / 118 / EEC on health problems affecting trade in fresh poultrymeat, OJ No L 62, 15.3.1993, p. 1.

Alternatives of compliance considered in the analysis	
non-compliance	- FR, PL, NL: non-compliances with regards to on-farm record keeping (especially of daily mortality data) were reported by CAs as a recurrent issue (FCEC 2017) - FR, UK, NL: non-compliances with regards to the monitoring of daily mortality rates at slaughterhouses have been reported as routine issues (FCEC 2017)
type of AW indicators monitored at slaughterhouses	*frequently recorded indicators (surveys among CAs by FCEC 2017; and Butterworth et al. 2016):* - footpad dermatitis (FPD)[448] - cumulative daily mortality rate[449] - dead on arrival[450] - total rejections
approach to monitoring and recording	- according to a survey among CAs by Butterworth et al. (2016), there is generally a high level of harmonisation between the MS regarding the monitoring of e.g. FPD, dead on arrival and total rejections while there is a medium level for e.g. cumulative daily mortality rate and a low level of harmonisation for further indicators such as wing fractures - however, some differences between the MS exist even if the level of harmonisation is considered high: - e.g. IT, UK in 2016: FPD is only evaluated if ante-mortem inspection raises suspicions for poor AW (FCEC 2017) - e.g. DK, SE in 2016: 100 feet per flock evaluated for FPD (FCEC 2017) - e.g. DK in 2016: only manual evaluation of FPD permitted (FCEC 2017) - e.g. NL, DE in 2016: automatic camera systems permitted for FPD evaluation but only used in few slaughterhouses (FCEC 2017; Harn and Jong 2017) - mostly electronic recording of data at slaughterhouses in 2016 but paper-based systems were also used in some MS (e.g. IT, PL) (FCEC 2017) - the responsibilities for monitoring/recording may differ (e.g. FPD can be monitored by meat hygiene inspectors, government vets or slaughterhouse staff) (Butterworth et al. 2016)
actions/follow-up due to monitoring results	- generally, the thresholds for action differ between the MS (FCEC 2017) - e.g. SE in 2016: permission for increasing stocking density is granted only if a certain FPD score is achieved (FCEC 2017) - e.g. DK, PL, ES in 2016: FPD score not necessary for permission to increase stocking density but permission can be withdrawn if a certain score is not achieved (FCEC 2017) - e.g. DK, NL, SE, UK in 2016: electronic transmission of information to producers for each flock (FCEC 2017) - e.g. IT in 2016: mostly paper-based transmission of information to producers (FCEC 2017) - e.g. UK, DK, DE in 2016: information for benchmarking of performance against others is provided to producers (FCEC 2017) - slaughterhouses often downgrade carcasses according to FPD scores which entails price mark-ups/dowsn (FCEC 2017)

[448] This animal welfare indicator is mentioned in the Broilers Directive as an example of suitable AW indicators.

[449] According to the Broilers Directive, the cumulative daily mortality rate must be recorded for all consignments from flocks with a max. stocking density > 33 kg/m².

[450] According to the Broilers Directive, the number of animals dead on arrival must be recorded for all consignments.

Businesses (farm) direct compliance costs

	Costs and benefits
producers	- Only **sporadic qualitative information** on the costs and benefits of monitoring/follow-up at slaughterhouses could be obtained. *Slaughterhouses* - Slaughterhouses will usually provide the staff for carrying out manual assessments (recurrent) and/or purchase equipment for automatic assessments of indicators such as FPD (mostly one-off). - Camera systems for the automatic assessment of FPD have been reported to cost 70 000-100 000 € (one-off) plus operating costs (FCEC 2017). - Estimates of staff costs are available for the Swedish FPD program (100 single feet evaluated per flock) which was already in place before the Directive entered into force. According to Ekstrand et al. (1998), this program did not entail any additional costs because staff could carry out the tasks within their habitual working hours. *Farmers* - Farmers' revenue may decrease if the carcass is downgraded upon detection of lesions (e.g. FPD) but it has also been suggested that in the long term, the farmers' revenues may increase if measures are implemented in consequence to prevent lesions (Ekstrand et al. 1998). However, the costs of these measures (e.g. change of litter or feed; FCEC 2017) would have to be balanced against the potential increase in revenues and no information could be obtained in this regard. - Administrative costs due to on-farm record keeping in DE amount to ca. 120 000 €/year (recurrent) (BR-Drs. 399/09). - Fees for the monitoring program are charged to farmers in FI at ca. 166 000 €/year (recurrent) (FCEC 2017).

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	- The effects of on-farm record keeping on AW are expected to be indirect and closely connected to slaughterhouse monitoring/follow-up but no information could be obtained in this regard. - It is generally accepted that slaughterhouse data have an immense potential to improve AW. In view of the differences that exist with regards to the alternatives of compliance, it is expected that the AW outcomes that have been achieved in practice in connection with monitoring/follow-up at slaughterhouses differ between the MS. - Systematic and representative information on AW outcomes could not be obtained although the European Commission should theoretically possess such information due to Art. 6(2) of the Broilers Directive. - Nevertheless, some evaluations of monitoring programs in individual MS are available. After the implementation of the FPD monitoring program in SE, a decrease in the incidence of severe FPD from 11 % to 5 % over 3 years was observed (Berg and Algers 2004). Marked changes in the range of approximately 10 percentage points have also been reported by Nielsen (2009) for DK. On a qualitative level, FCEC (2017) report that AW had improved in NL due to FPD monitoring. For the UK, Mullan et al. (2021) also report a marked improvement in FPD scores over time. For all of these estimates it has to be taken into account that they consist of observed associations without controlling for confounding factors that might explain (part) of the observed decreases in FPD lesions (e.g. change in breed), i.e. it is difficult to attribute the observed decreases to the monitoring programs themselves. - In addition, Mullan et al. (2021) provide more detailed information on the slaughterhouse monitoring program in the UK. One of the main findings is that farms that exceeded the national threshold score for severe FPD mostly managed to obtain non-trigger scores again but nevertheless, these farms mostly remained in the worst

	performing quartile.
consumers	- According to the stakeholders interviewed by FCEC (2017) in NL, the monitoring/follow-up program at slaughterhouses had little impact on consumers as the majority is not even aware of this provision. A lack of knowledge among consumers regarding the provision was also observed by stakeholders in DK and SE. - A general assessment of consumers' benefits due to the Broilers Directive is presented in Section 3.2.3.2.
environment	- No information could be obtained regarding the impacts of the provisions on the environment.
public health	- The importance of post-mortem inspections of carcasses for food safety is obvious. The impacts that additional details on mortality rates and welfare-relevant lesions have had on food safety could not be assessed due to a lack of information.

CBA summary

- Costs and benefits due to the provisions are expected to differ between the MS because of variable approaches to compliance/implementation.
- There is a lack of systematic information on the costs and benefits of the provision to all stakeholders that were analysed. In this context it should be noted that the European Commission should theoretically possess systematic information on AW outcomes due to Art. 6(2) of the Broilers Directive.
- Studies from several MS show that the incidence of FPD has decreased over time but it is uncertain whether this can be attributed to the monitoring/follow-up programs or whether an independent trend has been detected. In any case, monitoring enables the detection of such trends.
- Consumers have little knowledge about the provision.

Provisions in total

Business (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg carcass weight]			**change in total production costs** compared to BAU [Mio. €/year] *hypothetical scenarios: share of production volume for which production practices were adjusted*						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
Single provisions				**Not possible**						
Provisions in total [Mio. €/year] [sum of the highlighted production costs]				**No estimate possible, as no studies for the impact of the selected provisions could be found or only sporadic qualitative information was available**						

Legislation in total based on literature estimates (See Annex 6.3)	**0**	**0,745**	**1,49**				**17,90**	**35,80**	**53,70**	**71,60**

Looking at the estimates in the literature (see Annex 6.3.2.), the cost of compliance estimates range from 0% to 1,49%, depending on the country case. For a typical farm in Italy, it is even assumed that the broiler directive has reduced production costs due to an increase in stocking density. Assuming a middle range increase in total production costs of 0,75% and that for about 50% of the EU production volume, adjustments were necessary, total direct compliance costs for adjusting the production due to the legislation amount to about 35,8 Mio. Euro per year.

Note that Rayment et al. (2010) propose a much higher estimate: 192 Mio. Euro per year for the EU. However, their underlying assumptions are quite different from ours. They assume: "Based on midpoint of AgraCEAS estimate of 1-1.5% increase in production costs, production of 11.6 million tonnes at production cost of €1400/tonne carcase weight, and assuming 95% of birds are reared in indoor systems." Contrary to ours, we assume lower production costs (only 1070 Euro/tonne of carcass weight), less production volume (only 8,97 Mio tonnes which corresponds to broiler production and not poultry production in general), only a coverage of about 50% of the production (according to our BAU research), and only a cost increase of about 0,74% (according to new findings by Menghi et al. 2014), resulting in the much lower estimate.

Bringing this now into perspective in terms of the overall economic size of the sector, assuming a yearly average production value of broiler meat of about 13,7 Mrd. Euro in 2008 (based on FCEC 2017), these direct **costs of compliance amount to about 0,26% of the EU production value**. If we take our hypothetical value for an average production year (9,6 Mrd. €) instead (as was done for the other farm-level directives due to a lack of alternatives), the value of 35,8 Mio. €/year corresponds to about 0,37 %.

Public authorities' direct compliance costs

In addition, regarding public authorities' costs of inspections for this legislation, no overall EU estimate could be found, but only scattered MS values. If one takes the average of the Czech and the Dutch value and multiplies it with 28 (for the 28 MS), then one would come up with an EU estimate of **about 22,4 Mio Euro** per year. Again, this value is an extremely rough estimate! In addition, it has to be noted that the FCEC (2017) report that we base our estimates on did not distinguish between one-off and recurrent costs.

		Public authorities		
Source	**Source type**	**provisions** that entailed costs (in the MS)	**total one-off costs** [Mio. €]	**total recurrent costs** [Mio. €/year]
FCEC (2017)	report, survey data	CZ: equipment for on-farm measurements, staff costs for on-farm and slaughterhouse inspections	**1,3**	
		NL: IT system to register farms, inspections/audits/verifications,	**0,3**	

		Public authorities		
Source	Source type	**provisions** that entailed costs (in the MS)	**total one-off costs** [Mio. €]	**total recurrent costs** [Mio. €/year]
		training of official veterinarians		
BR-Drs. 399/09[451]	report, ex-ante impact assessment	none	**0**	**0**
DEFRA (2010a)	report, ex-ante impact assessment	preparatory work, training, IT implementation, policy work, registration, inspections	**0,14**	**0,18**

Calves directive

Regarding the calves directive, two provisions were studied in detail. The first provision focuses on some characteristics of the barn interior and the second on feeding characteristics.

For the CBA of the provisions of the calves directive, the following assumptions were made for the calculation of compliance costs for businesses (farmers):

Assumptions	
baseline value for total production volume[452] of veal meat [1000 tonnes/year] (Eurostat 2014)	**1 000**
baseline value for total production costs of veal meat [€/kg] (A 02 carcass price as of 1.1.2016; European Commission 2022b)	**3,4**

Note that these are **rather "heroic" assumptions** as the legislation entered into force in 2008 but the earliest data for veal production that could be found were from the year 2009. In addition, no production costs could be found, hence, instead the price of veal meat was used, but this one is from 2016, the earliest price information that could be found after several hours of searching the EC webpage.

[451] Document issued by the German *Bundesrat*: Vierte Verordnung zur Änderung der Tierschutz-Nutztierhaltungsverordnung, 30.04.2009.

[452] The production volume refers to the year 2009 (see Figure 4 of Eurostat 2014).

Provision: confinement, size/properties of individual pens, floor area for group housing

BAU

The current provisions have applied since 1998 with a transitional period until 2007:

- individual confinement only for calves ≤ 8 weeks of age in pens with *i)* pen width ≥ calf's height at the withers[453], *ii)* pen length ≥ calf's body length multiplied by 1,1 and *iii)* perforated walls that allow calves to have direct visual and tactile contact with each other
- after the age of 8 weeks: group housing with a space allowance of 1,5 m² for calves < 150 kg, 1,7 m² for calves from 150 to 220 kg and 1,8 m² for calves ≥ 220 kg
- no tethering in individual pens/stalls; tethering in group housing only for ≤ 1 h during milk/replacer feeding

Before that (under Directive 97/2/EC and 91/629/EEC), the following provisions were of relevance:

- no time limit for individual confinement; size of individual pens: pen width > 90 cm ± 10% or 0,8x the height at the withers (no length limits); perforated walls without further specifications
- group housing: space allowance of 1,5 m² for calves of 150 kg (no further specifications)
- tethering was permitted without time limits in individual pens/stalls and in group housing

[453] For Friesian Holstein calves, this corresponds to 75 cm to 105 cm over the period from birth (ca. 42 kg) to 6 months of age (ca. 180 kg) (reviewed by Weiß 2018).

BAU	
exceeding or similar/equal to EU legislation	- national legislation in DE since 1995: group housing for all calves > 8 weeks of age, size of individual pens similar to the Directive (Kälberhaltungsverordnung 1992)[454] *veal calves* - NL in 1995: 22,9 % of veal calves in group housing with 1,5 m²/calf after the age of 8 weeks (before this age: individual pens ± tethering); market share NL: 24 % in 1994 (SVC 1995)[455] *replacement heifers and calves for beef production (except suckler calves)* - EU: usually individual confinement for the first 4 to 8 weeks, then group housing indoors or outdoors with variable space allowance (COM(95) 711 final) - NL, FI, IE: for typical dairy farms, the requirements corresponded to common husbandry practices before EU legislation was introduced (Menghi et al. 2014) - FR, IT, UK: for typical beef fattening farms, the requirements corresponded to common husbandry practices before EU legislation was introduced (Menghi et al. 2014)
individual confinement without time limit	*veal calves* - FR, IT: mostly individual pens (size: 0,6 x 1,6 m to 0,7 x 1,8 m) with non-perforated side partitions on slatted floors for the whole fattening period; often tethered during the first 4 to 8 weeks; market share FR+IT: 57 % in 1994 (SVC 1995; Morisse et al. 1994; Cozzi et al. 2009) - NL: majority of veal calves not in group housing (see above)

Alternatives of compliance considered in the analysis	
individual confinement and group housing according to the requirements	- lack of systematic information, estimates rely mostly on expert opinions - based on EC audit reports, Rayment et al. (2010) conclude that compliance with the Calves Directive was generally satisfactory - expert opinion: Broom (2017) suggests that the "banning of calf crates" (p. 45) was generally enforced - EPRS (2021) indicates that non-compliances with regards to visual and tactile contact in individual pens (FR, IT), space allowance (DE) and tethering (IT) exist but no further details are provided - Within the general framework provided by EU legislation, multiple alternatives of compliance exist that differ especially with regards to group size and age at transfer into group housing (EFSA 2012; Marcé et al. 2010). For example, according to EFSA (2012) most likely 70 % of calves in the EU are kept in individual pens until the age of 3 to 8 weeks, while 28 % are

[454] According to Menghi et al. (2014), the provisions on calf housing entailed costs for dairy farms in DE (see above). However, the authors do not provide any further details and it is unclear whether a vigorous approach was followed by excluding provisions that already existed at the national level before the Directive came into force.

[455] The information on husbandry practices referred to by SVC (1995) was gathered in a survey by the 'Commodity Board for Feedstuffs in the Netherlands'.

	moved to group pens immediately after birth and 2 % remain with the dam during the first weeks.[456] Based on an expert survey, Marcé et al. (2010) show that for replacement dairy calves the proportion of animals moved into group pens directly after birth ranges from 0 % (e.g. BE, DE) to 60 % (ES, EL) and 90 % (IE).

Businesses (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg carcass weight]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: *share of production volume for which production practices were adjusted*						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
confinement, size/properties of individual pens, floor area for group housing	**1**	**1,65**	**2,3**	**-**	**-**	**-**	**14,0**	**28,1**	**42,1**	**56,1**

- There are only few quantitative estimates of producers' costs available. Labour has been suggested as an important cost item (Bertrand and Martineau 1995) but could not be included in the figures for total cost changes because of a lack of information.
- Furthermore, it was not possible to give an account of the impacts of different feeding systems (e.g. automatic milk dispenser, manual feeding in troughs) and of widespread outdoor systems (igloos/hutches, also for group housing) on total production costs compared to BAU.
- Therefore, the available estimates should only be considered as tentative approximations!

