Council of the
European Union

Brussels, 8 December 2023
(OR. en)

16405/23
ADD 5

Interinstitutional File:
2023/0448(COD)

VETER 110
AGRI 792
AGRILEG 338
CODEC 2409
IA 357

COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	7 December 2023
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2023) 401 final
Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the protection of animals during transport and related operations, amending Council Regulation (EC) No 1255/97 and repealing Council Regulation (EC) No 1/2005

Delegations will find attached document SWD(2023) 401 final.

Encl.: SWD(2023) 401 final

EUROPEAN
COMMISSION

Brussels, 7.12.2023
SWD(2023) 401 final

PART 2/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the protection of animals during transport and related operations, amending Council Regulation (EC) No 1255/97 and repealing Council Regulation (EC) No 1/2005

{COM(2023) 770 final} - {SEC(2023) 397 final} - {SWD(2023) 399 final} - {SWD(2023) 402 final}

Contents

ANNEX 1: PROCEDURAL INFORMATION 4
1. LEAD DG, DECIDE PLANNING/CWP REFERENCES 4
2. ORGANISATION AND TIMING 4
3. CONSULTATION OF THE RSB 4
4. EVIDENCE, SOURCES AND QUALITY 8
ANNEX 2: STAKEHOLDER CONSULTATION (SYNOPSIS REPORT) 10
ANNEX 3: WHO IS AFFECTED AND HOW? 22
1. PRACTICAL IMPLICATIONS OF THE INITIATIVE 22
2. ADMINISTRATIVE AND ADJUSTMENT COSTS (ONE-IN, ONE-OUT) 22
SUMMARY OF COSTS AND BENEFITS 23
3. RELEVANT SUSTAINABLE DEVELOPMENT GOALS 25
ANNEX 4: ANALYTICAL METHODS 27
1. BASELINE 27
2. METHODOLOGY AND MODELS 27
2.1. Identification of potential impacts and indicators used 27
2.2. Multi-Criteria Decision Analysis (MCDA) 28
2.3. Supply chain analysis 30
2.4. Assessment of cumulative impacts on production levels and consumer prices with the Agricultural Commodity Market Model (by JRC) 33
2.5. Costs and benefits 39
2.6. Assessment of food affordability 39
2.7. Comparison of the options and of the packages of options 52
3. SOURCES AND CHALLENGES 52
4. CORRELATION TABLES WITH EXTERNAL STUDY FOR THE MCDA 55
5. SENSITIVITY ANALYSIS 58
ANNEX 5: COMPETITIVENESS CHECK 62
1. OVERVIEW OF IMPACTS ON COMPETITIVENESS 62
2. SYNTHETIC ASSESSMENT 62
2.1. Cost and price competitiveness 62
2.2. International competitiveness 64
2.3. Capacity to innovate 67
2.4. SME competitiveness 68
ANNEX 6: SME TEST 69
ANNEX 7: EFSA OPINIONS 72
EFSA'S MAIN RECOMMENDATIONS ON THE WELFARE OF ANIMALS DURING TRANSPORT: 72

Space allowance during transport 73
Transport Poultry: 77
Transport Rabbits: 79
Specific means of transport: 80
ANNEX 8: OTHER EU LEGISLATION AND POLICIES 82
ANNEX 9: DETAILED IMPACT ASSESSMENT 85
3. JOURNEY TIMES AND SPACE ALLOWANCE 85
3.1.1. Background and non-action scenario 87
3.1.2. Animal welfare impacts 87
3.1.3. Economic impacts 88
3.1.4. Social impacts 93
3.1.5. Environmental impacts 93
3.2. EXPORTS 93
3.2.1. Background and non-action scenario 94
3.2.2. Animal welfare impacts 95
3.2.3. Economic impacts 96
3.2.4. Social impacts 100
3.2.5. Environmental impacts 100
3.3. TRANSPORT OF UNWEANED CALVES 101
3.3.1. Background and non-action scenario 101
3.3.2. Animal welfare impacts 103
3.3.3. Economic impacts 103
3.4. HOT TEMPERATURES 106
3.4.1. Background and non-action scenario 107
3.4.2. Animal welfare impacts 108
3.4.3. Economic impacts 108
3.4.4. Social impacts 109
3.4.5. Environmental impacts 110
3.5. NEW TECHNOLOGIES 110
3.5.1. Background and non-action scenario 110
3.5.2. Animal welfare impacts 111
3.5.3. Economic impacts 111
3.5.4. Social impacts 112
3.5.5. Environmental impacts 112
3.6. TRANSPORT OF CATS AND DOGS 113

3.6.1. Background and non-action scenario 113
3.6.2. Animal welfare impacts 114
3.6.3. Economic impacts 115
3.6.4. Social impacts 116
3.6.5. Environmental impacts 117

ANNEX 1: PROCEDURAL INFORMATION

1. LEAD DG, DECIDE PLANNING/CWP REFERENCES

The Directorate for Health and Food Safety (DG SANTE) is the lead DG on the initiative on the Proposal for a Regulation of the European Parliament and of the Council on the protection of **animals during transport and related operations** (repealing and replacing Council Regulation (EC) 1/2005).

The initiative has the reference **PLAN/2022/1491** in the Agenda Planning.

The initiative is in the Annex 1 of the **European Commission's Work Programme for 2023**[1] (under the heading "A European Green Deal", item 5).

The **Fitness Check of the existing animal welfare legislation**[2], which includes the Transport Regulation, was published on 4 October 2022, after it received a positive opinion from the RSB with recommendations that have been addressed.

2. ORGANISATION AND TIMING

An Inter-Service Steering Group (ISSG) was first established in May 2020 for the purpose of the Fitness Check of the existing animal welfare legislation and involved representatives from several Commission' services: DG AGRI, DG INTPA, DG ENV, DG JUST, DG MARE, DG MOVE, DG NEAR, DG TRADE, DG RTD, DG JRC, Legal Service and the Secretariat General.

The mandate of the existing ISSG was amended to also cover the work on the revision of the animal welfare legislation, which included transport. The ISSG met on 12 December 2022, 19 January 2023, 20 February 2023, 27 March 2023 and 9 June 2023. The members of the ISSG were regularly informed on the progress of the initiative and invited to relevant meetings.

3. CONSULTATION OF THE RSB

An **upstream meeting** with the Regulatory Scrutiny Board (RSB) was held on 3 October 2022. At the meeting, the Commission introduced the initiative and its objectives, as well as the methodological challenges (e.g. unquantifiable benefits, lack of data, timing of certain scientific input, as well as uncertainties related to food security).

This Impact Assessment Report, covering the initiative on the protection of animals during transport, was submitted to the RSB on 30 October 2023 and benefitted from a written

---

[1] European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Commission work programme 2023, A Union standing firm and united*, COM(2022) 548 final, 2022, Annex 1.

[2] European Commission, *Commission Staff Working Document, Fitness Check of the EU Animal Welfare Legislation,* 2022, SWD/2022/0328 final, p. 52.

procedure. The RSB opinion was received on 17 November 2023. The RSB gave a positive opinion with reservations, based on the following findings:

(1) The analysis of costs and benefits is not clearly presented.

(2) The analysis of impacts on competitiveness and the distributional impacts in the supply chain, including on producers and consumers, is not sufficiently comprehensive.

(3) The comparison of options is not sufficiently clear.