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits

[456] Individual pen until 3 to 8 weeks after birth: most likely 70 % (50-80 %; medium level of uncertainty); group pen immediately after birth: most likely 28 % (20-35 %; medium level of uncertainty); with the dam until 3 to 8 weeks after birth: most likely 2 % (1-4 %; high level of uncertainty) (EFSA 2012).

animals	- The increased pen size required by EU legislation has improved animal welfare because species-specific movements are less restricted compared to the crate systems that were commonly used before (reviewed by EFSA 2006). - The requirement for group housing of calves is expected to have improved AW compared to unlimited individual confinement which was commonly practiced for veal calves before because bovines are inherently social animals with a behavioural repertoire that cannot be fully expressed in individual confinement (reviewed by Jensen 2018; Costa et al. 2016; Mandel et al. 2016; EFSA 2012, 2006). However, group housing has often been identified as a risk factor for infectious diseases (reviewed by Lorenz 2021; Costa et al. 2016; Mandel et al. 2016; EFSA 2012, 2006). Although it is challenging to manage this risk, it has been demonstrated that it is possible to maintain similar or even better health outcomes in group housing systems compared to individual confinement (reviewed by Lorenz 2021; Costa et al. 2016). - Another risk associated with group housing systems is cross-sucking among calves. Cross-sucking is a damaging behavioural disorder that can occur in group housing but its root cause are management practices related to milk and roughage feeding (reviewed by Costa et al. 2016). Several studies have demonstrated that cross-sucking can be reduced with adapted feeding management (reviewed by Jensen 2018; Costa et al. 2016; Mandel et al. 2016; EFSA 2012, 2006) but this may be challenging in practice. - Animal welfare and health outcomes in group housing depend considerably on additional factors such as space allowance and group size (reviewed by Jensen 2018; Costa et al. 2016; EFSA 2012). A review on optimal space allowances in group housing systems could not be obtained and group size is currently not covered by EU legislation.
consumers	- Broom (2009) identifies public concern about confinement in crates and calves' diets as key drivers leading to the introduction of the first Calves Directive (91/629/EEC). - It has been claimed that EU legislation has generally improved the reputation of veal farming (Mounaix et al. 2007) and that this has offset any additional costs (Rayment et al. 2010). Nevertheless, Pardon et al. (2014) conclude that the Belgian veal industry remains subject to public criticism even though EU legislation was implemented rapidly, which can be attributed mainly to the use of antibiotics.
environment	- No information could be obtained on the environmental effects of the increase in the size of individual pens and the introduction of group housing.
public health	- EFSA (2006) points out that food safety risks in connection to group housing depend particularly on space allowance and group size which are important management-related factors for animal health outcomes (see above).

CBA summary

- Although the provisions on individual pens and group housing apply to all categories of calves, it appears that mostly veal production was affected while the provisions corresponded to BAU for the other calf categories. However, this evaluation relies on sporadic information from individual MS because systematic data on husbandry practices in the MS is lacking.
- There are large differences between the MS regarding the typical age of calves when they are transferred into group housing and a considerable share of calves is transferred into group housing directly after birth.
- The quantitative estimates that could be obtained for producers' costs do not cover all of the cost items that have been identified as relevant on a qualitative level.
- It is expected that the increased size of individual pens and the requirement for group housing have improved AW compared to the BAU situation. However, management is

decisive to ensure satisfactory AW/health outcomes and may be more challenging in group housing systems compared to individual confinement.

- Public concern about the rearing practices in veal production was a main driver for the introduction of the first Calves Directive in 1991 (Broom 2009). Although some authors claim that the reputation of veal production has improved since EU legislation entered into force, others stress that important issues of public concern persist.
- No information could be obtained on the environmental effects of the increase in the size of individual pens and the introduction of group housing.
- Evidence on the effects of the provisions on public health are scarce but it has been suggested that space allowance and group size in group housing are important factors in this connection.

Provision: feed properties

BAU

The current provisions have applied since 1998:

- sufficient iron content in the diet to ensure average blood haemoglobin (Hb) ≥ 4,5 mmol/L
- calves > 2 weeks of age: minimum daily ration of fibrous food that increases from 50 g/day to 250 g/day over the period from 8 to 20 weeks of age

Before that, similar provisions applied under Directive 97/2/EC and 91/629/EEC, but these were more vague and an exception was granted for the supply of fibrous food to calves intended for white veal meat production.

BAU	
General remarks: - In 1995, a share of 20 % of calves in the EU (6 million/year) was reared for veal meat production, 0,6 % were suckler calves and the remainder were reared as replacement heifers or for beef production (SVC 1995). - The white colour of veal meat results from a "controlled iron anaemic state" (Pardon et al. 2014, p.155) due to a lack of dietary iron. Fibrous food (i.e. roughage) is the natural iron source in calves' diets but iron can also be supplemented artificially as a compound in milk replacer. In addition, fibrous food also plays an important role to stimulate the physiological transition from the pre-ruminant state to the ruminant state. This transition is necessary for the rearing of replacement heifers and for bull fattening but for economic reasons, it was not desired for veal calves in the 1980-90s (SVC 1995). - Therefore, although the provisions apply to all calves, they implied changes mainly for the rearing of veal calves and these will be the focus of this analysis.	
exceeding or similar/equal to EU legislation	- Before the Hb threshold of ≥ 4,5 mmol/L was introduced in the EU, there were independent developments in the veal industry to monitor blood haemoglobin concentrations in order to achieve target levels of around 4,6 mmol/L because a number of studies had shown that values below this threshold resulted in productivity losses (SVC 1995). - Furthermore, there were developments in NL to provide roughage, especially in a new feeding regime used to produce 'pink veal meat' (SVC 1995) but no quantitative figures are available.
average blood haemo-globin < 4,5 mmol/L and/or minimum daily	- Generally, there is a lack of data regarding Hb levels in the EU calf population and therefore, it cannot be evaluated for certain how many producers would have tried to achieve Hb target levels ≥ 4,5 mmol/L even if

ration of fibrous food below the requirements	EU legislation had not been introduced. - There is no systematic information available on the supply of roughage to calves but some sporadic evidence could be obtained: Roughage was not regularly supplied to veal calves in FR, the largest veal producing MS with a market share of 33 % in 1994 (SVC 1995).

Alternatives of compliance considered in the analysis	
average blood haemoglobin ≥ 4,5 mmol/L and minimum daily ration of fibrous food according to the requirements	*General remarks* - lack of systematic information, estimates rely mostly on expert opinions[457] - based on EC audit reports, Rayment et al. (2010) conclude that compliance with the Calves Directive was generally satisfactory - expert opinion: Broom (2017) suggests that the requirements for feed properties were generally followed *Blood haemoglobin (Hb)* - estimates for EU average by EFSA (2006): calves with Hb < 4,5 mmol/L are generally very rare (1-20 %) in the EU calf population, with the exception of some production systems for white veal for which no data is available but according to experts, a considerable share of calves is expected to have an iron deficiency possibly resulting in Hb levels below the threshold - estimates for EU average by EFSA (2012): the probability of calves intended for white veal meat production to receive an iron-deficient diet that results in an anaemia with Hb < 4,5 mmol/L is most likely 17 % (9-30 %; medium level of uncertainty) - EPRS (2021) indicates that non-compliances with regards to Hb levels exist in FR but no further details are provided *Fibrous food* - As milk replacer has become increasingly expensive over time, solid feed components (i.e. concentrate, roughage) have become more attractive. However, systematic information on the feed rations currently supplied in the MS is not available. Feed rations are expected to differ not only in terms of roughage quantity but also with regards to fibre source and physically effective particle size (e.g. chopped/long straw, pelleted feed that includes ground fibre, silage) (EFSA 2006). - According to Pardon et al. (2014), in BE the EU requirements for the supply of fibrous food to veal calves are generally met and even exceeded.

Businesses (farm) direct compliance costs

	Costs and benefits
producers	- For veal production, maintaining Hb levels ≥ 4,5 mmol/L and supplying roughage is associated with several cost and revenue items (SVC 1995) **but quantitative figures to estimate their economic impacts are not available**. *Revenue items* - On the one hand, Hb levels ≥ 4,5 mmol/L have been associated with productivity gains but on the other hand, there is some evidence that the percentage of carcasses in the highest price class (according to meat colour) declines if Hb levels exceed this threshold (reviewed by SVC 1995). Nevertheless, meat produced under Hb values

[457] Slaughterhouse data would be a suitable alternative but are currently not available (EFSA 2012).

	Costs and benefits
	between 4,5 and 5 mmol/L still displays a white colour for which some price mark-ups can be achieved (EFSA 2006; SVC 1995). - Economically, price mark-ups for white meat colour have to be balanced against possible productivity gains due to higher Hb levels but there are no studies available where this was attempted. The fact that there are records of independent monitoring activities in the veal industry before the legislation entered into force (see above) provides an indication that Hb levels ≥ 4,5 mmol/L might have entailed economic benefits. - Given the requirement to maintain Hb levels ≥ 4,5 mmol/L, the supply of roughage in the quantities required by legislation is not expected to have an impact on carcass colour grades if fibre sources with low iron contents are chosen (Prevedello et al. 2012; Cozzi et al. 2002). However, feed management becomes more challenging when attention has to be paid to low iron contents (Mounaix et al. 2007) and this can lead to additional costs. The effects of the roughage quantities required by legislation on abomasal lesions, which are an important cause of veal calf mortality and revenue loss, have not yet been clearly established and it is likely that these effects depend on the fibre source and especially, on the physically effective particle size which is currently not regulated by EU legislation (reviewed by Bus et al. 2019; Cozzi et al. 2009). *Cost items* - The market for veal feed components has changed immensely since the legislation was introduced in the 1990s. At that time, the production of veal meat was a means of reducing surpluses from milk production and for example, stock-piles of butter were used to produce milk replacer (Susmel 1986). Nowadays, milk replacer is comparatively expensive and solid feeds (i.e. concentrate, roughage) have become an attractive alternative. For example, Mollenhorst et al. (2016) demonstrate that for many constellations of veal diets consisting of milk replacer, roughage (including quantities much larger than required by legislation) and concentrate, lower feed costs can potentially offset revenue losses due to carcass colour downgrading. However, the effects of roughage supply on fixed costs (e.g. feeding equipment, labour) were not included in this study. - Further cost items that have to be taken into account are investments into storage facilities for roughage (one-off) and labour for roughage distribution and cleaning (recurrent) (SVC 1995). *Benefits* - It has been claimed that EU legislation has generally improved the reputation of veal farming (Mounaix et al. 2007) and that this has offset any additional costs (Rayment et al. 2010). Nevertheless, Pardon et al. (2014) conclude that the Belgian veal industry remains subject to public criticism even though EU legislation was implemented rapidly, which can be attributed mainly to the use of antibiotics.

<u>Animal, consumer, environment, public health costs and benefits (direct and indirect)</u>

	Costs and benefits
animals	- The Hb threshold of ≥ 4,5 mmol/L does not correspond to the physiological state but rather to a “controlled iron anaemic state” (Pardon et al. 2014, p.155). A threshold of 6 mmol/L is advised to ensure adequate metabolic functioning and animal welfare, so that e.g. the oxygen-carrying capacity of the blood allows for species-specific activities to be carried out (reviewed by EFSA 2012, 2006). Below the threshold of 4,5 mmol/L, there is the risk of severely impaired immune function (reviewed by Marcato et al. 2018; EFSA 2012, 2006). - It is required by EU legislation that the Hb threshold is met *on average* which, according to EFSA (2012, 2006), gives rise to the following issues: *i)* if the group average is considered, this does not ensure that each individual calf meets the target level and *ii)* if the average over the fattening period is considered, this might mask lower

	Hb levels during the last weeks before slaughter and these are particularly critical because the economic incentives for lower Hb levels are strong. - The effects of the roughage quantities required by legislation on abomasal lesions, which are an important cause of veal calf mortality, have not yet been clearly established and it is likely that these effects depend on the fibre source and especially, on the physically effective particle size which is currently not regulated by EU legislation (reviewed by Bus et al. 2019; Cozzi et al. 2009). - Generally, roughage can contribute to the prevention of abnormal oral behaviours related to a lack of rumination (reviewed by Bus et al. 2019; EFSA 2012, 2006). However, Webb et al. (2013) point out that several studies have shown that the roughage quantities required by EU legislation are not sufficient for this purpose. Furthermore, Webb et al. (2013) emphasise the importance of fibre source and particle size for AW outcomes related to roughage supply.
consumers	- Broom (2009) identifies public concern about confinement in crates and calves' diets as key drivers leading to the introduction of the first Calves Directive (91/629/EEC). - It has been claimed that EU legislation has generally improved the reputation of veal farming (Mounaix et al. 2007) and that this has offset any additional costs (Rayment et al. 2010). Nevertheless, Pardon et al. (2014) conclude that the Belgian veal industry remains subject to public criticism even though EU legislation was implemented rapidly, which can be attributed mainly to the use of antibiotics. - Historically, consumers learned to associate the white colour of veal meat with its tenderness (Putten 1986) although the tenderness is mainly due to the young age of the animals. As a result, the white colour of veal meat became an important indicator signalling quality to consumers (Putten 1986) and driving consumer demand (reviewed by Pardon et al. 2014; Cozzi et al. 2009). There have been attempts to educate consumers about pink veal meat as an alternative and this was successful to a certain extent in some MS (Putten 1986) but the white colour continued to be rewarded by consumers with price mark-ups (reviewed by Pardon et al. 2014; Cozzi et al. 2009).
environment	- There is no evidence available regarding effects of supplying the roughage quantities required by EU legislation on greenhouse gas emissions. - Generally, the supply of roughage is expected to increase CH_4 emissions due to enteric fermentation. However, depending on the quantity of milk replacer that is substituted with roughage and/or concentrate, this effect can potentially be offset by resource savings in the production of milk replacer and the heating of water for serving the milk replacer (Mollenhorst et al. 2016).
public health	- As Hb levels < 4,5 mmol/L are associated with a severe dysfunction of the immune system (reviewed by Marcato et al. 2018; EFSA 2012, 2006), it can be hypothesised that requiring levels above this threshold could have contributed to reducing the burden of infectious diseases and the use of antimicrobials. However, studies that have analysed this relationship are not available.

CBA summary

- The provisions on feed properties implied changes mainly for the rearing of veal calves. Quantitative estimates of producers' costs are not available.
- Before the Directive entered into force, there had been independent developments in the veal industry to maintain Hb levels ≥ 4,5 mmol/L in order to achieve productivity gains. This can be considered as an indication that Hb levels above this threshold entailed economic benefits and that these were not outweighed by possible price mark-downs for meat colour.
- At the time when the Directive was introduced, veal calves' diets consisted mostly of milk replacer because surpluses from milk production could be reduced this way. Roughage was most likely not regularly supplied and therefore, the legislation is

expected to have entailed costs related to roughage material, labour for distribution/cleaning and investments into storage facilities. In contrast, nowadays milk replacer is comparatively expensive and solid feed components (roughage, concentrate) are becoming increasingly attractive as substitutes but systematic information on the feed rations currently supplied in the MS is lacking.

- The Hb threshold of ≥ 4,5 mmol/L does not correspond to the physiological state but rather to a "controlled iron anaemic state" (Pardon et al. 2014, p.155) that is associated with impaired AW. Values below this threshold can lead to even worse AW outcomes, especially with regards to immune function. As the provision requires the Hb thresh-old to be met on average, it is not guaranteed that this target is achieved for each animal at all times. The effects of the required roughage quantities on abomasal lesions have not yet been clearly established and likely depend on fibre source and particle size which are currently not regulated by EU legislation. It is likely that the required roughage quantities are not sufficient to prevent behavioural disorders related to a lack of rumination and that fibre source and particle size also play an important role in this regard.
- Consumer demand for white veal meat is an economic incentive for low Hb levels and consumer education has only been partially successful in this regard.
- There is not enough information available to assess the effects of the provisions on the environment and public health.

Provisions in total

Business (farm) direct compliance costs

	change in total production costs compared to BAU [% per kg carcass weight]			**change in total production costs** compared to BAU [Mio. €/year]						
				hypothetical scenarios: share of production volume for which production practices were adjusted						
Provisions	**min**	**central**	**max**	**2 %**	**5 %**	**7 %**	**25 %**	**50 %**	**75 %**	**100 %**
confinement, size/properties of individual pens, floor area for group housing	**1**	**1,65**	**2,3**	**-**	**-**	**-**	**14,0**	**28,1**	**42,1**	**56,1**
Provision in total [Mio. €/year] [sum of the highlighted production costs]				**42,1**						
Legislation in total based on literature estimates (See Annex 6.4.2)		**5**					**42,6**	**85,2**	**127,8**	**170,4**

Hence, in total the direct costs of compliance for the above provisions amount to **about 42,1 Mio. Euro per year**, assuming the production volume shares for each legislation as indicated by the blue shades in the table (and as sampled in the BAU table). These costs should be considered as annualised one-off costs. Note that for the second provision under review, i.e. feed properties, no quantitative cost estimates could be found.