The table below lists the changes made to the Impact Assessment Report in response to the detailed recommendations of the RSB in its opinion:

Table 1: RSB recommendations

RECOMMENDATIONS OF THE RSB	**MODIFICATIONS IN THE IMPACT ASSESSMENT REPORT IN RESPONSE TO THESE RECOMMENDATIONS**
(1) The report should complete and better substantiate the impact analysis. It should better explain how the costs were calculated so that the costs of the measures and the packages of options are presented in all their components and as totals. In particular, the supply chain and distributional analysis should be more comprehensive and include the acknowledged effects on the whole supply chain. The report should make an effort to quantify the effects of market dynamics and regional patterns which affect the price of products and hence producers. It should further develop the assessment of distributional effects on affected stakeholders and clearly present which sectors, regions or Member States would be most impacted. It should be clearer where and to what extent the costs are likely to be passed on to consumers in the different sectors. Annex 3 should be completed in line with the above, to include the implications for consumers, as well as to complete the cost-benefit tables in accordance with the supply-chain analysis and to include the estimations of costs and benefits for all impacted actors. It should include the impact	Section 6 and Annex 3 have been completed to better substantiate the impact analysis, and to better explain how costs were calculated, how these costs are distributed and how these costs might be passed on to consumers. The supply chain analysis has been made more comprehensive to better take account of impacts on farms and slaughterhouses. The distributional analysis was elaborated upon to better describe the impacts on different sectors. To the extent possible the effects on market dynamics and regional patterns have been quantified in the external study on the modelling of policy options for the protection of animal welfare during transport. The cost-benefit table in Annex 3 has been updated accordingly.

of all measures included in the preferred package.	
(2) The overall impact on competitiveness should be more explicit regarding the costs faced by the different actors. The scoring of cost and price competitiveness should be reviewed in this light in the Competitiveness Check presented in Annex 5. The ability of the cost-bearing actors to afford the necessary investments should be discussed, in particular where costs are unlikely to be passed on through the supply chain. The report should better explain the relation between the economic costs generated by the proposal and the relatively low reported impact on consumer prices and food affordability.	Annex 5 was reviewed to be more explicit regarding the costs faced by the different actors to ensure consistency with the scores allocated and to align it with the updated modelling results based on the more comprehensive supply chain analysis referred to above. The extent to which operators would be able to afford the necessary investments has been clarified. Furthermore, the relation between the economic costs generated by the proposal and the relatively low reported impact on consumer prices and food affordability has been explained.
(3) The report should better explain the methodology for scoring the impacts. This is particularly important where ranking of options is based on relatively small differences in the total scores. The impact scoring tables and the associated discussions in section 6 should be substantiated with the relevant cost or benefit estimations, systematically complementing scores with the relevant quantitative data, and ensuring their consistency with the key estimates.	The report mentions in Section 6 more clearly that a MCDA has been performed to score the impacts and links to the Annex 4 where the detailed methodology is presented. Section 6 was also revised to present more clearly the costs and benefits estimations underlying the scores allocated to the different impacts.
(4) The report should be clear as to the policy choices and trade-offs as regards alternative options. The report should provide an adequate justification for the cases in which only one choice is offered on measures, or on parameters such as transition periods. It should for example inform whether stakeholders concurred with the finding of having only one option. The report should clarify the assessment of those measures with an impact such as space allowance for specific sectors, including its potential	The policy choices and trade-offs were clarified. Further justification has been provided in Section 5.3 as regards discarded options to justify cases where no alternative option or parameter is assessed. The presentation of stakeholders' views on the options considered has been strengthened in Section 6 where the impacts are presented. Section 6.1. on the impacts of the options on journey times and space allowance was

impact on the environment. In general, the assessment of environmental impacts and coherence with climate and environmental objectives should be clarified for all options.	clarified to present the impacts on different sectors. The assessment of the environmental impacts was revised across the Section 6. The comparison of the options in terms of coherence was also strengthened across the Section 7.
(5) The report should better compare the options packages and explain the methodology behind their scoring. The report should complement the scores in the tables with the relevant and more granular cost and benefit data, so that the comparison of packages in terms of effectiveness, efficiency, coherence and proportionality becomes clearer. This is in particular important for measures without alternative options. The report should provide further clarification on the relationship of the scoring of measures with the cost benefit analysis on one side, and the scoring of option packages on the other, and indicate clearly what is the basis for the scoring in each case, how they are related and whether the scoring of packages takes other factors into account, and how. The parameters used in the comparison of the two packages in terms of effectiveness, efficiency, coherence and proportionality should be adequately explained. The total costs and benefits of the preferred package should be clearly presented. The report should make further use of stakeholders' views, including diverging ones, in the comparison of options and in justifying the preferred option. The proportionality assessment of the preferred package should be further developed and substantiated by the preceding analysis.	The scores allocated in the comparison of the packages were revised to ensure consistency with the comparison of the options (Section 7.1. to 7.6.) and their impacts (Sections 6.1. and 6.2) and are further explained with a revised text including in terms of proportionality. The comparison of the measures without alternative options was clarified (Sections 7.3. and 7.4.) and combined with other options where needed (Section 7.1.). The description of the total costs and total benefits of the packages was reinforced in relevant parts of the document. The total costs and benefits of the preferred package are presented in Section 6.2.1. Stakeholders' views are presented into more details in Section 6, including diverging views.
(6) The report should ensure the consistency of figures and scores reported. The metrics of the impacts should be clarified. In particular, the report should explain why a time horizon of 5 years is indicated in relation to the	The report was checked to ensure consistency of figures and scores reported. The time horizon of 5 years has been clarified in Section 6.2.1.

impacts and how costs will develop after this time horizon.	

4. EVIDENCE, SOURCES AND QUALITY

The Impact Assessment Report has built on the **Fitness Check** of the EU animal welfare legislation as well as new scientific evidence on animal welfare, in particular the **EFSA recommendations listed in Annex 7**.

The Impact Assessment Report takes into account the input from stakeholders, including the feedback on the **Inception Impact Assessment**[3] (IIA) and the contributions to the **Public Consultation**[4] (PC). The IIA, covering both the fitness check and the impact assessment, was published on 6 July 2021 and open for feedback until 24 August 2021. The PC, also covering both the fitness check and the impact assessment, ran from 15 October 2021 to 21 January 2022.

An **external study**[5] supporting the impact assessment accompanying the initiative on the welfare of animals during transport was carried out. This study gathered information and data on impacts and costs for stakeholders of the initially proposed measures and options (it should be noted that some measures presented in this impact assessment report deviate from the measures that were originally assessed in the external supporting study), and further documented six case studies. Views from stakeholders gathered during the targeted consultation activities (surveys, interviews, focus groups, workshop) organised in the context of this study are presented in Annex 2.In addition, an assessment of the cumulative impacts of the two proposed packages of measures and options was made based on a supply chain analysis by external experts.

Finally, the Commission's Joint Research Centre has performed two analysis:

- the outcome of the supply chain analysis on impact on production costs was used to model impacts on production levels, consumer prices, exports and imports
- The impacts of the two packages on food security and food affordability were assessed.

As part of the supporting study, statistical sources and databases have been consulted:

- **Eurostat** (e.g. EU trade, annual enterprise statistics, labour force main indicators, etc);
- **European Commission databases or reports** (e.g. overview reports of DG SANTE Directorate for audits and analysis, Trade Control and Expert System (TRACES));

[3] Available on the European Commission Have Your Say platform : https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12950-Animal-welfare-revision-of-EU-legislation_en

[4] Available on the European Commission Have Your Say platform : https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12950-Animal-welfare-revision-of-EU-legislation/public-consultation_en

[5] European Commission, Directorate-General for Health and Food Safety, *Study supporting the Impact Assessment accompanying the revision of the EU legislation on the welfare of animals during transport,* Publications Office of the European Union, 2023, doi: 10.2875/110728. (Transport study).

- **Other European institutions or international statistical sources** (e.g. EPRS reports, European Court of Auditors reports, UN Comtrade, etc.).

ANNEX 2: STAKEHOLDER CONSULTATION (SYNOPSIS REPORT)

This synopsis report provides an overview of the results of the consultation activities carried out in the context of the Impact Assessment supporting the initiative on the protection of animals during transport.

1. CONSULTATION STRATEGY

The aims of the consultations were to:

- inform stakeholders and the public on the ongoing impact assessment.
- receive views of the public and stakeholders on possible future options; and
- to gather evidence and data regarding impacts of policy options from stakeholders.

2. IDENTIFIED STAKEHOLDERS

The initiative is relevant to a wide and varied range of stakeholders. The main categories of concerned stakeholders are:

- Business and professional organisations in the food supply chain (including in particular: farmers, transporters and meat production/processing).
- Competent authorities of the EU Member States responsible for animal transport.
- Citizens (EU and non-EU).
- NGOs active at Union level in relation to animal welfare, sustainability and environmental policies, and consumer organisations.
- Trade Unions
- Experts from academic and research institutes active in the field of animal welfare.
- European bodies, including the European Food Safety Authority (EFSA).
- International intergovernmental organisations active on animal welfare.
- Third country trading partners with the EU.