If one assumes a yearly average production value of veal meat of about 3,4 Mrd. Euro, these direct **costs of compliance amount to about 1,23% of the production value**. Again, as emphasised at the beginning of the calves section, this is a very crude estimate given the patchy data availability.

In comparison to the estimates in the literature, our estimates differ from what has been proposed by Menghi et al. (2014) and Rayment et al. (2010) (see Annex 6.4.2.). However, one has to note that Menghi et al. estimated, based on their sample, the direct compliance costs to be equal to zero for *beef* producers, and only for *dairy* producers estimated additional production costs of about 0,5%. On the contrary, Rayment et al. (2010) estimated about 5% compliance costs for *veal* producers. As one can see from the above tables, we only considered veal producers as it could not be excluded that the estimate by Menghi et al. (2014) for dairy farms comprises gold-plating issues (see Section 3.2.4.1). If we apply the percentage term by Rayment et al. (2010) to our baseline values about size of production and prices, we come up with a value of about 127,8 Mio Euro, assuming that about 75% of EU production had to be adjusted to the then new legislation. As indicated in Section 3.2.4, **our quantitative estimates do not comprise all the cost items that have been identified on a qualitative level.** Whether the estimate by Rayment et al. (2010) is more plausible

cannot be determined for certain because the authors do not provide enough details on the cost items and modifications they assume (e.g. existing building, new building etc.).

Public authorities' direct compliance costs

In addition, public authorities' costs of inspections for this legislation were assessed by a report from 2010 to be at 9,6 Mio. Euro per year.

Public authorities' costs of inspections (application of the EU Standard Cost Model)

		On-farm inspections [Mio. €/year]
Source	**Source type**	**calves**
Rayment et al. (2010)[458]	report, theoretical scenarios	**9,6** (EU-27)

[458] Rayment et al. (2010) present calculations that correspond to the EU Standard Cost Model. However, the authors do not subtract baseline costs of inspections that would be carried out in the MS even if no EU legislation existed.

Overview of costs and benefits identified in the evaluation of legislation on the protection of animals during transport

As pointed out in the introductory part of the study, only selected provisions of the legislation were analysed in detail (see Table 1 for overview). Given the scarcity of studies on transportation issues, we do not present each provision one after another but start by summarising the BAU information for all provisions and then proceed with an overall cost-benefit assessment.

Selected provisions

BAU

Properties of means of transport by road

Provision	BAU	compliance with the Transport Regulation (EC) 1/2005
properties of means of transport by road	- Predecessors with regards to rules for the means of transport were Regulation (EC) 411/98, Directive 95/29/EC and Directive 91/628/EEC. - Compared to these pieces of legislation: - several requirements have remained largely unchanged (e.g. feeding equipment, bedding) - some requirements have become more specific (e.g. ventilation system, capacity of water tanks) - some requirements have been added (e.g. navigation system) - A detailed account of the BAU status for the individual MS is out of the scope of this study.	- in the period from 2009-2013: 9,1 % of infringements detected in IT during on-road inspections were related to a lack of equipment (Padalino et al. 2020) - in 2014 and 2015: on average 7 to 8 % of infringements reported by the MS to the EC were related to the means of transport (road or sea) (Baltussen and Wagenberg 2018)
- navigation system	- in 2005: 2 % of vehicles equipped (EU) (Baltussen et al. 2011)	- in 2009: 77 % of vehicles equipped but system is not always used (EU) (Baltussen et al. 2011) - in 2020: transport companies routinely use GPS systems for their own purposes (to track vehicles during journeys and to monitor driving hours) but this additional information is not accessible to CAs (DG(SANTE) 2019-6834)
- ventilation system	- in 2005: 19,9 % of vehicles equipped (EU) (Baltussen et al. 2011)	- in 2009: 29,3 % of vehicles equipped (EU) (Baltussen et al. 2011)
- watering system	- in 2005: 16,3 % of vehicles equipped (EU) (Baltussen et al. 2011)	- in 2009: 24,3 % of vehicles equipped (EU) (Baltussen et al. 2011)
- feeding	Specific conclusions cannot be drawn with the available data (Baltussen et al.	

equipment	2011).

Journey log

Provision	BAU	compliance with the Transport Regulation (EC) 1/2005
journey log	- Route plans were already required under the predecessor legislations (see above) which implies that some basic infrastructure was already in place to process journey information. - Compared to the predecessor legislations, the information obligations have increased but the requirement to install a navigation system was intended to facilitate the processing of the additional information. - A detailed account of the BAU status for the individual MS is out of the scope of this study.	- Audits carried out by the EC in 2017 (CZ, NL, FR) indicate that almost all journey logs for long-distance transports are returned to the CAs which had not been the case in the initial phase after the implementation of the Regulation (Baltussen and Wagenberg 2018). - The use of returned journey logs for checks by the CA differs considerably between the MS. For example, in France CAs are instructed to randomly check 5 % of journey logs whereas in NL, all journey logs are briefly checked and for 10 % of journey logs, GPS and temperature data is taken into account (Baltussen et al. 2011). - Based on data requested from the MS, the EC presents the preliminary conclusion that returned journey logs are generally only checked minimally and that the CAs either do not detect non-compliances or do not pursue them (DG(SANTE) 2019-6834). - For exports from the EU, it is often impossible for the CA to obtain the information recorded by the navigation system and by the temperature monitoring device, even upon request (DG(SANTE) 2019-6834).

Certificate of approval of means of transport

Provision	BAU	compliance with the Transport Regulation (EC) 1/2005
certificate of approval of means of transport	- Under the predecessor legislations (see above), the MS already had to ensure that the means of transport complied with the requirements laid down in the Directives. This implies that some form of approval system would usually have been in place already but a detailed account of the BAU	- Based on information from audits, the EC affirms that the approval procedure is generally well developed in the MS (DG(SANTE) 2019-6834). However, some non-compliances persist e.g. regarding failure to

	status for the individual MS is out of the scope of this study.	indicate the animal category on the certificates which may result in unweaned animals being transported in inappropriate vehicles (DG(SANTE) 2019-6834). The EC attributes these non-compliances to local officers who do not follow the national guidelines (DG(SANTE) 2019-6834). - Since the implementation of the Regulation, the number of approved trucks has increased by approximately 6-fold (Baltussen et al. 2011) but from this, it is not possible to infer levels of non-compliance because the share of new and existing vehicles is uncertain.

Authorisation of transporters

Provision	BAU	compliance with the Transport Regulation (EC) 1/2005
authorisation of transporters	- Basic requirements regarding registration and authorisation had already applied under the predecessor legislations which implies that some basic infrastructure would already have been in place in the MS. However, a detailed account of the BAU status for the individual MS is out of the scope of this study. - In the Transport Regulation, the requirements for transporter authorisation were further extended compared to the predecessor legislations.	- Some figures are available regarding the number of authorised transporters (Baltussen et al. 2011) but it is not possible to infer levels of non-compliance from this.

Training and certification of staff

Provision	BAU	compliance with the Transport Regulation (EC) 1/2005
training and certification of staff	- Basic requirements regarding training had already applied under the predecessor legislations which implies that some basic infrastructure would already have been in place in the MS. These requirements were extended in the new legislation especially with regards to the need to pass an examination and obtain a certificate. - A detailed account of the BAU status for individual MS is out of the scope of this study but limited evidence is available for the UK. DEFRA (2006) assumed that the	- Since the implementation of the Regulation, the number of certified drivers has increased by approximately 16-fold (Baltussen et al. 2011) but from this, it is not possible to infer levels of non-compliance because the share of newly certified drivers is unknown. However, survey data indicate that training courses are generally available in the MS (Baltussen et al. 2011).

	existing courses would fulfil the new requirements with only small syllabus changes. However, arrangements to carry out examination and certification procedures were not yet established (DEFRA 2006).	- The certification procedures differ considerably between the MS. For example, DK requires 5-day courses every 5 years while in other MS only a single training of half a day is mandatory (Baltussen et al. 2011).

Legislation in total

BAU

- Based on official data, the EC concludes that the level of compliance with the Transport Regulation is generally high within EU territory.
- But at the same time, it is emphasised that AW incidents continue to be regularly reported by NGOs, especially at EU borders DG(SANTE) 2019-6834.
- ECA (2018) highlights that non-compliances occur with regards to the rules on long distance transport and the transport of unfit animals. The share of infringements related to fitness for transport was on average 28 % in 2014 and 43 % in 2015 (Spoolder and Ouweltjes 2018).[459]

Businesses direct compliance costs

Regarding the direct compliance costs of transport companies are available.

	change in transportation companies' costs compared to BAU [Mio. €/year]
Source: Rayment et al. (2010)[460]	
one-off costs (annualised over 15 years): - properties of means of transport by road - certificate of approval of means of transport - training and certification of staff - authorisation of transporters	**126** (EU-27)

[459] The provisions on fitness for transport were not investigated in detail in the current study.

[460] Rayment et al. (2010) extrapolate the impact assessment from DEFRA (2006) to the EU-27 level and add administrative costs as estimated by the "High Level Group of Independent Stakeholders on Administrative Burdens".

recurrent costs due to administrative information obligations: - drawing up and keeping available transport and planning information - drawing up of a disinfection register	**1 600** (EU-27)[461]
Legislation in total [Mio. €/year]	**1 726** (EU-27)

- As market prices for animal transports did not increase after the introduction of the Regulation, Baltussen et al. (2011) conclude that the additional costs were not passed on along the supply chain but had to be shouldered by the transport companies whose profit margins are expected to have decreased. Baltussen et al. (2011) indicate that this was mainly due to a lack of enforcement of the Regulation which enabled competition from transport companies that did not comply with the new requirements.
- Generally, digital route planning of animal transports has the potential to yield economic benefits (Frisk et al. 2018) and a recent report by the EC suggests that many transport companies use GPS systems intensively even beyond the requirements of the Transport Regulation (DG(SANTE) 2019-6834). However, in a survey carried out in 2009 (shortly after entry into force of the Regulation), 61 % of stakeholders indicated that route planning was not improved with the navigation system and some drivers did not even use the system at all because they knew the routes by experience (Baltussen et al. 2011). Furthermore, 71 % of stakeholders indicated that the use of the navigation system did not improve handling of the journey log (Baltussen et al. 2011).

Public authorities

Regarding **direct compliance costs** for public authorities, Rayment et al. (2010) estimated the costs of inspections for this legislation to be at 14,0 to 15,0 Mio. Euro per year.

[461] Based on estimates by the High Level Group, Rayment et al. (2010) point out that the potential for the reduction of recurrent administrative costs is immense: cost savings of up to - 627 Mio. €/year with an online database for registration of transport animals and - 500 000 €/year if inspection frequency is linked to transportation time. Whether this potential has been achieved in the meantime, is unclear. From the Annex to COM(2009) 544, it can be inferred that a policy proposal on automatic satellite tracking of transports was under preparation by the European Commission. This was expected to reduce the administrative burden of Regulation (EC) 1/2005 by - 60 % through a reduction of the time spent on i) drawing up transport information, ii) record-keeping (no documentary evidence would have to be carried on the vehicle anymore) and iii) automatic submission of the journey log to the CA. However, until recently no such tracking system has been established and journey logs are often returned without details of the tachograph and temperature records (EPRS 2018). If the CA requests further details, transporters are obliged to provide these but no specific requirements exist for the format so that often long paper files with coordinates and temperature data are submitted (DG(SANTE) 2019-6834). Furthermore, ECA (2018) indicates that CAs rarely use TRACES (the online tool to monitor intra-EU long distance, cross-border journeys) to target inspections.

A survey among competent authorities (CA) in the MS suggests that the total increase in administrative costs amounted to approximately **+ 5 to + 15 %** compared to the situation before the Regulation was in force, but the CAs could not provide systematic information on the cost items that were affected (Baltussen et al. 2011).

According to the same study (Baltussen et al. 2011, p.44), the survey among member state administrations also revealed, **that 56% of the MS did not change inspection** and approval routines for means of transport due to the new regulation.

Public authorities' costs of inspections (application of the EU Standard Cost Model)

		Transport inspections [Mio. €/year]
Source	**Cost items**	**estimated costs**
Rayment et al. (2010)[462]	**inspections** (excl. document checks): - during road transport - at markets - at place of departure - at control posts - at transfer points	**14,0 to 15,0** (EU-27)

Regarding the **benefits** of the regulation for public administrations, 50 % of CAs in the survey by Baltussen et al. (2011) believe that some benefits in control activities were achieved because of the installation of navigation systems.

[462] Rayment et al. (2010) present calculations that correspond to the EU Standard Cost Model. However, the authors do not subtract baseline costs of inspections that would be carried out in the MS even if no EU legislation existed.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Costs and benefits
animals	*General assessment* - The main conclusion of the implementation assessment by Baltussen and Wagenberg (2018) is that the effect of the Transport Regulation on AW cannot be evaluated for certain because adequate information is lacking. Especially, animal-based AW indicators are not yet commonly used (Baltussen and Wagenberg 2018). - Some information on animal-based AW indicators was collected by Baltussen et al. (2011) in a stakeholder survey. In total, the data indicate that (among other indicators) the incidence of death on arrival (DoA), lameness, severe injuries and bruises has slightly decreased since the implementation of the Transport Regulation. However, if the information is considered separately according to stakeholder groups, it appears that while 63 to 68 % of farmers believe that DoA, injuries and bruises have declined due to the Regulation, only 24 % of transport companies share this opinion (Baltussen et al. 2011).[463] On a more general level, Baltussen et al. (2011) also report that scientists, slaughterhouses and AW NGOs believe that AW has improved due to the Regulation whereas competent authorities do not see any positive impacts. These discrepancies demonstrate the disadvantages of relying on survey data when assessing AW outcomes. - Member states regularly report the quota of infringements detected during transport inspections and these figures have remained mostly stable since the implementation of the Regulation (Baltussen and Wagenberg 2018). However, from this it cannot be concluded that AW has remained unchanged because *i)* the share of MS adopting a risk-based approach to inspections has increased over time and *ii)* the infringement quota also comprises infringements that have little impact on AW such as documentation errors (Baltussen and Wagenberg 2018). *Properties of means of transport and approval of vehicles* - Since the introduction of the Regulation, vehicles are better equipped with ventilation and watering systems as well as satellite navigation systems (Baltussen et al. 2011). The availability of feeding equipment cannot be evaluated with the available data (Baltussen et al. 2011). Stakeholders indicate that limited to strong improvements were achieved regarding (among others) facilities for loading and unloading, roof, mechanical ventilation and feeding/watering (Baltussen et al. 2011). - The equipment of vehicles is an important prerequisite for AW but better equipment does not automatically imply improved AW (Baltussen and Wagenberg 2018). *Journey log* - Baltussen and Wagenberg (2018) conclude that the obligation to return a more detailed journey log than before has resulted (if at all) in indirect benefits to AW because the journey will already be terminated at this stage. Such indirect effects include better planning and contingency plans (Baltussen and Wagenberg 2018). - The checks carried out in practice on returned journey logs and the actions taken in consequence appear to be mostly minimal although considerable differences exist between the MS (DG(SANTE) 2019-6834). For exports from the EU, it is often impossible for the CA to obtain the information recorded by the navigation system and by the temperature monitoring device, even upon request (DG(SANTE) 2019-6834).

[463] The number of farmers and transport companies who answered the questions is not given.