3. OVERVIEW OF CONSULTATION ACTIVITIES AND EVIDENCE GATHERED

Table 1: Overview of consultation activities carried out per stakeholder group relevant to the protection of animals during transport

Category	IIA[6]	Conference	Preliminary interviews	Targeted survey	Focus groups / workshop	PC[7]
Business operators and business associations (e.g. primary producers, transporter,	X	X	X	X	X	X

[6] Inception Impact Assessment.
[7] Public Consultation.

processor/retailer, etc).						
Public authorities	X	X	X	X	X	X
EU bodies		X	X		X	
Competent authorities in the Member States	X	X	X	X	X	X
Citizens (EU and non EU)	X					X
Civil society &NGOs	X	X	X	X	X	X
Consumer and environmental organisations	X	X	X	X	X	X
Academic/research institutions		X	X	X	X	
Intergovernmental organisations			X		X	X
Trading partners					X	X

Inception Impact Assessment

The Inception Impact Assessment[8] (IIA) on the revision of the EU legislation on animal welfare, presenting the objectives of the revision and the policy options under consideration, was published on 6 July 2021 and open for feedback until 24 August 2021. Amongst others, it covered animal welfare during transport. There was a total of 983 feedback received and additional information was provided as part of the responses of 114 organisations, including NGOs, business associations and companies / business organisations. After the screening of the feedback[9], 110 feedback were identified as belonging to four stakeholder campaigns leading to a total of 873 individual feedback. Out of these, 525 have been analysed as relevant to the protection of animals during transport in the context of the external study.

Based on the 525 individual contributions relevant to transport, the majority of feedback was received from EU citizens (428; 81.52%), followed by NGOs (43; 8.19%) and business associations (15; 2.86%) and company/business organisation (13; 2.48%). 515 contributions came from stakeholders from EU Member States, three from stakeholders from the UK and 7 from stakeholders from other third countries. There were no responses from respondents from seven Member States[10].

[8] Available on the European Commission Have Your Say platform : https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12950-Animal-welfare-revision-of-EU-legislation_en
[9] No feedback to the IIA has been moderated.
[10] Croatia, Cyprus, Hungary, Latvia, Luxembourg, Malta and Slovenia.

Interviews

As part of the external study, nine exploratory interviews were conducted to discuss the challenges with the current implementation of the Transport Regulation as well as to gather views on the proposed policy options including their impacts. The interviews were also used to gather feedback about information sources that could be consulted in the context of the study. Consulted stakeholders in this context were: competent authorities from three Member States, two NGOs, one business association, one international organisation, one academic expert and representatives of the European Commission (DG SANTE). 43 other interviews were carried out as part of the six case studies and were used to assess the impacts of the options in specific contexts. They are therefore not reported in this annex.

Survey

As part of the external study, one targeted survey was completed. It aimed to collect information on the options considered and their potential impacts. This included views on whether the options would result in adjustment costs or changes in administrative and enforcement costs. The survey targeted competent authorities (20 contributions), businesses (14 contributions) or associations representing them (19 contributions), NGOs (11 contributions) and researchers/academics (2 contributions). Two respondents replied as 'other'. 68 responses have been analysed[11].

Focus groups and workshop

As part of the external study, two focus groups and one workshop were organised in September 2022 in order to discuss the findings of the study with relevant stakeholders and gather feedback and insights.

The two focus groups gathered different types of stakeholders to ensure targeted and robust discussion:

- The first focus group brought together 22 representatives of businesses or business associations (representing transporters, breeders and producers) and 11 competent authorities from nine Member States. The discussion covered the economic impacts, focusing especially on potential costs, of the options related to transport conditions, exports to non-EU countries, the transport of vulnerable animals and monitoring.
- The second focus group brought together 17 representatives of NGOs (11) and academic or other relevant experts on animal welfare (6). The discussion covered mainly issues and impacts on animal welfare of the options on transport conditions, exports to non-EU countries, transport of vulnerable animals and monitoring.

[11] Out of the total 79 responses received, 11 responses were found to be duplicates or blank and were therefore excluded from the analysis. One response was sent via email following the closure of the survey and was included in the final sample for analysis.

The workshop gathered 80 participants representing 35 business associations (transporters, breeders, agriculture/producers) and three business organisations / companies, 17 competent authorities from 12 Member States[12], nine NGOs, five academic experts and six stakeholders from EU institutions, international organisations and non-EU countries. The analysis and main conclusions for the policy measures were presented for the participants to express views on the findings, in particular on the effectiveness of the different options considered.

Public consultation

The Public Consultation[13] (PC) on the revision of the EU animal welfare legislation ran from 15 October 2021 to 21 January 2022.

The Impact Assessment Report presents the outcomes of the analysis of the public consultation as carried out in the external study. The analysis has been performed based on 59 281 total contributions[14]. 1 546 contributions as being part of campaigns were identified.

As part of the valid individual contributions analysed (57 727), the vast majority of respondents were EU citizens (54 600 contributions; 92,12%) and non EU citizens (2 817 contributions; 4.75%). Other contributions were received from businesses (537 contributions; 0.91%) and business associations (123 contributions; 0,21%) but also from NGOs (266 contributions, 0.45%), academic/research institution (116 contributions; 0.20%), environmental organisation (92 contributions; 0.16%) and consumer organisations (11 contributions; 0.02%). 83 contributions were also received from public authorities (0.14%), trade unions (38 contributions; 0.06%) and respondents categorised as 'Other' (590 contributions, 1%).

1 546 contributions were identified as part of 10 campaigns and analysed separately. Nearly all of the respondents gave their contribution as EU and non-EU citizens (1 521 out of 1 546; 98.4%). The other respondents gave their contributions as another type of stakeholders (25 out of 1546; 1.6%), predominantly as representing an NGO (12 out of 1546; 0.8%).

Other consultation activities

A Stakeholder Conference[15] was organised on 9 December 2021. The conference provided an opportunity to elaborate on possible improvements for the future, as well as for stakeholders to validate the preliminary findings of the Inception Impact Assessment. One panel covered the specific challenges of animal welfare during transport (Panel 3). Almost **500 stakeholders**, representing e.g. Member States, NGOs, academia, SMEs and international organisations, participated in the discussions.

---

[12] Austria, Belgium, Czechia, Denmark, Finland, Germany, Hungary, Italy, Latvia, Lithuania, Netherlands, Sweden.

[13] Available on the European Commission Have Your Say platform : https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12950-Animal-welfare-revision-of-EU-legislation/public-consultation_en

[14] Eight contributions were considered duplications and excluded from the analysis.

[15] European Commission, *EU Animal welfare today & tomorrow, an opportunity for stakeholders to validate the preliminary findings of the Fitness Check of the current EU animal welfare legislation.*

In addition, since the publication of the Inception Impact Assessment in July 2021 and until the end of March 2023 when the Impact Assessment Report (initially covering a potential revision of the different legislations on animal welfare) was first submitted to the RSB, the Commission has held **72 meetings with stakeholders** both from industry and civil society. During the meetings, stakeholders could provide **their views, insights and when available any additional data** to inform the work of the European Commission. Since then, the Commission has continued liaising with many stakeholders and the Impact Assessment report on the revision of the legislation on the welfare of animals during transport has been enriched with elements coming from this additional consultation.

4. METHODOLOGY

All concerned stakeholder categories were reached throughout the various consultation activities and participated. All expressed views were analysed and taken into account as part of the evidence base of the Impact Assessment. Table 1 "Stakeholders engaged per consultation activity" (presented under section 1.) provides an overview of stakeholders consulted as part of the Impact Assessment.

The supporting study 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 surveys. The analysis of the evidence from consultation activities was conducted first at the level of individual data collection tools. Then, to the extent possible, the data was triangulated with data coming from the literature review.

5. CONSULTATION CHALLENGES

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

- **Analysis of public consultation results**: The outcomes of the analysis performed as part of the external study has been presented in this Impact Assessment Report, based on the data extracted from EU Survey (59 281 contributions, with 8 duplications identified and excluded from the analysis). However, it should be noted that the data reported in this Impact Assessment differs slightly from the data reported in the Have Your Say platform mainly due to a different approach to moderation and campaigns (59 286 contributions[16], with 64 contributions moderated[17] and a lower number of campaigns considered). However, these differences are not leading to significant differences in the statistical analysis performed[18].
- **Evidence provided by stakeholders during interviews**: for reasons of trade secrecy and a lack of pan-European data, stakeholders were not always in a position to share

[16] The difference of 5 contributions in Have Your Say is not impacting the number of valid contributions analysed, as these 5 contributions had to be moderated due to technical errors.
[17] In the have Your Say platform, a total of 64 contributions were moderated, due to additional 51 contributions moderated as not respecting the feedback rules and the 5 contributions mentioned above.
[18] The 51 moderated contributions represent 0.09% of the valid individual contributions analysed. The difference of 271 campaigns considered represent 0.47% of the valid individual contributions analysed.

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 some of the options examined in the Impact Assessment, or about the economic benefits of certain measures. In addition, where professional stakeholders indicated estimations of costs of some of the options, they often were not able to substantiate how the estimate was calculated and on what basis, making it difficult to check its solidity and reliability. However, this was to some extent compensated by the data gathered by the external contractor, experts, or by the Commission through desk research.

The challenges emerging from the public and targeted consultations were addressed by discussing the impact assessment findings with scientific experts and stakeholders, among others during the focus groups and workshop.

6. OUTCOMES OF THE CONSULTATION ACTIVITIES

National Competent Authorities (NCAs)

An important problem highlighted by NCAs is the unclear or unspecific text in the Transport Regulation itself. The Regulation is not specific about the sanctions either and this should be addressed. Furthermore, they see a lack of coherence in enforcement and implementation across the EU. One NCA referred to the need of further clarity and clear guidance on temperature requirements and on overhead space for animals. Another one mentioned that the main problem is the inconsistencies between the time limits in the Transport Regulation and the requirements of the social legislation related to road transport. Also, it was added that the Regulation should be more specific also for non-commercial transport and define better what is a commercial or a private purpose.

According to one NCA, the Transport Regulation is outdated and there is a lack of rules/requirements concerning the commercial transport of pets, some agricultural animals (e.g. rabbits, birds/poultry and fish), chinchillas or even exotic animals, which should be included and clarified in the revised Transport Regulation. Another NCAI mentioned the export by sea of unweaned calves as a major problem because of the length of the journey. Furthermore, what is lacking is a legal basis to ensure responsibility of the journey organizer.

Specific concerns were highlighted by Ireland and the Irish dairy sector, since any limitation has important economic consequences for the sector, which relies on transport of calves by ferry based on roll-on roll-off, which takes more than 19 hours. In addition to Ireland who may not be able to reach continental Europe within 19 hours, some other Member States like Spain and Italy, who are amongst the main beneficiary countries of calves transported on long journeys, would also be impacted as their farming sector could not satisfy the national market demand. Member States and business stakeholders from southern Member States are generally more concerned by restrictions on hot temperatures as they will be more impacted. They often flag the logistical challenges linked to transporting live animals by night.

Some NCAs mentioned that they would like to see a more nuanced approach as to the type of transport used as some MS have invested more in specific infrastructure, which should be taken into account. Moreover, according to some NCAs, journey times of less than 8 hours are unacceptable and any journey time under what is currently allowed, would have significant

impacts.

In terms of exports to third countries, one NCA expressed their support for a total ban of live animal exports outside the EU, however it stated that it is not necessary to completely ban sea transport but to limit it to a maximum journey time. Another NCA mentioned that if the EU adopts the Irish ship standards, there would be huge improvements for animal welfare. Generally, they were not in favor of replacing transport of live animals by transport of carcasses only, as it is not possible to automatically replace the transport of live animals with transport of carcasses as the demand for meat is not equivalent to the demand of live animals. Furthermore, if EU exports are banned, North African countries will simply replace their imports with imports from other countries, likely with lower welfare standards. It would be more appropriate for the EU to help improve conditions in e.g. slaughterhouses in destination countries.

NCAs agreed that the Transport Regulation needs to provide specific rules for unweaned and vulnerable animals. One NCA even agreed that it is better not to transport them at all. However, one NCA addressed the importance of the transport of young calves, if transport is not possible, they would be slaughtered soon after birth. The NCAs generally welcomed provisions on the commercial transport of cats and dogs.

Regarding improving monitoring and enforcement, several suggestions were made by NCAs. For example, to create an EU-wide electronic journey log, an app that the driver can fill and check-in at different points (loading, arrival etc.) and those logs can be verified, or compulsory GPS on the truck. Compliance and enforcement costs would depend on the already existing rules in the MS. They did not comment on other impacts of the policy options.

Non-Governmental Organisations (NGOs)

NGOs highlighted the need for deep revision in order to reflect scientific findings and that a ban on sea transport is needed which is not provided by current legislation. Furthermore, there is a lack of controls at departure, during the travel and at arrival and no authorities check when and how animals arrive at the slaughterhouse. They also agreed that the Transport Regulation is outdated and pointed to the lack of rules concerning the transport of specific animals.

NGOs agreed that all aspects of the current legislation need to be updated. Particularly, one NGO stated in this regard that all of the aspects need to be species-specific as well as category specific.

NGOs generally supported a total ban of live animal exports outside the EU as European welfare standards could not be guaranteed in third countries. Instead, animal transport outside the EU should be moved towards export of carcasses. Importantly, moving to slaughtering in the EU (stunning) would actually give more business to EU slaughterhouses with a potentially positive economic impact. The impact of such a policy change would be improved animal welfare and state of the environment as well as a boost of EU business.

NGOs supported specific rules for unweaned and vulnerable animals and further stressed that it is better not to transport them at all. Furthermore, they were in favour of implementing specific rules for cats and dogs.

Considering improved monitoring and enforcement, one NGO mentioned the need for more sanctions as only few Member States are complying with existing rules, and consequently they have disadvantages in terms of competition. They also addressed the lack of exchange of data between Member States. It was suggested to introduce an EU independent authority for monitoring and checking Member States' compliance with the law. One of the NGOs stated that these measures are only mitigating and stressed that live animals should not be transported at all.

In terms of costs, one NGO mentioned that the biggest impact in the value chain would initially be on farmers and subsequently on the transport company (technology). However, ultimately, it should be the responsibility of the Member States and the EU to enable policy changes to be made since in the end it is the consumer who receives higher-quality products. Prices of animals would also go higher if slaughtered in the EU bringing another potential economic benefit. This would all be feasible but there is apprehension of changes even if there would be little economic impact.

Furthermore, according to NGOs, enhanced legislation would lead to a reduction of the current overproduction of meat and animal products as prices would increase, which would be beneficial for the environment. Currently, the low cost of meat does not incentivize consumers to make the right choice, maintaining the overconsumption of meat in the EU. Less animal transport together with less animal product production would result in less pollution by meat industries. Another option raised by these NGOs is to move slaughterhouses or to construct them at a closer distance to the farms in order to avoid long transports. This would also have a positive impact on local economies. Additionally, one NGO highlighted the current sea pollution due to carcasses that are discarded in the sea during sea transport.

Business and professional organisations

Business organisations also highlighted the lack of coherence in enforcement and implementation across the EU. According to business organisations, the current requirements regarding animal welfare are sufficient, and the most problematic thing is reloading and unloading. Shorter journeys and more frequent resting times can be attractive but loading and unloading is very problematic for the welfare of animals. If travel times are reduced, more loading and unloading would be necessary. Furthermore, as regards space, the stakeholders pointed to the right balance as animals might fight, they will not have stability during transport and can get hurt under too much space. Stakeholders generally supported measures regarding the weight and minimum age of the animals, although some of them flagged the economic and logistical challenge (e.g. trucks with two decks instead of three have to be used).

Regarding exports to third countries, the organisations stated that if those are banned, third countries will most likely replace these EU imports with imports from other countries with lower animal welfare standards (e.g. longer journey times). However, suggested improvements of exports include improved border checks or conducting pre-assessments of the welfare, so that paperwork can be transferred to border controls in advance.

According to these stakeholders, the replacement of live animal transport with transport of carcasses may not be feasible because:

- The transport of animals to the Middle East/Africa is not always for slaughter.

- The transportation of carcasses over long journeys would require more energy due to the requirement for refrigeration.
- There might be specific conditions for religious slaughter in some destination countries that favours the import of live animals.

The replacement of live animals by the transport of carcasses also depends highly on the willingness of the importing country to accept such a replacement. If there is no acceptance, there will only be substitution of EU animals with imports from other parts of the world (likely subject to longer journeys and less strict animal welfare regulations than in the EU).

This category of stakeholders generally supports that the Transport Regulation needs to provide specific rules for cats and dogs as well as for unweaned and vulnerable animals. However, a complete ban would mean that farmers have to keep all animals, which is not realistic and farmers will not do that, they will reduce the overall number of herds. Furthermore, they pointed out the necessity of defining the term "unweaned" within the Regulation.

According to the organisation, the biggest costs were administrative processes which could be simplified through new technology such as apps or automatic transfer of notifications between countries, so that checks happen faster at the border. Furthermore, the biggest impacts in the value chain would be on the farmers who might lose the market; for the transporters, they are already starting to transport other goods instead of live animals. In some countries there is already a shortage of drivers.

Academic experts and institutions

Compared to other stakeholder groups, the academic experts and institutions commented relatively little. The issue of diseases spreading due to animal transport was brought up by academics. They stressed the importance of checking the animal prior departure: check whether animals are able to be transported or not, if they are affected by diseases or injuries. Poor transport conditions can worsen present diseases or lead to transmission to other animals. Veterinary inspection should be expanded to all animals and not only be limited to the vulnerable ones. If welfare is poor, there is a higher chance to develop illnesses. The academics also supported a total ban of live animal exports outside the EU as it would it is difficult to guarantee the welfare standards in non-EU countries.