	Training and certification of staff - Appropriate training of staff is an important prerequisite for AW (Baltussen and Wagenberg 2018). Broom (2017) even claims that the provision on training of staff has been the most beneficial one of all in terms of AW. - However, the actual benefits achieved in practice due to the provision on training remain uncertain. Generally, it is expected that the effects vary in the MS due to differences in the implementation of training courses and examination procedures (see section 3.3.1.1). For example, in a survey among drivers and attendants in Romania, 86 % of participants confirmed that the training programs were useful for their future activities while 14 % denied this. In comparison, stakeholders from different MS surveyed by Baltussen et al. (2011) estimated that the provision on training resulted in rather limited benefits regarding death on arrival, lameness and injuries. In a survey among commercial drivers of cattle in Denmark, 52 % of the participants could not answer two questions on fitness for transport and 35 % reported that they were frequently unsure about fitness for transport (Herskin et al. 2017).
consumers	*General perceptions regarding transport* - Gavinelli et al. (2008) argue that the public is very sensitive about the transport situation of animals. - Clark et al. (2017) performed a meta-analysis of WTP studies. Given "consistently positive WTP", they concluded that "consumers are concerned about all aspects of welfare" and thus, that "a holistic approach to animal wellbeing needs to be considered in policy, which takes into consideration all aspects of welfare such as housing, environment and transport." - Wille et al. (2017) point out that consumers consider the current rules to be insufficient, even though they often do not know them in detail. It could be shown that overall, the test persons have a predominantly negative attitude towards animal transports. - Liljenstolpe (2008) found that Swedish consumers were willing to pay an increment for mobile slaughtering of pigs to avoid transportation of live animals. A similar finding was reported by Carlsson et al. (2007a), with the difference that in this study, Swedish consumers were found to be willing to pay a price premium for the use of mobile abattoirs for cattle but not for broilers. *Characteristics of the journey (quality, length)* - Bennett and Blaney (2003) found in a survey among 2000 randomly selected people in the UK in 1996 that transports of animals for up to 24 h (with food and water at 8 h intervals) were perceived as unacceptable but as less unacceptable than e.g. egg production in cages. - Latacz-Lohmann and Schreiner (2019) take pig transports as an example and estimate that one additional hour of transport time lowered participants' WTP at the retail level by 0,14 € [per kilogram pork cutlet]. - Nocella et al. (2010) conducted a consumer survey in IT, GB, DE, ES, FR. They asked participants about space and hygienic conditions during transport, certification of people involved in transport, vehicle characteristics and rest opportunities for animals between transport and slaughter. The majority (> 80%) of the respondents considered it "quite important" or "very important" to further improve these aspects but it appears that almost half of the respondents did not expect that it is likely that stakeholders would adhere to higher standards if these were part of a certification program for high quality products i.e., many consumers had trust issues. - In a study for DE and PL, Grunert et al. (2018) find that a transport time to slaughter of less than 4h was important for the purchase decisions of 16,9% of German respondents whereas this was the case only for 5,75 % of Polish respondents.

	Impact on meat quality From a stakeholder survey, Baltussen et al. (2011) conclude that "the regulation has slightly improved the quality of meat" (p. 53). This could be interpreted as a positive indirect benefit of the legislation for consumers. However, later on in the study the survey results are reported separately for transport companies and farmers and it appears that both stakeholder groups largely agree that the transport regulation did *not* improve meat quality (see p. 90 and 91). It is therefore difficult to draw any definite conclusions in this regard.
environment	In the literature search, no discussion of the impacts of the provisions on the environment could be found.
public health	In general, animal welfare and public health are connected at all stages of the food chain, including transport (e.g. through the immunosuppressive effect of stress) (reviewed by Jalakas et al. 2014; Blokhuis et al. 2008). However, whether the provisions have actually had an effect on public health outcomes in practice could not be determined with the available literature.

CBA Summary

- Compared to the cost-benefit assessments for the farm level, a different approach had to be employed for the Transport Regulation because the calculation of percentage terms that indicate cost changes per product is not feasible. In contrast to animal products such as eggs and meat, the Transport Regulation comprises different "units" (per journey, per application, per vehicle, per person). The most relevant unit appears to be "journey" and the challenge connected to this unit is that it is not uniform i.e., journeys differ considerably, especially with regards to length (km) and to the MS that are covered. These two aspects have important impacts on the costs of journeys because labour and fuel together constitute approximately 65 % of the total journey costs. In consequence, the same absolute value of one-off or recurrent costs will lead to very different relative cost changes dependent on what type of journey (km, MS) is considered. Therefore, relative cost changes can only be systematically calculated if very detailed information is available regarding the individual journey and this is out of the scope of this study. The only available study that systematically aggregates the individual cost items with the help of detailed information provided by DEFRA is Rayment et al. (2010). According to their estimation, total additional costs for transport companies in the EU-27 (in 2010) amount to **+ 1726 Mio. €/year.** Although considerable savings of administrative costs are conceivable through the use of digital tools, this potential appears to be largely unused up to date.
- If negative AW outcomes such as injuries and bruises are prevented, this can result in cost savings and increased revenue. The extent to which this could offset the costs of providing better AW during transport is unknown. In order to establish links between transport costs and damages of animals, it would have to be known how effective different measures are in preventing transport damages but no quantitative information is available in this regard.
- The available limited evidence suggests that costs to public authorities have increased in the range of + 5 % to + 15 % due to the legislation. It is expected that some benefits were achieved through the implementation of navigation systems.

- The possibility to assess AW is generally limited because animal-based indicators are not yet commonly used and the available information from a stakeholder survey is inconclusive. Nevertheless, the Transport Regulation provides for important prerequisites for AW such as equipment/approval of means of transport and training/certification of staff but the extent to which these requirements have resulted in practical benefits is uncertain. The provision on journey log is expected to have yielded limited (if any) indirect benefits on AW. For training/certification and journey log, the effects on AW outcomes are expected to vary considerably between the MS due to differences in implementation.
- Regarding indirect benefits for consumer, the literature shows that consumers are very sensitive about the transport situation of farm animals. Hence, any improvement in the transport legislation provides an indirect benefit to consumers. However, it was not possible to determine from the studies whether the changes initiated by the legislation led to changes in consumers' attitudes towards animal transports. The studies tended to ask for even stricter rules and what consumers would be willing to pay for them. A stakeholder survey by Baltussen et al. (2011) resulted in the finding that "the regulation has slightly improved the quality of meat" (p. 53). This could be interpreted as a positive indirect benefit of the legislation for consumers. However, at a later point in the study the survey results are displayed separately for transport companies and farmers and these stakeholder groups mostly do not see any improvements in meat quality which makes it difficult to draw definite conclusions in this regard.
- In general, animal welfare and public health are connected at all stages of the food chain, including transport, but with the available literature it could not be determined whether the provisions had an effect on public health outcomes in practice.

Overview of costs and benefits of identified in the evaluation of the legislation on the protection of animals at the time of killing

In this section, the findings for costs and benefits of the Slaughter Regulation (Council Regulation (EC) No 1099/2009 of 24 September 2009) are reported. Firstly, literature findings regarding the selected provisions, BAU and compliance will be presented and in a second step, a cost-benefit evaluation for the legislation as a whole is presented.

Selected provisions

BAU

Animal welfare officers

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
animal welfare officers	not required	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:* - animal welfare officers were commonly appointed in e.g. UK, CZ, NL in slaughterhouses for cattle, pigs, poultry (survey by FCEC 2007a, 2007b)[464] *no animal welfare officer:* - animal welfare officers were not commonly appointed in e.g. BE, DK in slaughterhouses for cattle, pigs, poultry (survey by FCEC 2007a, 2007b) - UK: 33 % of slaughterhouses that would be required to appoint an animal welfare officer did not already have one in 2012 (DEFRA 2013)	*animal welfare officers have been required since 2013* - EC audits from 2013-2015: Animal welfare officers are usually appointed but their activities are not always recorded, especially in small/medium-size slaughterhouses (DG SANTE) 2015-7213-MR).

[464] The survey by FCEC (2007a; 2007b) included: i) for red meat: 102 responses from slaughterhouses in 10 different MS and ii) for poultry: 29 responses from slaughterhouses in 8 different MS but not all slaughterhouses answered every question.

Monitoring of killing/stunning effectiveness, Standart Operation Procedures (SOPs)

Provision	Req. under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
monitoring of killing/stunning effectiveness, SOPs	not required	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:* - monitoring and recording of stunning effectiveness was common practice in the majority of slaughterhouses (cattle, pigs, poultry) surveyed by FCEC (2007a, 2007b) but the sample size of animals that were monitored varied from 0,001 % to 100 % of slaughtered animals - plans of control based on HACCP (or similar) were commonly available in slaughterhouses for cattle, pigs and poultry in e.g. DK, IT, SE, HU (survey by FCEC 2007a, 2007b) - SOPs were already available in most large slaughterhouses in the UK (DEFRA 2013)	*monitoring of killing/stunning effectiveness and definition of SOPs have been required since 2013* - EC audits from 2013-2015: Monitoring of killing/stunning effectiveness is usually implemented but it appears that the quality of the activity differed, especially if official inspections did not include this aspect (DG(SANTE) 2015-7213-MR). - Monitoring of unconsciousness was not practiced at all in 39 % of poultry slaughterhouses sampled by Devos et al. (2018) in BE (n = 18). Where monitoring was implemented, it was usually performed by the animal welfare officer but sometimes also by untrained staff (Devos et al. 2018). - EC audits from 2013-2015: SOPs are usually defined but the relevance of the indicators that are covered by the SOPs varies between the MS and depends on whether guides to good practice for the definition of SOPs are available (DG(SANTE) 2015-7213-MR).
		no monitoring of killing/stunning effectiveness and/or SOPs: - plans of control based on HACCP (or similar) were not commonly available in slaughterhouses for cattle, pigs and poultry in e.g. NL, DE, CZ (survey by FCEC 2007a, 2007b)	

Training and certification of staff

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
training and certification of staff	basic requirements regarding training but certification was not required	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:* - training and some form of examination/certification required by national legislation in e.g. DE, UK, CZ (FCEC 2012)	*training and certification have been required since 2013 with a transitional period until 2015* - EC audits from 2013-2015: Training followed by an independent examination has been implemented in all audited MS but differences exist e.g. with regards to the examination procedure
		no certification for training required:	

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
		- national legislation in e.g. BE, DK, FR required basic training but examination/certification goals were not defined (FCEC 2012) - In the survey by FCEC (2007a, 2007b), 92 % of slaughterhouses for red meat and poultry (n=80 and n=27 respectively) indicated that employees were systematically trained but this was done mostly internally (red meat: 67 %, poultry: 74 %) and often without certification (red meat: 44 %, poultry: 48 %).	(practical examination less common than desk-based) (DG(SANTE) 2015-7213-MR; DG(SANTE) 2016-6001-MR).

National reference networks for scientific support

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
national reference networks for scientific support	not required	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:* - national reference centres for scientific support already existed in most MS with differences regarding the degree of formal institutionalisation (SEC(2008) 2424)	*scientific support through e.g. national reference networks had to be provided since 2013* - National contact points have been established in at least 21 MS and EFSA provides a platform to support coordination among them (EFSA 2020a).
		no national reference network for scientific support: - it was estimated by the EC that 10 MS would have to set up new networks (SEC(2008) 2424)	

Technical devices

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
technical devices	basic requirements for application	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:*	*specific values for frequency (Hz) and strength (mA) have applied since 2013*

Provision	requirements under Directive 93/119/EC	BAU	compliance with the Slaughter Regulation (EC) 1099/2009
- electrical parameters for waterbath stunning of poultry	of electrical currents, further specifications of strength and duration of the current were in the responsibility of the CA	- national legislation in e.g. FI, CZ, RO defines or recommends combinations of current frequency and strength that correspond to the requirements in the Regulation (FCEC 2012)	- EC audits from 2013-2015: CAs in several MS accept electrical parameters that are below the requirements in the Regulation if obvious signs of consciousness are monitored (DG(SANTE) 2015-7213-MR) - Based on measurements in seven slaughterhouses in BE, Devos et al. (2018) point out that on average, the required current per bird was reached in all slaughterhouses. However, when the distribution of the measurements was taken into account, it turned out that in two slaughterhouses, the share of broilers that did not receive the required currents reached 7 % and 38 % (Devos et al. 2018).
		frequency (Hz) and strength (mA) of electrical currents are not specified or do not correspond to the requirements of the Regulation: - no specifications in national legislation in e.g. FR, IT, DK (FCEC 2012) - specifications in national legislation do not correspond to the requirements in the Regulation in e.g. DE, NL, PL, UK (FCEC 2012)	
- recording devices for electrical stunning	not required	*exceeding or similar/equal to Slaughter Regulation (EC) 1099/2009:* - In the survey by FCEC (2007a, 2007b), 54 % of slaughterhouses for pigs (n=11) and 61 % of slaughterhouses for poultry (n=28) indicated that they already recorded electrical parameters but sometimes not for each animal. The type of recorded parameters differed between the respondents. - No information is available for cattle slaughterhouses.	since 2013 (with a transitional period until 2019), equipment for electrical stunning had to be fitted with a device that records the electrical parameters for each animal stunned/per waterbath
		no recording of electrical parameters for each animal stunned/per waterbath: - In the UK, it was estimated that all poultry slaughterhouses using waterbaths would have to modify their equipment in order to record electrical parameters (DEFRA 2013). Furthermore, it was assumed that hand-held devices for electrical stunning were not usually equipped with a recording function (DEFRA 2013). The situation for static equipment for electrical stunning of cattle was considered variable and no definite conclusions could be drawn (DEFRA 2013).	- As the transitional period has only ended in 2019, no information could be obtained on compliance.

Direct cost of compliance for slaughterhouses

		Slaughterhouses			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs**[465] compared to BAU [per unit]
SEC(2008) 2424 based on **FCEC (2007a, 2007b)**	report, theoretical scenarios	animal welfare officer	labour[466]	none	**+ 2 300 to + 4 600 €/year** (EU-27) [per slaughterhouse]
		monitoring of killing/stunning effectiveness, SOPs	labour	none	mostly included in the figures for animal welfare officer
		training and certification of staff	attendance of course, fee for certificate of competence	-	**+ 225 €** (EU-27) [per person]
		training and certification of staff	-	carcass value (pigs)[467]	**- 830 to - 2 300 €*** (EU-27) [per person]
		authorisation of new stunning/killing methods	application fee	none	**+ 6 000 to + 15 000 €** (EU-27) [per application]
DEFRA (2013)	report, theoretical scenarios	animal welfare officer	labour[468]	none	**+ 8 300 €/year*** (UK)[469] [per slaughterhouse]
		SOPs (small businesses)	one-off costs, items not further specified		**+ 2 100 €*** (UK) [per slaughterhouse]
		monitoring of	development of		**+ 60 €*** (UK)

[465] The figures for changes in total costs and revenues are summed up for the EU-27 level and the UK according to the presumed number of slaughterhouses that were affected and the number of applications/certifications that were expected to occur.

[466] The calculations provided in the EC's ex-ante impact assessment (SEC(2008) 2424) for the costs of animal welfare officers, monitoring of killing/stunning effectiveness and the use of SOPs correspond to the EU Standard Cost Model.

[467] Impaired carcass quality due to maturation deficiency (PSE: pale, soft, exudative).

[468] The calculations provided by DEFRA (2013) for the costs of animal welfare officers correspond to the EU Standard Cost Model.

[469] Assumption for all calculations: average exchange rate in 2012: 1 £ = 1,2337 € (Office for National Statistics 2021).

		Slaughterhouses			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs**[465] compared to BAU [per unit]
		killing/stunning effectiveness	procedure		[per slaughterhouse]
			implementation and updates		**+ 1 100 €/year*** (UK) [per slaughterhouse]
		certification of staff	application fees		**+ 30 to + 330 €*** (UK) [per application]
			fees for approval as assessment centre		**+ 300 €*** (UK) [per centre]
		recording devices for electrical stunning (hand-held devices, modification of waterbaths)	investment costs	none	**+ 3 900 to + 4 300 €*** (UK) [per device]
		prohibition of decapitation/cervical dislocation as routine killing/stunning method for poultry	one-off costs, items not further specified	none	**+ 490 to + 1 200 €*** (UK) [per slaughterhouse]
		electrical parameters for waterbath stunning of poultry	none	carcass weight (trimming of bruised tissue)	**+ 0,33 €*** (UK) [per bruised bird][470] or **+ 3,4 ct*** (UK)[471] [per slaughtered bird]
		further provisions[472]			

[470] DEFRA (2013) assumes that the carcass of 10,3 % of stunned birds will be bruised due to the EU requirements for current frequency and strength.

[471] The price per slaughtered bird was not converted to a percentage term relative to producer prices for broilers because this would not adequately reflect the impacts on slaughterhouses as their final product corresponds to the value added to the carcass (and for this, no data could be obtained for 2013).