They also favoured the provision of transport regulations on unweaned and vulnerable animals as well as on cats and dogs. Furthermore, with regards to fish, the academic interviewee stated that fish transport requires more control and monitoring (e.g. salmon fish are transported in "sea cages"). It is in the interest of producers to decrease the number of mortalities.

International and EU organisations

The EU organisation explained some of the reasons for the ongoing revision Council Regulation (EC) No 1/2005 on the protection of animals during transport (referred to as "Transport Regulation" in short) – while the Farm to Fork Strategy provides political platform, the objective is also to reflect the latest scientific evidence (i.e. EFSA opinions) in order to ensure that animal welfare is not compromised and to respond to EU citizens calls for a greener Europe, as transport is also an environmental issue. Public acceptance and attitudes (e.g. trends

favouring local production and consumption, calls for more sustainable food production chains) are also shaping the revision process.

The issue of problems at borders and exports outside the EU was particularly highlighted as a concern by the EU organisation as feedback is rarely received, especially when it comes to third countries. The international organisation further stressed the issue of information flows and gave the Australian system as an example of more advanced monitoring. Another major problem pointed out by the EU organisation is long distance transport by any means – but particularly challenging is the transport by sea. According to the international organisation, the lack of coherence in enforcement and implementation across the EU is crucial. In order to improve animal welfare, implementation of current rules, collaboration and communication between authorities must be improved and feedback from the destination must be provided.

In terms of the ban on transport of live animals and the possible replacement by the transport of carcasses, the international organization highlighted the need for a cooling infrastructure (such as refrigerators) in the EU, which currently does not exist.

The stakeholder group supported specific rules for the transport of unweaned and vulnerable animals and cats and dogs. Moreover, the international organisation advised that young animals should be transported only if the conditions in the vehicles/vessels meet their specific needs and supports the options for the stricter rules. If there was a total ban on transport, however, the breeding system would be affected. According to the international organisation, there is also a need to regulate the transport of horses, fish and laboratory animals.

Regarding improved monitoring, it was mentioned that strengthened collaboration is necessary and needs improvement. This should be achieved through the same level playing field for all businesses and exchange of information. In terms of expected costs, the European organisation stressed that audits and subsequent infringement procedures require a lot of time and resources, e.g. the ability to conduct multiple checks, to ensure follow-up to determine non-compliance and measuring the progress made. For the moment, there is no expectation to change the number/frequency of audits for any of the options although it would be better to have more audits. The stakeholders did not elaborate on other policy impacts.

EU and non-EU citizens

The views of this stakeholder group were mainly assessed through a public consultation on animal welfare focusing on the issue in general and covering different aspects of animal welfare. It contained three questions specific to animal welfare during transport and a general open question. The vast majority of the respondents were EU citizens (54 600 contributions or 92.12%). Non-EU citizens contributed to a lesser extent (2 817 contributions or 4.75%).

The majority of respondents supported the introduction of stricter requirements on the transport of live animals and bans on the transport of vulnerable animals and live animals outside the EU. Between 94-96% of the sample of non-campaign respondents supported maximum journey times, more specific requirements for different animal species and technical requirements for the means of transport used for long journeys. Between 83-94% of the non-campaign respondents supported a ban on live animals to non-EU countries for both breeding and slaughter. 49-54% favoured a limitation of the exports to those non-EU countries where

requirements on animal welfare are at least equivalent to standards within the EU or favoured transport under stricter conditions. 94% of the non-campaign respondents supported a ban of the transport of vulnerable animals and only 44-45% supported transport under stricter requirements or limited to 8 hours. Amongst the responses to the open question, the most frequent statements (made by at least 10% of the sample) were: "define limit for long distance transport'; "ban live animal exports outside the EU, "ban all live animal transport", "stricter requirements for live animal transport conditions", "reduce need to transport animals for slaughter", "ban transport of vulnerable animals", "more transparency / label covering transport conditions". These views were predominantly shared by citizens as the overall number of other stakeholders who contributed was significantly lower

Campaigns

In the context of the external study, the analysis of the contributions to the IIA and to the PC led to the following conclusions:

IIA: four campaigns were identified as part of 110 contributions:

Campaigns	Total number of contributions	Main issues identified related to the protection of animals during transport
1.	65	The stakeholders call for: • A ban on long-distance transport of animals • A ban on exports of animals outside the EU • A system of sanctions for breaches of these prohibitions and for EU mechanisms to oversee the enforcement of these sanctions
2.	24	The stakeholders call for: • 'stopping long-distance transport of animals to countries outside the EU'
3.	11	The stakeholders support: • 'a ban on the transport of animals outside the EU'
4.	10	The stakeholders call for: • 'a ban on the transport of animals'

PC: 10 campaigns were identified as part of 1 546 contributions:

Campaigns	Total number of contributions	Contributions relevant to transports	Main issues identified related to the protection of animals during transport
1.	755	23	• Nearly all of the respondents refer to a general ban of transport and/or exports. • Five respondents refer specifically to defining stricter requirements and limiting the transport of all animals to eight hours.
2.	337	22	• Nearly all of the respondents refer to a ban of transport (only a few specify that this should cover exports outside the EU, transport over

			long journeys or transport of unweaned animals). • One respondent proposed limiting all transport to four hours.
3.	227	2	• Two respondents call for including information about transport in an animal welfare label.
4.	60	39	• The majority of the respondents call for a limitation of transport to 8 hours. • Some respondents refer to a ban of transport outside the EU or in extreme heat.
5.	49	48	The majority of respondents call for: • "replacing the transport of live animals to third countries with the transport of meat, carcasses and genetic material of the animal; • no more animal transports by sea; • transport to the nearest suitable slaughterhouse; • maximum temperatures for transport (no transport below +5°C and above +25°C)".
6.	43	0	*No concerns were specifically related to transport.*
7.	34	0	*No concerns were specifically related to transport.*
8.	25	24	All respondents call for: • a complete ban of EU exports to non-EU countries • a ban of the transport of vulnerable animals.
9.	8	7	The majority of respondents call for: • maximum transport time of 4 hours for poultry and rabbits • 8 hours for other animal species • monitoring of animal transport with surveillance cameras; • specifications for the space/conditions on transport vehicles; • extension of controls beyond the reliability of the transport company: • the actual conditions during transport must be checked; ban on live exports.
10.	8	8	*No concerns were specifically related to transport.*

ANNEX 3: WHO IS AFFECTED AND HOW?

1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

Road transporters will need to reorganise their journey planning and contracts to comply with the new requirements on journey times (including for exports), vulnerable animals and hot temperatures. They might need more trucks and drivers to comply with the requirements of increased space allowances. Transporters involved in exports outside the EU will need to contract an independent auditor from the International Federation of Auditors to carry out on-the-spot checks to verify that the EU transport rules are complied with until destination. Occasional additional costs may incur to transporters for the measure on limitations of transport during hot weather, as drivers will need to work during the night. In addition, while almost all trucks already have a GPS system installed, certain administrative steps will be needed to provide authorities real-time access to this data. To a considerable extent, however, the overall administrative burden is expected to decrease by a further use of digital communication tools.

Some **sea transporters** will have to upgrade or replace their vessels and register these under another flag, to meet updated requirements. Sea transporters will also need to train a member of the crew as an animal welfare officer, to take appropriate measures to safeguard the welfare of animals.

Slaughterhouses may be affected by the measure on transport during hot weather events, as staff may have to work at night, or they will have to invest in a larger space to keep the animals until resuming the slaughter activities in the morning.

Breeding and fattening farms may be affected by the measure on the limitation of journey times. A certain share of current route patterns will have to change due to the limitations, which may lead to the re-localisation of some farms.

Cat and dog professional breeders will have to ensure transporters adapt to the requirement for veterinary checks for cats and dogs.

2. ADMINISTRATIVE AND ADJUSTMENT COSTS (ONE-IN, ONE-OUT)

As regards the administrative costs and adjustment costs imposed on the respective groups of stakeholders, the situation could be summarised as follows:

For **transport by road, total costs amount to EUR 2 884 million annually** over 5 years. This includes, thanks to the introduction of new technologies such as GPS and a centralised database, a **EUR 71 million reduction in administrative burden**.

For export via sea of beef and sheep, **the administrative burden would be EUR 195 000 for the one-off registration of vessels to a white or grey flag and EUR 21 208 annually for the training of a certified animal welfare officer for each vessel**. Additionally, the adjustment cost of upgrading vessels to meet new requirements would cost EUR 380 million overall (one-off cost).