[472] In addition, DEFRA (2013) assumes that the following provisions would lead to additional one-off costs of approximately + 500 000 €*: mechanical restraints for religious slaughter, guides to good practice developed by industry to support the definition of SOPs, equipment for constant current stunning, time limit of 1 minute for live shackling of poultry. Within the scope of this study, it does not appear proportional to review these provisions in detail. However, the costs associated with these provisions are included in the figures in section 3.4.2. DEFRA (2013) also analysed an option where cost savings could have been achieved if higher national standards (certification of staff for slaughter outside slaughterhouses, minimum time period of 20s between neck cut and subsequent movement for religious slaughter) had been removed

		Slaughterhouses			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs**[465] compared to BAU [per unit]
FCEC (2012)	report, theoretical scenarios, only poultry slaughter-houses	animal welfare officer	labour	none	**+ 0,19 ct to + 0,77 ct*** (EU) [per slaughtered bird]
		equipment: minor changes to existing equipment[473] (not specified)	investment costs	none	**+ 12 000 €** (EU) [per slaughterhouse]
		equipment: major changes to existing equipment (not specified)			**+ 42 000 €** (EU) [per slaughterhouse]
		equipment: new system necessary (e.g. new waterbath)			**> + 950 000 €** (EU) [per slaughterhouse]
		recording device for electrical stunning			**+ 15 000 to 50 000 €** (EU) [per slaughterhouse]
		electrical parameters for waterbath stunning of poultry	none	carcass weight (trimming of bruised tissue)	**+ 0,7 to + 3,1 ct** (EU)[474] [per slaughtered bird]
		time limit of 1 minute for live shackling of poultry	none	speed of throughput	'several million Euros if alterations to lairage and transport system are also required'[475]

*Own calculations based on data from the source.

because they were not required by EU legislation. However, this was not the government's preferred policy option.

[473] FCEC (2012) indicate that in a survey among slaughterhouse operators from 10 MS (n=39), 23 % of respondents suggested that minor changes were required, 23 % that major changes were required and 18 % that a new stunning system would have to be purchased. However, FCEC (2012) do not link these figures to a total cost estimate for the EU-27, presumably because the data did not appear representative for the EU-level.

[474] For this figure, FCEC (2012) extrapolate the findings from DEFRA (2013) to the EU-level, presumably for EU-27.

[475] According to FCEC (2012), the proportion of slaughterhouses affected is unknown.

Legislation in total

As could be seen in the previous section, there are a number of studies that focus on specific provisions, but do not provide an overall cost assessment. On the other hand, there are (a limited number) of studies that analysed compliance costs and benefits for slaughterhouses and various stakeholders for the legislation in total. These studies are summarised in the following.

Businesses direct compliance costs

	Slaughterhouses		
Source	**change in costs**[476] compared to BAU [Mio. €/year]	**change in revenues** compared to BAU [Mio. €/year]	**Legislation in total** [Mio. €/year]
Rayment et al. (2010)[477]	**+ 40,0 to + 55,0** (EU-27)	**+ 6,0 to + 16,9** (EU-27)	**+ 23,0 to + 49,0** (EU-27)
DEFRA (2013)	**+ 1,0** (UK)*	**- 5,8** (UK)*	**+ 6,8** (UK)*

*Own calculations based on data from the source.

The more reliable estimation for the EU level seems to be the one by Rayment et al. (2010). To assess the economic relevance of these costs, it would be helpful to put them into perspective with the turnover of all EU slaughterhouses. However, given that it is not easy to find this type of data, one can only try to approximate this number. According to the **German** statistical office (Destatis), the turnover of the German meat industry in 2019 was 39,6 Mrd. Euro of which about 48% related to slaughterhouses (i.e. about 19 Mrd. Euro) (Destatis 2020). If we take 36 Mio. Euro as an average of annual costs of compliance for the EU level (central value in the interval [23;49]; see above) and link this to the output of the German slaughter industry, this total EU value corresponds to about **0,18% of the turnover**. Hence, for the EU slaughterhouse industry as a whole, the value must be much smaller.[478]

[476] The costs and revenue items included in the figures are reviewed in detail below.

[477] Rayment et al. (2010) connect the cost and revenue items presented in the EC's ex-ante impact assessment (SEC(2008) 2424) which was drawn up on the basis of an external study by FCEC (2007a; 2007b).

[478] FCEC 2012 (p.8) indicated that the economic output from poultry slaughterhouses (EU-27) in 2011 was about 31,55 Mrd. Euro. Hence, for this the assumed average costs of compliance would correspond to about 0,11% of the output.

Public authorities direct compliance costs

		Public authorities			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**change in total costs** (change in € compared to BAU)
SEC(2008) 2424 based on **FCEC (2007a, 2007b)**	report, theoretical scenarios	setting up national reference networks for scientific support	not specified	none	**+ 4,0 Mio. €/year** (EU-27)
		drawing up a report on AW during depopulation	development of computerised system, various (all one-off costs)	none	**+ 1,9 Mio. €** (EU-27)
		certification of staff	labour (public authority staff)	partially recovered from slaughterhouses via fees	**+ 2,5 Mio. €/year** (EU-27)
		authorisation of new stunning/killing methods	authorisation procedure	fully recovered from slaughterhouses via fees	

Hence, if one may add up the direct costs of compliance for the three provisions on setting up a reference network, depopulation and certification of staff, the sum would amount up to about 8,4 Mill Euro per year compared to the BAU situation.

Animal, consumer, environment, public health costs and benefits (direct and indirect)

	Additional costs and benefits
animals	*Animal welfare officer* - The appointment of animal welfare officers is connected to the goal of better enforcement of AW legislation in slaughterhouses. The potential of AW officers to contribute to improved AW is recognised by slaughterhouse operators (see below; FCEC 2007a, 2007b). To achieve this potential, it has been suggested by Gerritzen et al. (2021) that AW officers should have a status similar to members of work councils in order to ensure a certain degree of independence from the economic interests of their employers. However, this is not yet required by legislation. The extent to which animal welfare officers currently contribute to improve AW in practice cannot be determined. *Training and certification of staff* - There is consensus that the skills of staff are a decisive factor for the welfare of cattle, pigs and poultry in slaughterhouses (reviewed by EFSA 2020b, 2020c, 2019; Velarde and Dalmau 2017; Broom 2017; Grandin 2010). For cattle, 39 out of 40 slaughter-related hazards identified by EFSA (2020b) are related to training or fatigue of staff. Similar figures apply to pigs (29/30) and poultry (30/40) (EFSA 2020c, 2019). - In addition to the basic requirements regarding training of staff that had already applied under Directive 93/119/EC, the Slaughter Regulation requires certification of staff by an external body. This serves the purpose to harmonise training and to prevent the perpetuation of bad practices (DG(SANTE) 2016-6001-MR). However, whether the requirement for external certification has actually improved AW in

	practice cannot be determined for certain. From the survey by FCEC (2007a, 2007b), it can be concluded that room for improvement was present because although training was commonly provided, this was usually done internally and often without certification (see BAU). - When assessing the benefits of external certification, it is important to take into account that differences between the MS exist with regards to the certification procedure (DG(SANTE) 2015-7213-MR; DG(SANTE) 2016-6001-MR). For example, practical examinations are regarded as best practice (DG(SANTE) 2015-7213-MR) but are less frequently implemented in the MS (DG(SANTE) 2016-6001-MR). - Broom (2017) concludes that of all provisions, the provision on training has been the most beneficial one for AW but he does not specify the role that certification has played in this regard. In contrast, the ex-ante survey by FCEC (2007a, 2007b) suggests that slaughterhouse operators (cattle, pigs, poultry) considered 'plans of control' (similar to SOPs) as the most beneficial measure, followed by the animal welfare officer (cattle, pigs) and the presence of an employee at the bleeding line (poultry) but additional training and certification was not presented as a choice option in the survey. *Monitoring of killing/stunning effectiveness, SOPs* - The importance of adequate monitoring of stunning effectiveness for AW has been emphasised for cattle, pigs and poultry by EFSA (2013a, 2013b, 2013c) and tools for the calculation of appropriate sample sizes for monitoring have been developed. SOPs have the objective to facilitate the incorporation of monitoring procedures into daily routines. The potential of SOPs to improve AW is confirmed by slaughterhouse operators (see above; FCEC 2007a, 2007b). - Whether the provisions on monitoring of killing/stunning effectiveness and SOPs have contributed to improve AW in practice, cannot be determined for certain and is expected to differ between the MS. DEFRA (2021) points out that the need to formalise processes led in some cases to reflection and strategic review of processes which may have improved AW. However, according to Velarde and Dalmau (2017), most difficulties with the implementation of the regulation were related to effective stunning. Non-compliances regarding monitoring have also been found by Devos et al. (2018) in a sample of poultry slaughterhouses in BE. EC audits have highlighted that the quality of monitoring and SOPs differed considerably between slaughterhouses (DG(SANTE) 2015-7213-MR). *Network for scientific support* - There is a lack of information regarding the effects of networks for scientific support on AW. It is generally accepted that knowledge exchange and transfer play an important role for the enforcement of the Regulation (Velarde and Dalmau 2017; Vidal et al. 2016; DG(SANTE) 2015-7213-MR). *Electrical parameters for waterbath stunning of poultry* - With regards to waterbath stunning of poultry, there exists a trade-off between AW and economics: electrical parameters that ensure effective stunning are associated with more haemorrhages and therefore, decreased revenues (reviewed by Grandin 2020; EFSA 2019). For this reason, some CAs that were audited from 2013-2015 accepted the use of electrical parameters that did not comply with the Regulation if certain conditions were met (DG(SANTE) 2015-7213-MR). *Recording devices for electrical stunning* - The effects of recording devices on AW are expected to be indirect because the stunning procedure will already be terminated when records are checked. Records have the potential to facilitate enforcement if they are retrieved by the CA or used for internal purposes by the animal welfare officers. It is important to note

	that signals and displays for immediate checks during the stunning procedure had already been required under Directive 93/119/EC.
consumers	In the literature search, no discussion of the impacts of the reform of the slaughter legislation on consumers could be found. In a consumer trend study for beef meat by Troy and Kerry (2010) slaughtering is seen as one element in the "production context". This may explain, why virtually no separate studies on consumer impacts can be found, as assessments either look at "production", i.e. farm, transport and slaughtering level together, or slaughtering is subsumed under "transport", at least from a consumer research perspective.
environment	In the literature search, no discussion of the impacts of the reform of the slaughter legislation on the environment could be found. Hoeksma et al. (2017) argue in the context of an analysis on consumers' preferences for meat from mobile slaughtering units that when buying these meat products, "animal welfare concerns might weigh more heavily than environmental concerns".
public health	Again, also for this area, no separate studies could be found. It is to assume that a look into the food safety literature may bring to light some indirect costs and benefits of the reform of the slaughter legislation. However, this was beyond the scope of this study.

CBA Summary

- There is a lack of information on the costs of the Slaughter Regulation to slaughterhouses and only two aggregate figures could be obtained for the EU-level and for the UK (by Rayment et al. 2010 and DEFRA 2013). When taking a closer look at these figures, it appears that they differ with regards to some of the provisions they comprise. While both figures include similar cost estimates for the provisions on animal welfare officers, SOPs, monitoring of killing/stunning effectiveness and training/certification of staff[479], there is a remarkable difference concerning the revenue side. Rayment et al. (2010) consider that revenues would increase because training/certification of staff would improve the quality of pig carcasses whereas DEFRA (2013) assume that revenues would decrease because the parameters for electrical waterbath stunning of poultry would impair carcass quality. In DEFRA's aggregate figure, this loss of revenue is by far the largest individual item while pig carcass quality is not included at all, compared to the figure by Rayment et al. (2010) where poultry carcass quality is not included.
- Whether either of these scenarios has actually occurred after the implementation of the legislation cannot be determined for certain with the available literature. The mechanisms that the different scenarios are based on (PSE for pigs and haemorrhages for poultry) are both plausible (reviewed by Grandin 2020; EFSA 2019; Faucitano 2018). In a recent post-implementation review, DEFRA (2021) could not re-evaluate the costs associated with electrical waterbath stunning of poultry because the exchange with the industry was limited due to the COVID-19 pandemic. In conclusion, the available figures for costs of slaughterhouses due to the Regulation should be considered with caution.

[479] When taking into account that the wage level in the UK is above EU average, the cost estimates can be considered rather similar.

- There is a lack of evidence regarding the effects of the provisions on AW in practice. It is generally accepted that the provisions have the potential to improve AW. For several provisions (e.g. animal welfare officer, SOPs, training/certification), the extent to which this potential can be reached in practice depends on the specific circumstances which are currently not regulated in EU legislation. In contrast, whether the effects of defining electrical parameters for waterbath stunning of poultry are achieved in practice appears to be a question of enforcement.
- Regarding public authorities' costs due to the regulation, the available evidence is also scarce but suggests that costs were very limited.
- Regarding consumer, environment and public health, no direct or indirect benefits could be identified.

Recent external assessments: Expert interviews

In addition to the findings from the different studies, also some selected expert interviews were conducted regarding the costs and benefits of the legislations. In the following, relevant pieces of information and comments are summarised that help to put the impacts of the legislations into perspective.

General directive

- One comment by an organisation was made, that the general directive is not clear enough and as individual interpretations are possible, allows for different levels of implementation.

Pigs directive

- A farm level stakeholder reports that as a consequence of the directive, higher direct costs due to increased administrative, added and indirect costs occurred which resulted in lower production efficiency. The efficiency aspect diminished over time as stakeholders became more proficient with new systems.

Laying hens directive

- One animal welfare group criticised that cages (though enriched) are still allowed and in use.
- Issues on high dust level and lower laying hen health status in alternative system are reported as negative results by a farm level stakeholder.
- In addition, by the same organisation, the issues of human health and safety of farm workers were raised and the importance of preventing negative side-effects was stressed.

Broilers directive

- A lack of knowledge and awareness with respect to standards in the poultry sector is reported.
- Direct cost increases occurred due to decreased stocking densities. This led to an increase of 2-3% of the costs per kilogramme per animal.
- Furthermore, fixed stocking densities restrict flexibility which can lead in some cases to “unnecessary killing and ‘waste’ of birds”.

Calves directive

- One stakeholder mentioned that separating and mixing calves (and other animal types) at a very early age increases the likelihood of antibiotics use. Having animals that are more robust, in terms of genetics, and ensuring that good welfare measures are in place (e.g. space allowances, avoiding early mixing, providing good feed and roughage) are important and complementary aspects that can contribute to the reduction of medication intake and to keeping the animals healthy.

- Regarding animal welfare outcome indicators, it was suggested that the mortality rate of calves before the age of 6 months would be a very useful indicator as there are reports that hint at a rather “high” level.

Transport regulation

- According to one animal welfare group, animal needs are not sufficiently met with the regulation as it is not paying enough attention to different species, age and production stages.
- Interview partners from another organisation emphasise the need to align implementation closer with scientific knowledge.
- Regarding the impact of national regulations, for transport, in the case of cow trade, namely on young animals [calves], there can be some disruptions. One of the issues mentioned was that there is an uneven implementation of the regulation on transport of animals, which has not been harmonized across the EU.

Slaughter regulation

- According to one stakeholder group, the load of paperwork and record keeping as well as the complexity have increased due to the new legislation.
- The above-mentioned waste of animals also occurs with regards to transport, e.g. if cattle may not be fit for transport but fit for slaughter. If such an animal cannot be transported, at current circumstances it is wasted.

General remarks, not related to a specific legislation

- It is repeatedly reported that the willingness to pay on the demand side is not in line with efforts of producers to respect animal welfare standards and that consumers are not aware of applied standards. In addition, a contribution to improving animal welfare along all parts of the value chain would be key to further improvements of animal welfare.
- A stakeholder representing the consumers’ views agrees that knowledge about legislative standards is lacking and that WTP varies a lot but. On the other side they highlight that generally, there is a huge interest in animal welfare.
- Consensus among interview partners also exists with respect to the environmental impacts of the EU animal welfare legislation.
- One business stakeholder emphasises the trade-offs between animal welfare standards and the impact on the environment.
- In addition, they highlight a knowledge gap about this trade-off on the consumer side.
- A farm level stakeholder recalls that animal welfare and environmental legislation are opposing forces.
- Regarding the financial burden of the animal welfare legislation, there is huge agreement, that most part is born by producers and only some part is forwarded to consumers.