Regarding the welfare of cats and dogs, transporters of puppies and kittens would face a **reoccurring administrative cost of EUR 94.5 million and a single adjustment cost of EUR 7.5 million**.

SUMMARY OF COSTS AND BENEFITS

I. Overview of benefits (total for all provisions) – Preferred option		
Description	***Amount***	***Comments***
	Direct benefits	
	Animals: higher welfare both for animals currently regulated and expansion of standards for cats and dogs. In particular, animals are better able to express their natural behaviour when transported; suffer less from health problems; having more positive experiences. **Operators:** some measures lead to increased productivity (less animal mortality, less injuries, higher yields); higher quality products; level playing field in the EU internal market; better image and reputation of the sector (thus better economic sustainability); less transmissible animal diseases and zoonoses (and related savings); higher job satisfaction. **Citizens**: animal transport ensures animal welfare in line with citizens' expectations; rules that address citizens' expectations so exports align with EU animal welfare standards.	A description of benefits is included in section 6.1.2. of the main document. Increased space allowance reduces aggression and risks of diseases spread in animals that may also have an impact on human health. This also reduces the need for antimicrobials. Animal welfare during transport is expected to improve significantly, but there is no robust methodology to quantify or monetise such benefits.
	Indirect benefits	
	Public health: contributes to reducing zoonosis risks. **Economy:** enhanced consumer trust in livestock transport; smoother internal market.	Indirect benefits to society are difficult to quantify systematically or with certainty but are expected to be significant. As detailed in section 6.2.1. of the main document and Annex 4 to this report, a quantification is proposed for some of these indirect benefits.
	Environment: reduced emissions.	
	Administrative cost savings related to the 'one in, one out' approach*	
(direct/indirect)		

II. Overview of costs – Preferred option							
		Citizens/Consumers		**Businesses**		**Administrations**	
		One-off	**Recurrent**	**One-off**	**Recurrent**	**One-off**	**Recurrent**
New welfare rules on transport of animals.	Direct adjustment costs	n/a	n/a	**Cats/ dogs breeders:** upgrading of transport vehicles to meet new requirements. **Transporters:** costs related to the adaptation to new transport patterns. **Vessels:** cost of adapting the vessels.	**Transporters**: costs related to less activity as a result of journey time restriction (but very limited considering the additional activity triggered by new space allowance).	**Public authorities (EU institutions)**:	**Public authorities (EU institutions)**: Audits (in non-EU countries).

				Slaughterhouses: potential cost from having to slaughter at night or increase the capacity of waiting areas. **Farmers and breeders:** costs may arise from having to keep animals on farm longer. Costs may also arise from the need to source animals at higher price, or to sell at lower price.			
	Direct administrative costs	n/a	n/a	**Transporters:** costs related to the registrations under white or grey flag (for vessels).	**Cats/dogs breeders**: veterinary checks prior to transport. **Transporters:** costs related to the training of an animal welfare officer on vessels.	**Public authorities (EU and national):** n/a	n/a
	Direct regulatory fees and charges	n/a	n/a	n/a	n/a	n/a	n/a
	Direct enforcement costs	n/a	n/a	(Depends on the situation in each MS)	(Depends on the situation in each MS)	(Depends on the situation in each MS)	(Depends on the situation in each MS)
	Indirect costs	n/a	n/a	n/a	n/a	n/a	n/a

III. Application of the 'one in, one out' approach – Preferred option(s)			
[M€]	**One-off** (annualised total net present value over the relevant period)	**Recurrent** (nominal values per year)	**Total**
Businesses			
New administrative burdens (INs)	EUR 195 000 to transporters exporting by sea.	EUR 21 208 to transporters exporting by sea. EUR 94.5 million to transporters of cats and dogs.	
Removed administrative burdens (OUTs)		EUR 71 million from the introduction of mandatory GPS and real-time tracking software for operators transporting by land.	
Net administrative burdens*	EUR 195 000	EUR 24.5 million	
Adjustment costs**	EUR 7.5 million to transporters of cats and dogs. EUR 380 million to transporters exporting by sea.	EUR 2.88 billion to transporters of live animals by road.	
Citizens			
New administrative burdens (INs)	n/a	n/a	
Removed administrative burdens (OUTs)	n/a	n/a	
Net administrative burdens*	n/a	n/a	
Adjustment costs**	n/a	n/a	
Total administrative burdens***	EUR 195 000	EUR 24.5 million	

(*) Net administrative burdens = INs – OUTs;
(**) Adjustment costs falling under the scope of the OIOO approach are the same as reported in Table 2 above. Non-annualised values;
(***) Total administrative burdens = Net administrative burdens for businesses + net administrative burdens for citizens.

3. RELEVANT SUSTAINABLE DEVELOPMENT GOALS

III. Overview of relevant Sustainable Development Goals – Preferred Option(s)		
Relevant SDG	**Expected progress towards the Goal**	**Comments**
SDG 3 - Good health and well-being	Improving animal welfare during transport will contribute to combat AMR in both humans and animals, in line with the One Health approach, therefore contributing to better public health.	There is some link to target 3.D ('strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks'), especially indicator

		3.D.2 (percentage of bloodstream infections due to selected antimicrobial-resistant organisms*)*.
SDG 12 - Responsible consumption and production	The revision will contribute to easing the pressure on food systems and the intensity of their production, thus contributing to a more sustainable food system and consumption patterns.	The revision will have both a direct and indirect impact to encourage companies to adopt sustainable practices.

ANNEX 4: ANALYTICAL METHODS

1. BASELINE

The baseline against which the impacts are assessed is set at 2031 (including adoption rates of the measures based on national legislation in place and costs). The aggregated costs are provided against the 2031 baseline.

2. METHODOLOGY AND MODELS

As a first step, the animal welfare, economic, social and environmental impacts of the respective policy options as well as their distribution across stakeholders were analysed and scored through a Multi-Criteria Decision Analysis (MCDA), using triangulated evidence (evidence from stakeholder consultation, from desk research and quantitative analysis where available), based on the external study and additional evidence collected.

Secondly, an assessment of the cumulative impacts of the two proposed packages of measures and options was made based on a supply chain analysis.

Thirdly, the impact assessment analysis compared the different options as regards their effectiveness, efficiency and coherence, as well as their compliance with the proportionality principle.

Fourthly, the outcome of the supply chain analysis on impact on production costs was used to model impacts on production levels, consumer prices, exports and imports (performed by the Commission's Joint Research Centre), and additional analyses were performed (by the Commission's Joint Research Centre) to assess the impacts of the two packages on food security and food affordability.

2.1. Identification of potential impacts and indicators used

The main impacts identified by the Commission, to be considered in this impact assessment, were the following:

- Animal welfare impacts
- Economic impacts
- Social impacts (including the extent to which societal expectations are met)
- Environmental impacts

As improving the level of **animal welfare** is one of the general objectives of this revision, it should be noted that the impact on animal welfare is considered as a separate impact and is not analysed under the environmental impact (as can be the case in other impact assessments).

In addition, the assessment of **economic impacts** gives specific attention to the impacts on competitiveness, on SMEs and on administrative burdens on businesses which are reflected in the list of selected indicators.

The assessment of **territorial impacts** has also been performed in the supporting studies where relevant, for instance as regards the specific situation of islands and remote, mountainous areas.

The revision is not expected to have any impacts on fundamental rights. Provisions on real-time positioning of vehicles were designed to ensure that the protection of personal data is safeguarded, in compliance with the General Data Protection Regulation.

For each category of impact, indicators were developed by the external contractor and submitted to the Commission for approval. Further details on the indicators used and how these were measured are available in the supporting study[19].

2.2. Multi-Criteria Decision Analysis (MCDA)

Given the plurality of policy objectives, a large range of assessment criteria was needed. For this, a MCDA was considered to offer a comprehensive and transparent model, allowing for non-quantifiable impacts to be measured qualitatively (and quantified impacts to be measured in different units). This MCDA has been performed as part of the supporting study. The method was applied as follows:

Each impact of each option was scored using the following scale and point of reference:

- **Scale used:**
  - In the external study: Policy options were assessed in a consistent way using a scale from 1 to 5 (5-point Likert scale). In this case, the highest score is given to the most desirable option towards 5 (i.e. less costly or administratively burdensome, or best for animal welfare), 3 corresponds to a neutral score and the lowest score corresponds to the least desirable option (towards 1).
  - In the Impact Assessment report: The 5-point Likert scale was converted into a **-2 to +2 scale** (i.e. with 0 being neutral). In this case, the highest score is given to the most desirable option towards 2, 0 corresponds to a neutral score and the least desirable option is scored towards -2.
  - The conversion does not change outcomes of the MCDA.
- **Point of reference:**
  - Impact on animal welfare: Given that improving the level of animal welfare in the EU is a general objective of the revision, the latest EFSA recommendations serve as reference for this assessment. The options that are the closest to the recommendations / to the desired level of animal welfare are scored highest on the animal welfare impacts. The ones diverging the most from the recommendations / the desired level of animal welfare are given the lowest score. Thus, the current situation does not serve as a reference for the impact on animal welfare
  - Environmental, economic, social impacts: The current situation serves as a reference. These impacts were scored neutral when no changes were expected. However, when changes were assumed, positively or negatively, the score was reflecting this change.