- A farm level stakeholder highlights the farmers' satisfaction with the legislation as it builds a proper basis they can rely on for their daily work, knowing that they apply the right standards.
- Others remark that generally, the EU legislation builds a baseline for all MS but more harmonisation between MS regulations is needed as well as more accordance and clarity in formulation. It is suggested for example to avoid a term like "sufficient" and use clearer terms. Other stakeholders disagree and see sufficient clarity in the legislation and transfer the responsibility to the MS in case there is room for interpretation. An example for this variation in implementation between the MS is transport and this leads to complexities if multiple MS are involved in a cross-border transport situation.
- Several business stakeholders strongly emphasise that many producers are exceeding the requirements of current animal welfare legislations.
- From a consumers' perspective, it is stated that benefits of the animal welfare legislations outweigh the costs, even when respecting the fact that non-compliance also produces costs.

Conclusion

The objective of this study is to carry out an ex-post cost-benefit assessment for the EU animal welfare legislations at farm, transport and slaughter level that entered into force between the years 1998 and 2009.

The methodological approach was based on the CBA guidelines of the EU Better Regulation Tool. A complexity in the assessment emerged from the fact that the EU member states were at very different starting points when the legislation came into force. This had to be assessed provision per provisions, as an average across the full legislation would have caused too great a loss of accuracy. For this purpose, a number of provisions were selected that deemed to be the most important and/or costly ones (in terms of compliance costs).

For the approach, this meant that for each provision, Business As Usual (BAU) situations had to be identified ex-post, that reflected the situation in the different member states (i.e. already exceeding the proposed EU legislation; equal/similar to the proposed EU legislation; below minimum requirement to be defined in the proposed EU legislation). In addition, the EU production share that adhered to any of these three situations needed to be known in order to come up with meaningful estimates regarding the calculation of the direct costs of compliance of the affected businesses.

The study relied on already available information that was gathered by means of a systematic literature review. The costs and benefits were assessed for the following stakeholders: Businesses, consumers, public authorities, and regarding the dimensions animal welfare, environment and public health. The latter three are no stakeholders in the traditional sense, but it is in the societal interest to understand the costs and benefits of the legislations in these dimensions.

The results show that a certain amount of direct **costs of compliance** occurred for businesses and the public administrations. In terms of economic importance of the costs and benefits, only costs of compliance for businesses and administrative/enforcement costs of public authorities could be monetised. Even though this does not provide a full picture, this allows trying to assess the **economic importance** of the legislations for the different stages of the production process. According to our estimations, the direct costs of compliance for the respective legislations account to about

- 1,47% of an annual average pig production value for the **pigs** directive
- 10,95% of an annual average laying hens production value for the **laying hens** directive
- 1,23% of an annual average veal production value for the **calves** directive
- 0,26% of an annual average broiler production value for the broiler directive
- Less than 0,11% of an annual average production value for the **slaughterhouses** for the slaughter regulation.
- Due to lack of data, for the **transport directive**, no percentage estimate of compliance costs in relation to economic importance could be estimated.

These calculated values have to be taken with **utmost care**, as they are based on average annual values, **contain many assumptions** (as laid out in the study), and are only one

snapshot in time. But nevertheless, they show that the **cost burden** of improving animal welfare **differed** considerably between **the different actors** in the production process.

These findings are also in line with studies by the European Parliamentary Research Service (EPRS 2021) and others (Mitchell et al. 2017; Brouwer et al. 2011; Henningsen et al. 2018; Menghi et al. 2014). Nevertheless, **some provisions were costly to comply** with (e.g. group housing of sows) and although a longer transition period allowed for some flexibility, the investment sums can be very hard to shoulder for farmers (Brouwer et al. 2011; Baltussen et al. 2010).

On the benefit side, many issues could be identified where potential benefits for the animals, consumers, the environment or public health could be generated, but often, due to lack of animal-related indicators, or clear evidence on what had been achieved in practice, these **benefits could not be quantified** and safely attributed to the change in legislation. Hence, it remains the impression, that a large body of legislative text has been developed, implemented and enforced, but that **more effort is still needed to demonstrate and quantify systematically the resulting positive benefits** for the animals, consumers, the environment or public health (or the farmers).

Assuming as a **normative guideline** regarding animal welfare in the agricultural sector that the welfare of farm animals should be guaranteed from the day of birth to the day of slaughter, an **overall assessment of costs and benefits** could be done.

The question is then, if the EU animal welfare legislation does effectively achieve this objective in an efficient and coherent way, and what parts of the legislative framework lead to costs and benefits within this overall normative guideline.

In order to ensure animal welfare from birth to slaughter, all actors along the **production value chain (farmers, transporters and slaughterhouses)** have to take responsibility for their part of the value chain (and consumers need to be willing to pay accordingly for this animal welfare standard). In this regard, the EU legislative framework that was evaluated in this study is effective, as it provides an EU wide minimum standard for each part of the production value chain. However, the restriction must be made, that there are still important farm animals that are not covered by EU legislation (e.g. dairy cows, turkeys, sheep and goats).

Then, a next question must be, if the **benefits** of this minimum standard for the **animals** are sufficient from an animal welfare standpoint to warrant such a large legislation package. Here, the evaluation is less clear, because the animal welfare benefits are not systematically recorded, evaluated or monetised. The assessment in this study showed that only in some instances, EU legislation has contributed to raising animal welfare standards (e.g. ban of gestation and veal crates, ban of unenriched cages). In most cases, it rather unified patchy national legislations or defined common husbandry practices as the new legislative minimum standard. However, we also observe large differences in the national implementation of the legislation which may be due to “loopholes and unclearly defined provisions” (EPRS 2021) or problems in enforcement. Contrary to the intention, a number of practices, e.g. mutilations, lack of loose materials for manipulation, could not be abolished by the legislation. On the other hand, one must also consider the developments that could potentially have occurred over time if EU legislation had not been introduced. In this regard, the regulations might have

served as a safeguard against management practices that might otherwise have worsened animal welfare.

In addition, not only benefits for the animals were analysed, but also potential **benefits for consumers, the environment and public health**. Given that consumers frequently emphasise that animal welfare is of high importance, any legislative improvement in animal welfare may be considered beneficial for them. However, the studies also show that consumers do not consider the current level to be sufficient. Hence, consumers' actual benefits from the studied legislative changes are likely rather small. The same holds for environment and public health. Some small positive benefits could be detected, but the relationships were vague and not quantifiable.

When the **costs** of the studied legislations for businesses (farms, transporters, slaughterhouses) and public authorities are presented as percentage terms of total production costs, they might not appear substantial. However, given the small profit margins and fierce competition, also small increases in total costs can be tough to offset by the businesses and large investment sums can be hard to shoulder. Taking into account that the available data for the calculations of percentage terms is often very limited, there still seems to be a larger burden at the farm level although a comparison across the value chain actors is probably not appropriate, as the duration of animal care differs between the actors, and thus, also the related costs differ. The objective should be that animal welfare is guaranteed at all stages in the value chain and that the actors take responsibility for the whole time that the animal is under their responsibility. When focusing on the costs of different provisions of the legislations, it seemed that more substantial adjustments had to be done at the farm level. In particular, the pigs directive, the laying hens directive and the calves directive (although only for veal production) implied structural changes (ban of gestation and veal crates, ban of unenriched cages). The broilers directive implied a fundamental change in the principle of animal welfare regulation by introducing the systematic monitoring of animal-based indicators at slaughterhouses but cost estimates for this particular provision are scarce and the available studies suggest that costs might have been limited. At the farm level, the broilers directive led to mostly incremental changes. Costs due to the slaughter regulation can be considered limited compared to the output of the sector. An assessment of the impacts of the transport regulation would entail a high level of uncertainty because no information could be obtained on the cost structure of this sector.

To conclude, our **overall assessment of the studied legislative package is positive** as we recognise that an EU-wide minimum standard was established even if some challenges remain concerning the level of animal welfare, harmonised implementation and enforcement.

Not all animal welfare issues could be eliminated with the current EU legislation but it has to be acknowledged that the legislations offered protection against a deterioration of the animal welfare situation (for whatever reason). Hence, in order to achieve the aforementioned normative guideline that animal welfare should be ensured from birth to slaughter for each farm animal, a minimum legislative standard is necessary. This is what the current legislative package offers, at least for a number of relevant parameters. Without regulation, one would have to trust the market to regulate animal welfare. Indeed, better animal welfare very much depends on market actors and consumers, but it is clear that this does not work in all countries and not for all animals because market-driven animal welfare improvements often only cover limited production shares and market segments. Hence, a legislative minimum

standard is a more effective approach to ensure a minimum level of animal welfare, at least for all those farm animals that fall under the scope of the analysed legislations.

In the following **some more general observations** are listed that occurred during the finalisation of this study:

- **Data availability**: much could be said about the need for a more systematic provision of data on prices, turnovers, comparable costs of production, housing systems across member states, or animal welfare indicators. But in addition, also regarding available research, it was striking, that once the legislations were introduced, the research turned towards other topics and focused more on future assessments rather than ex-post assessments of past legislation, which is disadvantageous, because a monitoring and evaluation of the implementation may also provide interesting insights for future policy formulations.
- Our study, as well as all other assessments, only studied each provision individually and did not take potential **interactions of provisions** and related e.g. potential cost savings, benefits or complications into account.
- Regarding the **formulation of provisions** in the legislations, if several alternatives to comply with the legislation exist, it became clear, that the more expensive compliance with the preferred alternative is, the more **specific the text** of the legislation has to be formulated in order to achieve this alternative; otherwise, it is more likely that compliance alternatives will be chosen that are less costly. The same holds for the wording of the provisions: **the more vague the wording**, the more loopholes and ways to circumvent the legislation will be explored, in particular when costs of compliance are high.

Clearly, this study comes along with several **caveats**: an extremely tight time budget combined with a large scope of the study made this study a very challenging endeavour which did not allow to investigate with much detail and time some issues that would have needed more attention. In particular the economic importance of the provisions in relation to production costs would have needed more attention, but also the costs and benefits for example for consumers or the environment could only be touched upon briefly. The analysis of the consumer impacts relies heavily on willingness to pay estimates (WTP), but the often voiced critique to these estimates (see e.g. Lagerkvist and Hess 2011) could not really be picked up and be reflected on in the related assessment of the (costs and) benefits. Similar things could be said about the **impacts on animal welfare**, as the improvement of this is at the center of the set of studied legislations. Hence, the quantitative elaboration of changes in this dimension would have been desirable, but has to be left for future research.

Annex

In the annex, supplemental material is provided for each provision. This information was the basis for the cost assessments.

Pigs directive: cost of compliance estimates

Manipulable material for weaners and rearing pigs

		Producers				
Source	**Source type**	**period / floor / tail docking**	**enrichment**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Niemi et al. (2021)	peer-reviewed, stochastic bio-economic model, cost-effectiveness analysis	25 kg to slaughter / partially slatted / indifferent	chopped straw (100 g/day per pig) (D'Eath et al. 2016)	*enrichment:* labour (straw distribution), material *tail biting victims:* hospital pen (labour and other costs), veterinarian, medication, disposal of dead animals, feed	*tail biting victims:* carcass weight (daily gain), carcass condemnation, mortality	assuming a tail biting prevalence of 8 % and 93 % efficacy of the enrichment in reducing tail biting[480]: **0 %** (EU MS) [per kg carcass weight of slaughter pig]
			chopped straw (200 g/day per pig) (D'Eath et al. 2016)	*enrichment:* labour (straw distribution, removal of dirty straw), material *tail biting victims:* hospital pen (labour and other costs), veterinarian, medication, disposal of dead animals, feed		assuming a tail biting prevalence of 8 % and 100 % efficacy of the enrichment in reducing tail biting: **+ 1,6 %*** (EU MS) [per kg carcass weight of slaughter pig]
			object (spruce) (Chou et al. 2019b)	*enrichment:* material		assuming a tail biting prevalence of 8 % and 2 %

[480] Niemi et al. (2021) provide estimates of economic losses (€/slaughter pig) for a prevalence of tail biting ranging from 0 % to 50 %.

		Producers				
Source	Source type	**period / floor / tail docking**	**enrichment**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
				tail biting victims: hospital pen (labour and other costs), veterinarian, medication, disposal of dead animals, feed		efficacy of the enrichment in reducing tail biting: **0 %** (EU MS) [per kg carcass weight of slaughter pig]
			object (recently harvested wood) (Telkänranta 2020)	*enrichment:* labour, material *tail biting victims:* hospital pen (labour and other costs), veterinarian, medication, disposal of dead animals, feed		assuming a tail biting prevalence of 8 % and 99 % efficacy of the enrichment in reducing tail biting: **0 %** (EU MS) [per kg carcass weight of slaughter pig]
EURCAW-Pigs (2020)	report, theoretical scenarios	weaning to finishing, transport, slaughterhouse / - / mostly docked	straw (2x/day for 5 days)	farm: *enrichment:* labour, material *tail biting victims:* hospital pen (labour and other costs), veterinarian, medication	farm: *tail biting victims:* reduced growth, carcass condemnation, euthanasia	farm: assuming a tail biting prevalence of 2,12 %: **+ 0,5 %*** (NL) [per kg carcass weight of slaughter pig]
				transport: labour (removal of unfit pigs)	-	-
				slaughterhouse: cost items related to category 2 & 3 slaughter, carcass trimming	-	-[481]

[481] For slaughterhouses, EURCAW-Pigs (2020) estimate a cost increase of 2,24 €/1000 slaughter pigs. However, as the total production costs of slaughterhouses are unknown, this cannot be converted to a percentage term.

		Producers				
Source	Source type	**period / floor / tail docking**	**enrichment**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
D'Eath et al. (2016)	peer-reviewed, theoretical scenarios	32 kg to slaughter / partially slatted / undocked	chopped straw (100 g/day per pig)	labour (no tail docking[482], straw distribution), material	none[483]	**+ 1,1 %*** (DK, FI) [per kg carcass weight of slaughter pig]
			chopped straw (200 g/day per pig)	labour (no tail docking, straw distribution, removal of dirty straw), material		**+ 2,9 %*** (DK, FI) [per kg carcass weight of slaughter pig]
			object (wood on chain or holder)	labour (no tail docking), material		**+ 0,03 %*** (DK, FI) [per kg carcass weight of slaughter pig]
			-	*tail biting victims:* hospital pen (labour and extra enrichment material), veterinarian, medication, disposal of dead animals, feed	*tail biting victims:* production cycles (throughput), carcass condemnation	assuming a tail biting prevalence of 8 %: **+ 1,1 %*** (DK, FI) [per kg carcass weight of slaughter pig]
Telkänranta (2020)	dissertation, controlled experiment on commercial farm	2 to 5 months of age / partially slatted / undocked	object (recently harvested wood)[484]	labour, material *tail biting victims:* productivity (not further specified)	*tail biting victims:* productivity (not further specified)	given an observed prevalence of mild tail biting lesions of 36,2 % in the control group and 16,4 % in the experimental group: **+ 0,2 %*** (FI)

[482] Labour cost savings due to withdrawal from tail docking correspond to - 0,1 %* (DK, FI) [per kg carcass weight of slaughter pig]. These cost savings have been in-cluded in the figures for changes in total costs.

[483] D'Eath et al. (2016) model scenarios and connect enrichment with tail biting. However, these scenarios comprise measures going beyond EU legislation (increased space allowance, increased solid floor area) and cannot be used for this study.

[484] In addition, all pens in the control group and the experimental group were supplied with a straw rack and a metal chain. This is not included in the cost calculations but of course, had an impact on the observed prevalence of tail biting lesions.

		Producers				
Source	**Source type**	**period / floor / tail docking**	**enrichment**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
						[per kg carcass weight of slaughter pig]
Chou et al. (2020)	peer-reviewed, experiment on experimental farm	112 d (weaner stage to slaughter) / fully slated / undocked	grass (0,5 - 1,5 kg, 3x/day, 1x/day or 3x/week)	material	none	**+ 0,06 % to + 0,2 %*** (IE) [per kg carcass weight of slaughter pig]
			object (wood)			**+ 0,008 % to + 0,9 %*** (IE) [per kg carcass weight of slaughter pig]
			object (plastic)			**+ 0,008 % to + 0,08 %*** (IE) [per kg carcass weight of slaughter pig]
Haigh et al. (2019)	peer-reviewed, experiment on commercial farm	weaning to slaughter / fully slatted / docked	compressed straw blocks in dispenser	material	none	**+ 1,2 %*** (IE) [per kg carcass weight of slaughter pig]
Spandau (2015)	report, theoretical scenarios	125 d / fully slatted / -	straw in rooting tower (50 g/day per pig)	labour, capital, depreciation rooting tower (7 years), depreciation straw depot (10 years), material	number of pigs (space requirement for rooting tower)	**+ 1,3 %*** (DE) [per kg carcass weight of slaughter pig]
Achilles and Fritzsche (2013)	peer-reviewed, theoretical scenarios	128 d / partially slatted / -	straw in rooting tower (20 g/day per pig)	labour (refilling, maintenance), capital, depreciation (8 years), material	none	**+ 1,1 %*** (DE) [per kg carcass weight of slaughter pig]
Staaveren et al. (2021)	peer-reviewed, stochastic bio-economic model, observational	farrow to finish / - / docked	**-**	*tail biting victims:* feed	none	given an observed prevalence of severe tail lesions 3,13 ± 1,78 %: **+ 0,7 %*** (IE) [per kg carcass weight

		Producers				
Source	Source type	**period / floor / tail docking**	**enrichment**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
	data					of slaughter pig]
Harley et al. (2014)	peer-reviewed, observations in slaughterhouse	at slaughter / - / docked	-	-	*tail biting victims:* carcass weight	given an observed prevalence of moderate to severe tail lesions of 23,9 %: **+ 0,5 %*** (IE) [per kg carcass weight of slaughter pig]

*Own calculations based on data from the source.