Each impact of each option was scored using the following approach:

- **For the impact on animal welfare**: Although the impact on animal welfare was not quantified, the changes in terms of welfare were measured and therefore scored using the EFSA recommendations as reference for the desired level of animal welfare, which

[19] Transport study, Annex X (see note 5, page 8).

are based on the latest available scientific evidence. Where relevant the impacts were broken down by type of animal concerned (e.g. slaughter and non-slaughter animals).

- **For the economic, environmental and social impacts**: All costs and benefits covered by the indicators listed were taken into account in the analysis. In the impact assessment, the outcomes of the cost benefit analysis, when available, were taken into account when assigning scores to the economic, environmental and social impacts, respectively. It should also be noted that in the external study, although the impacts were broken down by type of stakeholder groups concerned when relevant, the average score per category of impacts was estimated giving indicators an equal importance. The impact assessment report deviates from this approach as the relative importance of the different indicators is reflected in the aggregated score of each impact.
- **Scoring the dynamic baseline**:
  - In the external study and in the preparation of this impact assessment, the No Policy Change (i.e. the dynamic baseline) has been scored as any other option, in order to show with robust data and in a consistent manner the assumed changes in the baseline as well as the cost of inaction. This also allows to give a clear picture of the evolution of the situation over the long period assessed and considering the number of different species impacted by the revision. This method has been implemented in both the supporting study and the Impact Assessment Report ('step 1').
  - However, as a second step, these scores of all options were converted to a baseline that is scored as 0 ('step 2') so that the baseline serves as the benchmark against which the policy options are compared (i.e. showing the net differences). The impact assessment report only includes tables presenting the results of the second step.

The multi-criteria impact matrix synthetises the performance of each option according to each impact, based on the following approach:

- **A total score was given to each respective policy option, aggregating the scores of the categories of impact considered** (animal welfare, economic, social and environmental). The score 0 applies absence of impacts or the current situation.
- **The total score is based on the weights allocated to each category of impact** (i.e. higher weights indicate the most important factors). The weights have been developed from a need for a balanced approach that strikes a compromise between animal welfare and economic impacts, taking into account the already existing economic pressure on transporters, but also the dual objective of ensuring higher welfare and contributing to sustainable food operations.
  - Taking into consideration the recent geopolitical developments and the current economic situation, in this impact assessment, the same weights are applied to all impact categories: Animal welfare (25%), Environment (25%), Economy (25%) and Social (25%).
  - In the supporting study, several approaches were considered, including one where focus was mainly put on the animal welfare impacts[20].

[20] The supporting study primarily applied the following weighting: animal welfare (35%), environment (25%), economy (20%) and social (20%).

A sensitivity and robustness analysis was performed to check if the ranking of policy options is stable, including making changes to the weight of the dimensions/criteria, to improve the transparency on the assumptions made in the impact assessment. The outcomes of the analysis are presented under point 5 of this Annex.

Summary of the conversions applied to the scores of the MCDA as described above for the purpose of the impact assessment:

Scale used: The 5-point Likert scale used in the supporting studies (i.e. 1 to 5, with 3 being neutral) was converted into a **-2 to +2 scale in the impact assessment report** (i.e. with 0 being neutral). The conversion however does not change outcomes of the MCDA and the comparison of the options.

Two-step approach of the analysis of the baseline: As mentioned, first the No Policy Change has been scored in order to fully reflect the cost of inaction and the assumed changes in the baseline ('step 1). **As a second step, these scores of all options were converted to a baseline that is scored as 0 ('step 2')** so that the baseline serves as the benchmark against which the policy options are compared (i.e. showing the net differences). The impact assessment report only includes tables presenting the results of this second step.

2.3. Supply chain analysis[21]

Based on the results of the separate study supporting the impacts assessment, the policy options were arranged in two packages (1 and 2) for which cumulative impacts have been assessed in an external study, by using the following methodology.

The purpose of the supply chain analysis was to estimate the cumulative economic impacts along the value chain (pigmeat, broiler meat, beef, eggs, milk). The following process was followed to quantify the joint costs of legislative packages to the actors of the value chain. These actors included farmers, breeders, processors, input suppliers, retailers and consumers, and the public sector. These joint or cumulative impacts of all measures are dependent on several factors. These include particularly 1) impacts of measures to operators who need to adjust their operations because of new regulations, 2) impacts on operators who do not need to adjust their operations, and 3) proportion and type of operators who are affected in different ways.

Step 1: Identification of options

The cumulative impacts were assessed through several steps. First, changes considered in the regulations were reviewed. This included that information provided in separate study were reviewed and summarised to identify qualitatively what kind of effects the measures were

[21] Economic impacts of the measure on exports and cats and dogs could not be analysed by the supply chain analysis nor the agricultural commodity market model. Instead, compliance costs have been calculated using the Standard Cost Model. Relevant parameters for the price, time and unit variables have been extrapolated based on triangulation in the supporting study.

expected to have. The most important stakeholder groups to be considered, i.e. farmers, breeders, processors, transporters, retailers, consumers, public authorities (e.g. administrative costs), and animals, and possible subgroups that need to be considered for the purposes of robust calculations were identified and inputs to them were described based on the four IA reports.

Step 2: Quantification of economic impacts of measures

Second step focused on quantifying the most significant impacts that regulatory changes can have on productivity and production costs of each individual change as reported by the separate studies, EFSA data and other data and previous studies. In practice, quantitative information was not available on the impact to all stakeholder groups mentioned above, and the impacts focused mainly on impacts to farmers, slaughterhouses, breeding sector and transporters. Because the separate reports did not provide detailed or consistent information for all relevant measures, additional data were searched from scientific publications, reports and other sources that were considered useful and robust to provide additional data. During this step, the impact of each measure was quantified in euros for each type of animal and operator that it was applicable. Additional variable costs, possible savings in variable costs, changes in market revenues, possible investments needed to comply with the measures and possible reductions in the number of animals that can be kept, transported or processed were quantified at farm, firm or animal level (euro per animal or euro per kilogram of output). Measures which were found to require investments or renovations in the current housing were annualised by using 5% interest rate and 15-30 years lifetime of an investment (30 years for buildings, 20 years for renovations, 15 for machinery):

$$\text{Annual cost} = C\ \frac{r}{1-(1+r)^{-t}},$$

where C is the cost of initial investment, r is the interest rate, and t is the duration of the investment. The annual cost was then divided by the production quantity that a given invest was estimated to produce annually. The external study[22] provides information on the literature and cost parameters used in the supply chain analysis.

Step 3: Normalising impacts

Third step was to quantify economic impacts to actors in a consistent manner so that the impacts of separate measures could be counted together. For this purpose, it was decided to summarise aggregate impacts per stakeholder group by using standard cost calculations that reflect the current relative change of production costs. The costs and revenues before and after adopting each regulatory change that were calculated at step two were transformed to a figure that describe the net impact per kilogram of output (e.g. €/kg meat produced). The net impacts were normalised to the production cost of one kilogram of meat, milk or eggs (depending on the stakeholder, costs to farmer, transporter or slaughterhouse) and then converted into a percentage change in production costs per unit of output and calculated on the condition that an actor must implement a change. Because the models operate with net economic impacts, in practice this meant that a cost elasticity estimate (∂C) was calculated for the case where specific measure is affecting economic operators in the sector. In general form, this cost elasticity estimate represented the relative change of production costs as follow:

[22] Transport study (see note 5, page 8).

$$\partial C = \frac{C_{\text{current}} + C_{\text{additional}}}{C_{\text{current}}},$$

where C_{current} is the current cost of production, transport or slaughtering associated with one kilogram of meat, milk or eggs and $C_{\text{additional}}$ is additional net cost that is cause be the implementation of the new policy measure. $C_{\text{additional}}$ were obtained from the results of step two above. While prices were normalised according to the 'current' level of production costs, anticipated future prices were used to determine the baseline level of production costs for the cost calculations of 2031. The information on the net cost impacts was delivered to JRC's Agricultural Commodity Market Model as an input. The elasticity estimate was applied to the 2031 baseline of costs in step 6.