Castration

		Producers			
Source	Source type	**anaesthesia / analgesia**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
It is expected that the age of the piglets does not have a relevant impact on producers' costs of carrying out surgical castration without anaesthesia and analgesia but no studies could be obtained that test this hypothesis.					
Scollo et al. (2021)	peer-reviewed, randomised controlled experiment on single commercial farm	sedation (azaperone) / meloxicam	labour (veterinarian, farmer)**, medication (anaesthetic, analgesic)	number of weaned piglets	**+ 0,9 %*** (IT) [per kg carcass weight of slaughter pig]
		local anaesthesia (procaine) / meloxicam			
Verhaagh and Deblitz (2019)	report, theoretical scenarios	general anaesthesia (inhalation of isoflurane) / -	labour (veterinarian, farmer)**, visiting fees of veterinarian, medication (anaesthetic only), depreciation, maintenance of equipment, materials	none	**+ 1,5 % to + 2,0 %*** (DE) [per kg carcass weight of slaughter pig] dependent on farm characteristics
		general anaesthesia (ketamine + azaperone) / -	labour (veterinarian, farmer)**, visiting fees of veterinarian, medication (anaesthetic only), materials	number of weaned piglets	**+ 1,7 % to + 2,3 %*** (DE) [per kg carcass weight of slaughter pig] dependent on farm characteristics
		local anaesthesia (procaine) / -		none	**+ 0,3 % to + 0,5 %*** (DE) [per kg carcass weight of slaughter pig] dependent on farm characteristics
Alleweldt et al. (2013)	report, theoretical scenarios	general anaesthesia (inhalation of isoflurane) / yes (not specified)	not clearly specified	not clearly specified	**+ 1,4 %*** (EU MS) [per kg carcass weight of slaughter pig]
		general anaesthesia (ketamine + azaperone) / yes (not specified)			**+ 1,1 %*** (EU MS) [per kg carcass weight of slaughter pig]
Steinmann et	report, theoretical	general anaesthesia	labour (veterinarian, farmer)**,	number of weaned piglets	**+ 1,5 %*** (DE)

		Producers			
Source	Source type	**anaesthesia / analgesia**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
al. (2012)	scenarios	(inhalation of isoflurane) / meloxicam	medication (anaesthetic, analgesic), depreciation of equipment (10 years)		[per kg carcass weight of slaughter pig]
Kluivers-Poodt et al. (2007)	report, observational case studies	local anaesthesia (lidocaine) / meloxicam	labour (veterinarian, farmer)**, visiting fees of veterinarian, medication (anaesthetic, analgesic)	-	**+ 0,4 % to + 1,3 %*** (NL) [per kg carcass weight of slaughter pig] dependent on farm size and production cycle)

*Own calculations based on data from the source.

** Excluding the labour costs of the veterinarian carrying out the surgical castration procedure.

Floor properties for weaners and rearing pigs

		Producers			
Source	Source type	**farm type / modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Baltussen et al. (2010)	report, theoretical scenarios	- / new building	capital, depreciation (15 years)[485]	-	**0 %** (NL)

[485] Baltussen et al. (2010) provide one-off investment costs per fattening pig for a farm of 1500 fattening pigs. In order to obtain percent changes in total costs per kg carcass weight of slaughter pig, these costs were converted to constant annual payments. The assumptions made for the calculation are: depreciation over 15 years, interest rate 4 %, 2,7 production cycles per year, carcass Grade E, slaughter weight 120 kg, killing out 79 %. As an approximation of baseline total production costs, a 5-year average (2005-2009) of market prices in NL from the Meat Market Observatory (European Commission 2022e) was used.

		- / transformation of old building			**+ 1,6 %*** (NL) [per kg carcass weight of slaughter pig]

*Own calculations based on data from the source.

Group housing for gestating sows

		Producers				
Source	Source type	**farm type / modification / technology**	**floor area / floor properties in group housing**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Mitchell et al. (2017)[486]	report, observational case study	specialised farrowing / - / ESF	- / partially slatted (65 % solid)	labour, depreciation, feed, other variable and fixed costs, overheads	number of weaned piglets, cull sows	**- 2,9 %*** (ES) [per kg carcass weight of slaughter pig]
LfL (2012)	report, theoretical scenarios	- / transformation of old building / free access stalls	- / slatted	investment excl. flooring (depreciation: 10 years)[487]	none[488]	**+ 0,4 %*** (DE) [per kg carcass weight of slaughter pig
		- / transformation of old building / free access stalls without lock				**+ 0,3 %*** (DE) [per kg carcass weight of slaughter pig

[486] In addition, Mitchell et al. (2017) provide data for NL and Brazil and give further information on animal welfare in the production systems. Unfortunately, this information could not be included because it only covers static analyses of the status quo and does not cover the *changes* due to the transition.

[487] LfL (2012) provide one-off investment costs per productive sow that are needed to fulfil the absolute minimum in farms that cannot/do not want to shoulder long-term investments. In order to obtain percent changes in total costs per kg carcass weight of slaughter pig, these costs were converted to constant annual payments. The assumptions made for the calculation are: depreciation over 10 years, interest rate 4 %, 27,6 weaned piglets per sow, piglets are sold at costs = price, no losses in the fattening stage, carcass Grade E, slaughter weight 120 kg, killing out 79 %. As an approximation of baseline total production costs, a 5-year average (2007-2011) of market prices in DE from the Meat Market Observatory (European Commission 2022e) was used.

[488] In the first two cases, the transition is accompanied by a reduction in the number of sows. In consequence, opportunity costs due to foregone revenue are expected but no quantitative data is given.

		Producers				
Source	Source type	**farm type / modification / technology**	**floor area / floor properties in group housing**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
		- / transformation of old building / free access stalls without lock				**+ 0,5 %*** (DE) [per kg carcass weight of slaughter pig
Krieter (2002)	peer-reviewed, theoretical scenarios	farrow-to-finish (vertical integration) / - / ESF	- / fully slatted	labour, investment incl. repairs (- years)	interval weaning to first estrus, rebreeding rate, number of piglets born alive	**- 0,2 %*** (DE) [per kg carcass weight of slaughter pig]
Gourmelen et al. (2001)	report, theoretical scenarios	farrow-to-finish / new building / trickle feeder	- / fully and partially slatted	labour, capital, depreciation (20 years)	number of stillborn piglets	**0 % to + 0,4 %*** (FR) [per kg carcass weight of slaughter pig]
		farrow-to-finish / transformation of old building / trickle feeder	- / partially slatted	labour, capital, depreciation (20 years), disinvestment (10 years)		**+ 1,0 %*** (FR) [per kg carcass weight of slaughter pig]
Rousseau and Salaün (1998)	report, theoretical scenarios	farrow-to-finish / new building / trickle feeder	- / slatted	labour, capital, depreciation (12 years)	none	**+ 0,5 %*** (FR) [per kg carcass weight of slaughter pig]
		farrow-to-finish / new building / free access stalls				**+ 1,1 %*** (FR) [per kg carcass weight of slaughter pig]
		farrow-to-finish / transformation of old building / -				**+ 1,5 %*** (FR) [per kg carcass weight of slaughter pig]

		Producers				
		farm type / modification / technology	**floor area / floor properties in group housing**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Source	**Source type**					
Backus et al. (1997)	report, observational case studies	experimental unit / new building / free access stalls	- / partially slatted	labour, investment, feed, water, manure disposal costs, energy	interval weaning to insemination	**+ 0,6 %*** (NL) [per kg carcass weight of slaughter pig]
		experimental unit / new building / ESF	- / partially slatted			**- 0,9 %*** (NL) [per kg carcass weight of slaughter pig]
		experimental unit / new building / trickle feeder	- / partially slatted			**- 0,1 %*** (NL) [per kg carcass weight of slaughter pig]

*Own calculations based on data from the source.

Provisions in total

		Producers	
		provisions that entailed costs (in the MS)	**total costs** (% change compared to BAU) [per unit of final product]
Source	**Source type**		
Menghi et al. (2014)	report, typical farm approach	group housing (DE, DK, NL) slatted floor (DE, DK, NL) high-fibre diet (DE, DK, NL, PL) manipulable material (DE, DK, NL, PL)	**+ 0,65 %** (DK) **+1,93 %** (NL) **+ 2,17 %** (DE) **+ 3,55 %** (PL) [per kg carcass weight of slaughter pig]

Rayment et al. (2010)	report, various approaches	-	**2 %** (EU average) [per kg carcass weight of slaughter pig]

Laying hens directive: cost of compliance estimates

Ban of unenriched cages

		Producers[489]				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Horne and Bondt (2003)	report, theoretical scenarios	enriched cage	transition from conventional cages (450 cm²/hen) to enriched cages, new building**	labour, housing, feed, general costs, other variable costs (litter material, electricity etc.)	none	**+ 13 %** (average of NL, FR, DE, ES, IT, UK) [per kg egg]
		aviary	transition from conventional cages (450 cm²/hen) to aviary system, new building**	labour, housing, feed, purchase of hen, general costs, other variable costs (litter material, electricity etc.)	number of eggs/hen, revenue for spent hen (due to mortality)	**+ 21 %** (average of NL, FR, DE, ES, IT, UK) [per kg egg]
Welsh Parliament (2002)	report, theoretical scenarios	enriched cage	transition from conventional cages (450 cm²/hen) to new enriched cages (20 % in new buildings, 30 % in existing buildings)	labour, capital, depreciation (20 years for new building, 10 years for transformation of old	none	**+ 9,9 %*** (UK) [per kg egg]

[489] "Producers" refers to farms with laying hens for egg production. The egg processing industry is not considered in the analysis

		Producers[489]				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
			transition from conventional cages (450 cm²/hen) to converted old cages (in existing buildings)	building)[490], feed, miscellaneous		**+ 13,2 %*** (UK) [per kg egg]
		free-range	transition from conventional cages (450 cm²/hen) to free-range systems with new buildings		number of eggs/hen	**+ 47,9 %*** (UK) [per kg egg]
Horne (2019)[491]	report, theoretical scenarios	enriched cage	transition from conventional cages (550 cm²/hen) to enriched cages, new building**	labour, housing (capital, depreciation, maintenance), general costs (book-keeping, clothing, insurance, manure disposal), other variable costs (litter material, electricity, veterinarian etc.)	none	**+ 6 %** (average of NL, DE, FR, ES, IT, UK, PL, DK) [per kg egg]

[490] The impact assessment published by the Welsh Parliament 2002 contains separate information on one-off investment costs and operating costs. In order to merge these costs into a single figure for total production costs, the one-off investment costs were converted to constant annual payments. The assumptions made for the calculation are: depreciation over 20 years for new buildings and over 10 years for transformation of old buildings, interest rate 5 %, one production cycle per year, production of 260 eggs/hen per year in alternative systems and 280 eggs/hen per year in cage systems (based on KTBL 1999).

[491] Further studies from the same author exist that investigate the same transitions in different years (Horne and Bondt 2017; Horne 2014; Horne 2012). The results only differ marginally and are not reported separately.

		Producers[489]				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
		barn/aviary	transition from conventional cages (550 cm²/hen) to barn or aviary system, new building**	labour, housing (capital, depreciation, maintenance), feed, purchase of hen, general costs (book-keeping, clothing, insurance, manure disposal), other variable costs (litter material, electricity, veterinarian etc.)	number of eggs/hen, revenue for spent hen (due to mortality)	**+ 23 %** (average of NL, DE, FR, ES, IT, UK, PL, DK) [per kg egg]
Damme (2008)	report, theoretical scenarios	aviary	transition from conventional cages (550 cm²/hen; hens > 2 kg: 690 cm²/hen) to the indicated system, new building**	labour, capital, depreciation (20 years for buildings, 10 years for equipment, repairs), feed, purchase of hen, other variable costs	number of eggs/hen, mortality	**+ 31,1 %*** (DE) [per kg egg]
		barn				**+ 47,5 %*** (DE) [per kg egg]
		free-range (building: aviary)				**+ 42,6 %*** (DE) [per kg egg]
		free-range (building: barn)				**+ 62,3 %*** (DE) [per kg egg]
AGRA CEAS (2004)	report, theoretical scenarios	barn	transition from conventional cages (550 cm²/hen) to barn system, new building**	labour, depreciation (10 years for buildings and equipment), feed, purchase of hen, other variable costs (medication, veterinarian, manure disposal, insurance, water, electricity etc.)	number of eggs/hen, mortality	**+ 26 %** (weighted EU-15 average based on relative size of national egg sector) [per kg egg]

		Producers[489]				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
		free-range	transition from conventional cages (550 cm²/hen) to free-range system, new building**	labour, depreciation (10 years for buildings and equipment), land rent, feed, purchase of hen, other variable costs (medication, veterinarian, manure disposal, insurance, water, electricity etc.)	number of eggs/hen, mortality	**+ 45 %** (weighted EU-15 average based on relative size of national egg sector) [per kg egg]
Damme (2001)	report, theoretical scenarios	enriched cage	transition from conventional cages (550 cm²/hen) to enriched cages, new building**	labour, capital, depreciation (20 years for buildings, 10 years for equipment, repairs), feed, purchase of hen, other variable costs	number of eggs/hen, mortality	**+ 14,8 %*** (DE) [per kg egg]
		aviary	transition from conventional cages (550 cm²/hen) to aviary system, new building**			**+ 18,7 %*** (DE) [per kg egg]
		barn	transition from conventional cages (550 cm²/hen) to barn system, new building**			**+ 44,5 %*** (DE) [per kg egg]

*Own calculations based on data from the source.

** The source provides a comparison of total production costs in different systems at the same point in time. This corresponds to the construction of a new building without disinvestment.

Additional requirements for unenriched cages during the transitional period

		Producers			
Source	**Source type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Horne (2019)[492]	report, theoretical scenarios	increase in space allowance from 450 cm²/hen to 550 cm²/hen	housing (not further specified)	not specified	**+ 3,8 %*** (EU) [per kg egg]
Welsh Parliament (2002)	report, theoretical scenarios	extension of cage front (to increase space allowance from 450 cm²/hen to 550 cm²/hen)	labour, capital, depreciation (10 years)[493], feed, services incl. maintenance	none	**+ 4,8 %*** (UK) [per kg egg]
AGRA CEAS (2004) based on LEI research data[494]	report, theoretical scenarios	increase in space allowance from 450 cm²/hen to 550 cm²/hen	housing (not further specified), feed	none	**+ 5,3 %*** (NL) [per kg egg]
			housing (not further specified), feed	number of eggs/hen, ratio of Grade B eggs, mortality	**+ 9,3 %*** (NL) [per kg egg]

[492] Further studies from the same author exist that investigate the same transition in different years (Horne and Bondt 2017; Horne 2014; Horne 2012). The results only differ marginally and are not reported separately.

[493] The impact assessment published by the Welsh Parliament (2002) contains separate information on one-off investment costs and operating costs for the option of fitting cages with front extensions. In order to merge these costs into a single figure for total production costs, the one-off investment costs were converted to constant annual payments. The assumptions made for the calculation are: depreciation over 10 years for investment in cage front extension, interest rate 5 %, one production cycle per year, production of 280 eggs/hen per year (based on KTBL 1999). Furthermore, the impact assessment describes a scenario where one hen per cage is removed in order to increase space allowance per hen. It is assumed that the removed hens would be rehoused in enriched cages (50 %) and in free-range systems (50 %). The cost changes for these transitions are included in the Annex section 6.2.2.

[494] The research data was unpublished at the time and was published only in Dutch later on.

		Producers			
Source	**Source type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Elson (2004)	literature review	increase in space allowance from 450 cm²/hen to 550 cm²/hen	not specified	not specified	**+ 4,0 %** (EU) [per kg egg]
Damme (2001) based on industry data	report, theoretical scenarios	increase in space allowance from 450 cm²/hen to 550 cm²/hen	not specified	not specified	**+ 6,7 %*** (EU) [per kg egg]
Glatz (2002)[495]	peer-reviewed, literature review	abrasive tape strip	material	not specified	**+ 0,2 %*** (UK) [per kg egg]
		abrasive compound for baffle plates	costs of fitting cages with the devices		**+ 0,3 %*** (UK) [per kg egg]
		metal plates with abrasive iron filings			**+ 0,7 %*** (UK) [per kg egg]

*Own calculations based on data from the source.

Alternative systems

		Producers				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
Welsh Parliament	report, theoretical	barn	new building (reduced stocking density: 9	labour, capital, depreciation (20 years for	none	**+ 8,0 %*** (UK) [per kg egg]

[495] Glatz (2002) provides estimates for one-off investment costs that were converted to constant annual payments under the following assumptions: depreciation over 3 years, interest rate 5 %, one production cycle per year, production of 280 eggs/hen per year (based on KTBL 1999). In order to calculate a percentage term, baseline production costs from Welsh Parliament (2002) were used.

		Producers				
Source	**Source type**	**system type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (% change compared to BAU) [per unit of final product]
(2002)	scenarios		hens/m² instead of 12 hens/m²)	new building, 10 years for transformation of old building)[496], feed, miscellaneous		
			transformation of old building (installation of verandas to reduce stocking density from 12 to 9 hens/m²)			**+ 10,4 %*** (UK) [per kg egg]
		free-range	new building (reduced stocking density: 9 hens/m² instead of 12 hens/m²)			**+ 8,4 %*** (UK) [per kg egg]
			transformation of old building (installation of verandas to reduce stocking density from 12 to 9 hens/m²)			**+ 10,4 %*** (UK) [per kg egg]
Damme (2001) based on industry data	report, theoretical scenarios	barn	reduction of stocking density from 12 to 9 hens/m²	not specified	not specified	**+ 9,4 %*** (EU) [per kg egg]

*Own calculations based on data from the source.

Beak trimming

		Producers			
		modification	**cost items** affected by transition	**revenue items** affected by	**total costs**

[496] The impact assessment published by the Welsh Parliament (2002) contains separate information on one-off investment costs and operating costs. In order to merge these costs into a single figure for total production costs, the one-off investment costs were converted to constant annual payments. The assumptions made for the calculation are: depreciation over 20 years for new buildings and over 10 years for transformation of old buildings, interest rate 5 %, one production cycle per year, production of 260 eggs/hen per year (based on KTBL 1999).

Source	Source type			transition and included as opportunity costs	(% change compared to BAU) [per unit of final product]
Horne (2019)[497]	report, theoretical scenarios	age restriction (< 10 days) for beak trimming	feed	mortality	**+ 1,2 %*** (EU average) [per kg egg]

Provisions in total

		Producers	
Source	**Source type**	**provisions** that entailed costs	**total costs** (% change compared to BAU) [per unit of final product]

[497] Further studies from the same author exist that investigate the same transition in different years (Horne and Bondt 2017; Horne 2014; Horne 2012). The results only differ marginally and are not reported separately.

Horne (2019)[498]	report, theoretical scenarios	- beak trimming - stocking density of 550 cm² during the transitional period - ban of unenriched cages, instead: enriched cages	**+ 12,7 %*** (EU average) [per kg egg]
Rayment et al. (2010)	report, various approaches	not specified	**+ 9 %** (EU average) [per kg egg]
Welsh Parliament (2002)	report, theoretical scenarios	- stocking density of 550 cm² during the transitional period - ban of unenriched cages, instead: rehousing in enriched cages (50 %) and free-range systems (50 %) - alternative systems	**+ 13,5 %*** (UK)[499] [per kg egg]

*Own calculations based on data from the source.

[498] Further studies from the same author exist that investigate the effects of the Laying Hens Directive in different years (Horne and Bondt 2017; Horne 2014; Horne 2012). The results only differ marginally and are not reported separately.

[499] The impact assessment published by the Welsh Parliament (2002) provides an estimate of annual compliance costs of £46 million for the UK. In order to calculate a percentage term, figures for total production costs were derived from the same study by merging one-off investment costs (converted to constant annual payments) and operating costs for the different systems according to their share in national production. The assumptions made for the calculation are: depreciation over 20 years, interest rate 5 %, one production cycle per year, production of 260 eggs/hen per year in alternative systems and 280 eggs/hen per year in cage systems (based on KTBL 1999).

Broilers directive

Provisions in total

		Producers	
Source	Source type	**provisions** that entailed costs (in the MS)	**total costs** (% change compared to BAU) [per unit of final product]
Horne (2018)	report, theoretical scenarios	stocking densities	**+ 0,2 %** (EU) [per kg **live weight** of broiler]
Menghi et al. (2014)	report, typical farm approach	stocking densities (FR, DE)[500] light intensity (FR, DE) indoor climatic conditions (ventilation, air cooling) (FR, DE, IT)	**+ 0 % to + 0,89 %** (FR) **+ 0,66 % to + 1,49 %** (DE) **- 1,22 %** (IT) [per kg slaughter weight]
Rayment et al. (2010)	report, various approaches	not specified	**1,25 %** (EU average) [per kg slaughter weight]

[500] In Germany, the stocking density of 42 kg/m² was not permitted under any circumstances due to national legislation (gold-plating; Tierschutz-Nutztierhaltungsverordnung 2009) but Menghi et al. (2014) still attribute costs due to the reduction from 42 to 39 kg/m² to EU legislation which is not in line with the approach followed in this CBA. The individual cost items could not be extracted separately from the study by Menghi et al. (2014).

		Producers		
Source	Source type	**provisions** that entailed costs (in the MS)	**total one-off costs** [Mio. €]	**total recurrent costs** [Mio. €/year]
FCEC (2017)	report, stakeholder survey	FI: not specified in detail but incl. fees for slaughterhouse monitoring	**6,0 Mio. €/year** (uncertain whether annualised one-off or recurrent costs)	
		NL: not specified in detail ("annual administrative and production costs") but excl. costs due to stocking densities	**2,7 Mio. €/year** (uncertain whether annualised one-off or recurrent costs)	
		DK, IT, ES, FR: not specified	minor costs	
BR-Drs. 399/09	report, ex-ante impact assessment	DE: administrative costs (on-farm record keeping)	negligible	**0,12**
DEFRA (2017) and DEFRA (2014)[501]	report, ex-post implementation review	lighting, ventilation, skylights/windows, environmental monitoring	**18,0**[502]	**-**
		training	**0,6**	**-**
		sum	**∑ = 18,6**	**-**
DEFRA	report, ex-ante	Annex I: lighting	**1,9**[504]	**0,6**

[501] The costs given by DEFRA (2017) related to reducing stocking densities from > 39 kg/m² are not reported here because a max. stocking density of 39 kg/m² was gold-plated in the UK and this is not considered as attributable to EU legislation in this analysis.

[502] All calculations for DEFRA (2017) are based on the average exchange rate in 2011: 1 £ = 1,1527 € (Office for National Statistics 2021) because figures were displayed for 2011.

		Producers		
(2010a)[503]	impact assessment	Annex II: NH_3, humidity, temperature, additional documentation	**9,7**	**0,2**
		training	**2,4**	**0,5**
		administrative costs (register stocking density)	**0,009**	**-**
		sum	**∑ = 14,0**	**∑ = 1,3**

[504] All calculations for DEFRA (2010a) are based on the average exchange rate in 2009: 1 £ = 1,1233 € (Office for National Statistics 2021).

[503] The costs given by DEFRA (2010a) related to reducing stocking densities from > 39 kg/m² are not reported here because a max. stocking density of 39 kg/m² was gold-plated in the UK and this is not considered as attributable to EU legislation in this analysis.

Calves directive

Confinement, size/properties of individual pens, floor area for group housing

		Producers			
Source	**Source type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity cost	**total costs** (% change compared to BAU) [per unit of final product]
SVC (1995)	report, theoretical scenarios	transition from individual pens (0,7 x 1,7 m) to individual pens (0,81 x 1,8 m)[505], new building**	investment costs: capital, depreciation (20 years for buildings, 10 years for equipment), maintenance	none	**+ 1,0 %*** (EU) [per kg carcass weight of veal calf]
		transition from individual pens (0,7 x 1,7 m) to individual pens (0,81 x 1,8 m), extension of existing building (no change in herd size)			**+ 1,3 %*** (EU) [per kg carcass weight of veal calf]
		transition from individual pens (0,7 x 1,7 m) to individual pens (0,9 x 1,8 m)[506], new building**			**+ 1,5 %*** (EU) [per kg carcass weight of veal calf]
		transition from individual pens (0,7 x 1,7 m) to individual pens (0,9 x 1,8 m), extension of existing building (no change in herd size)			**+ 2,1 %*** (EU) [per kg carcass weight of veal calf]

[505] According to the review of animal heights by Weiß (2018), the pen width of 0,81 m would allow for the accommodation of Friesian Holstein calves until the age of 4 weeks.

[506] According to the review of animal heights by Weiß (2018), the pen width of 0,9 m would allow for the accommodation of Friesian Holstein calves until the age of 8 weeks.

		Producers			
Source	**Source type**	**modification**	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity cost	**total costs** (% change compared to BAU) [per unit of final product]
		transition from individual pens (0,7 x 1,7 m) to group housing (1,5 m²/calf), new building**			**+ 1,0 %*** (EU) [per kg carcass weight of veal calf]
		transition from individual pens (0,7 x 1,7 m) to group housing (1,5 m²/calf), transformation of existing building (16 % increase in herd size)		number of calves	**+ 2,3 %*** (EU) [per kg carcass weight of veal calf]
Bertrand and Martineau (1995)	report, theoretical scenarios	transition from individual pens (0,65 x 1,8 m) to individual pens (0,81 x 1,8 m), new building** (no change in herd size)	investment costs: capital, depreciation (15 years for buildings, 7 years for equipment)	none	**+ 0,5 %*** (FR) [per kg carcass weight of veal calf]
		transition from individual pens (0,65 x 1,8 m) to individual pens (0,81 x 1,8 m), new building** (20 % decrease in herd size)		number of calves	**+ 1,6 %*** (FR) [per kg carcass weight of veal calf]
		transition from individual pens (0,65 x 1,8 m) to group housing (1,5 m²/calf), new building** (no change in herd size)	investment costs: capital, depreciation (15 years for buildings, 7 years for equipment), veterinary costs	mortality	**+ 1,1 %*** (FR) [per kg carcass weight of veal calf]

*Own calculations based on data from the source.

** The source provides a comparison of total production costs in different systems at the same point in time. This corresponds to the construction of a new building without disinvestment.

shadowed in grey: transition to group housing

Provisions in total

		Producers		
Source	**Source type**	**farm type**	**provisions** that entailed costs (in the MS)	**total costs** (% change compared to BAU) [per unit of final product]
Menghi et al. (2014)	report, typical farm approach	dairy	calf housing[507] (DE)	**+ 0,26 % to + 0,78 %** (DE) **+ 0 %** (IE) **+ 0 %** (NL) **+ 0 %** (FI) [per kg milk]
		beef	none[508]	**+ 0 %** (FR, IT, UK) [per kg carcass weight of beef]
Rayment et al. (2010)	report, various approaches	veal	group housing (EU)	**+ 5 %** (EU average) [per kg carcass weight of veal calf]

[507] Menghi et al. (2014) do not provide further details on what they summarise under 'calf housing'. Most likely they refer to: size and properties of individual pens, group housing (incl. tactile contact to neighbours), requirements for light, air and ventilation.

[508] The requirements of the Calves Directive corresponded to BAU for the typical beef fattening farms in FR, IT and UK that were analysed by Menghi et al. (2014). Beef farms receive calves either as weaners (ca. 14 days of age) or after an intermediate rearing phase at an age of up to ca. 4 months.

Transport directive: cost of compliance

		Transport companies			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (change in % or € compared to BAU) [per unit]
Baltussen et al. (2011)	report, theoretical scenarios	properties of means of transport by road	investment costs (depreciation period not specified)[509]: insulated roof, drinking devices with tanks, systems for heating drinking water, artificial ventilation facility, satellite navigation system (incl. temperature measurement and monitoring)	none	example journey pigs from DK to DE: **+ 0,8 %** [per journey] example journey cattle from FR to IT: **+ 0,6 %** [per journey]
		journey log	labour (filling in data, submission to competent authority)		**+ 21,49 €** (EU-27)[510] [per journey] example journey cattle from FR to IT: **+ 0,7 %*** [per journey]

[509] Furthermore, Baltussen et al. (2011) do not specify whether their estimates apply to conversions of existing vehicles or to the purchase of new vehicles.

[510] range: + **1,37 €** (BG) to + **25,21 €** (FR) [per journey].

		Transport companies			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (change in % or € compared to BAU) [per unit]
		certificate of approval of means of transport	labour (compilation of documents, inspection of vehicle)		**+ 26 €** (EU-27)[511] [per vehicle]
		authorisation of transporters	labour (application procedure)		**+ 515 €** (EU-27)[512] [per application]
	report, stakeholder survey	training and certification of staff	not specified	not specified	**+ 479 €** (MS not specified)[513] [per person]
DEFRA (2006)	report, theoretical scenarios	properties of means of transport by road: all vehicles	adjustment of ramp angles for existing vehicles[514]	none	**+ 370 € to + 15 000 €*** (UK)[515] [per vehicle]
		properties of means of transport by road:	conversion of existing vehicles[516]: mechanical ventilation, satellite		**+ 2 600 € to + 18 000 €*** (UK)

[511] range: + **1,65 €** (BG) to + **30 €** (FR) [per vehicle].

[512] range: + **33 €** (BG) to + **605 €** (FR) [per vehicle].

[513] range: + **55 € to** + **1500 €** [per person].

[514] For new vehicles, no relevant impact on costs is expected if ramps are built with shallower angles (DEFRA 2006).

[515] Assumption for all calculations: average exchange rate in 2006: 1 £ = 1,467 € (Office for National Statistics 2021).

		Transport companies			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (change in % or € compared to BAU) [per unit]
		vehicles for long distance journeys	navigation system, temperature monitoring, other		[per vehicle]
		certificate of approval of means of transport	inspection fee		**+ 220 €*** (UK) [per vehicle]
		training and certification of staff: journeys < 8 h	test, certification procedure		**+ 60 €*** (UK) [per person]
		training and certification of staff: long distance journeys	test, certification procedure		**+ 150 €*** (UK) [per person]
		authorisation of transporters	application procedure, application fee		**+ 80 €*** (UK) [per application]
Wagenberg et al. (2015)	report, theoretical scenarios	-	<u>damage during transport to slaughter:</u> - *lameness:* labour (slaughter on arrival) - *other severe issues:* labour (slaughter on arrival) - *death:* disposal costs	<u>damage during transport to slaughter:</u> - *wounds*: carcass value (trimming) - *lameness:* carcass value (trimming) - *death:* carcass value	<u>adult cattle / finishing pig:</u> *wounds:* **+ 36 € / + 0,60 €** (EU) *lameness:* **+ 37 € / + 13 €** (EU) *other severe issues:* **+ 2 € / + 2 €** (EU) *death:* **701 € / 135 €** (EU) [per affected animal]
			<u>damage during transport to farm:</u> - *lameness:* disposal costs (cull on arrival) - *other severe issues:* disposal	<u>damage during transport to farm:</u> - *lameness:* animal value (cull on arrival) - *other severe issues:* weight gain	<u>old calf / young calf / piglet:</u> *lameness:* **+ 894 € / + 134 € / + 42 €** (EU) *other severe issues:*

[516] DEFRA (2006) do not provide information on additional costs for new vehicles.

		Transport companies			
Source	**Source type**	**provisions** that entailed costs	**cost items** affected by transition	**revenue items** affected by transition and included as opportunity costs	**total costs** (change in % or € compared to BAU) [per unit]
			costs (cull on arrival) or separation for healing (labour) - *death:* disposal costs	(healing process) - *death:* animal value	**+ 450 € / + 67 € / + 21 €** (EU) *death:* **+ 894 € / + 134 € / + 42 €** (EU) [per affected animal]

*Own calculations based on data from the source.

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