Step 4: Joint impacts when adopting measures

Fourth step was to aggregate impacts across the supply chain by applying the results from the previous step's micro-level calculations. Dynamic impacts and interactions were taken into account where possible. This implied in broiler for example, that the aggregate impact of slower growth rate and increased space allowance (i.e. more space needed for a longer time period per bird) was considered instead of considering these separately. Because the Agricultural Commodity Market Model (see section 3.3.2) modelling work was designed to assess food affordability, market prices and supply and demand were considered static in this step. In this step it was assumed that, for example, increased space allowance could be compensated only by increasing the housing capacity so that the current amount of meat or eggs can be produced. Possible changes in the total supply, demand and market clearing prices were considered later in step 6 by incorporating results from the modelling work conducted by Agricultural Commodity Market Model team through a feedback-loop to the cost calculations. For example, if Agricultural Commodity Market Model's results suggested that a policy package would reduce aggregate supply and increase the market price, then the aggregate supply in the cost calculation was reduced according to the modelling result and aggregate costs was re-calculated and the total additional market revenues were also calculated for the new quantity that would be supplied.

Step 5: Determining the proportion of supply that still must adopt changes in the baseline year

Fifth step focused on identifying which proportion of animal population, farm population or livestock sector professionals would be required to implement the change. The proportions of population that would need to adopt measures were based on estimated share of populations that would not have adopted the measures by the end of the transition period. Hence, the baseline represents the proportion of population that has not adopted the measures by year 2031. Where possible, adoption rated were defined for each member state individually. Information about the total population of both farms and animals in the EU were obtained from Eurostat statistics and the supporting study for transport. Information about the current and anticipated adoption rates of each measure were searched from the supporting study, European statistics, scientific publications and from additional data provided by the European Commission. Complementary information was searched from reports and scientific publications and obtained from the European Commission. Cumulative economic impacts to different stakeholders were interpreted as percentage increases in production costs and revenues in each production line and as absolute impacts (euros) to different actors. Further details on the proportion of production that needs to adopt each measure in the baseline year is

provided in the Annex.

Step 6: Cumulative total impacts at the EU-level and for example farms and volumes of supply

Finally, the aggregated, cumulative impacts were represented at the EU-level as well as for a representative small, medium-sized and large farms by using the equations that can be presented in general form as follows:

$$\text{Impact}_{\text{EU in total}} = (((\partial C - 1) \acute{} \, C_{\text{baseline}}) \acute{} \, \Delta A \,) + \Delta P) \acute{} \, Q \acute{} (1 + \Delta Q),$$

where C_{baseline} is the baseline production cost per kg output in 2032 estimated by using cost data obtained from CAPRI model of the above-mentioned cost figures for slaughter and transportation, ΔA is the percentage of actors to adopt a change in the target population (defined for the EU or MS level and for a given group of actors), ΔP is estimated change in the producer price obtained from the Agricultural Commodity Market Model and converted to €per kilogram, Q is the baseline annual production quantity of commodity in the EU in 2032, and ΔQ is estimated policy-induced change In the quantity traded obtained from the Agricultural Commodity Market Model.

Limitations

Although the models operate at net impacts level, both benefits and costs of each measure and regulatory package were identified. The quantification of costs and benefits is constrained by the information that was available from the supporting study, scientific literature, statistics and other sources. In some cases, the source publication did not provide detailed information about the costs and benefits, and this limits the possibility to report such impacts in detail. The impacts were considered at the member state level. Member state level data were utilised to the extent that is was available. Because no member state level (or regional) data on the impacts was available for many measures, EU-level data or data reported and extrapolated for other countries was used. This concerned especially impacts faced by farms and other operators when they adopt a new measure, but to some extent also data concerning the proportion of population that needs to adopt the measure (e.g. the proportion of production that is already applying a measure.

2.4. Assessment of cumulative impacts on production levels and consumer prices with the Agricultural Commodity Market Model (by JRC)

Animal and egg production in the Agricultural Commodity Market Model

The EU module of the Agricultural Commodity Market Model calculates endogenously the production of beef and veal (BV), dairy, poultry (PT), eggs (EG), pigmeat (PK). The following paragraphs detail how the Agricultural Commodity Market Model represents animal and eggs production. The description starts with beef and veal as one of the most complex modelling approaches. Quantity produced of beef and veal is a function of the following elements:

i. weighted average of the returns (present year and past two years) in the form of a gross margin: producer price ($PP_{l,r,t}$) plus subsidy ($EPQ_{l,r,t}$) divided by the cost of production commodity index ($CPCI_{l,r,t}$);

ii. weighted average of feed costs during the last three years in the form of a feed cost index ($FECI_{l,r,t}$) divided by a cost of production commodity index;

iii. the previous year's production quantity ($QP_{l,r,t-1}$);

iv. a time trend (T);

v. the beef cow inventory from previous two years ($CI_{BV,r,t-p}$) and the dairy cow inventory from the previous year ($CI_{MK,r,t-1}$)

The structure of the equations in the model for the production of beef and veal livestock (BV) is:

$$\boldsymbol{log\, QP_{BV,r,t}} = \boldsymbol{\alpha} + \sum_{p=0}^{2}\left(\boldsymbol{\beta_p log\, \frac{PP_{BV,r,t-p} + EPQ_{BV,r,t-p}}{CPCI_{BV,r,t-p}}}\right) + \sum_{p=1}^{3}\left(\boldsymbol{\gamma_p log\, \frac{FECI_{RU,r}}{CPCI_{MK,}}}\right) + \sum_{p=1}^{2}\left(\boldsymbol{\delta_p log\, CI_{BV,r,t-p}}\right) + \left(\boldsymbol{\eta log\, CI_{MK,r,t-1} + \theta log\, QP_{BV,r,t-1}}\right) + \boldsymbol{\zeta} * \quad (1)$$

In the case of poultry (PT) production, the equation for determining production is simplified, given that the influence on present production choices from past years is limited. The growth cycle of typical commercial poultry is just few months. Poultry quantity produced is modelled as follows:

$$\boldsymbol{log\, QP_{PT,r,t} = \alpha + (\beta log\, \frac{PP_{PT,r,t} + EPQ_{PT,r,t}}{CPCI_{PT,r,t}}) + (\gamma log\, \frac{FECI_{NR,r,t}}{CPCI_{PT,r,t}}) + \delta log\, QP_{PT,r,t-1} + log(R_{PT,r,t}).} \quad (2)$$

In the case of pigmeat, the quantity of pigmeat produced is the sum of net trade in live animals (NTL) and the quantity produced from slaughtered animals (QPS):

$$\boldsymbol{QP_{PK,r,t} = QPS_{PK,r,t} + NTL_{PK,r,t}} \quad (3)$$

The quantity produced from slaughtered animals represents the net production and is endogenously calculated. Production depends on the number of animals slaughtered (SLH) and the carcass weight (CW):

$$\boldsymbol{QPS_{PK,r,t} = SLH_{PK,r,t} * CW_{PK,r,t}/100} \quad (4)$$

Slaughtered animal head numbers (SLH) depend on a producer gross margin (revenues and feed cost index). Decisions on how many animals are slaughtered in a year depend on the economic revenue returns of the previous year. The number of animals slaughtered in the current year also depends on the number of slaughtered animals in the previous year to model persistence in production. The equation is as follows:

$$\boldsymbol{log\, SLH_{PK,r,t}} = \boldsymbol{\alpha} + (\boldsymbol{\beta log} \frac{\boldsymbol{PP_{PK,r,t-1}+EPQ_{PK,r,t-1}}}{\boldsymbol{CPCI_{PK,r,t-1}}}) + (\boldsymbol{\gamma log} \frac{\boldsymbol{FECI_{NR,r,t-1}}}{\boldsymbol{GDPD_{ME,r,t-1}}}) + \boldsymbol{\delta log\, SLH_{PK,r,t-1}} + \boldsymbol{log(R_{PK,r,t})} \quad (5)$$

Pork carcass weights are modelled following a similar formula as the one used for calculating supply of other meats but carcass weight (CW) depends on revenue gross margin and the feed cost margin of the current year:

$$\boldsymbol{log\, CW_{PK,r,t}} = \boldsymbol{\alpha} + (\boldsymbol{\beta log} \frac{\boldsymbol{PP_{PK,r,t}+EPQ_{PK,r,t}}}{\boldsymbol{CPCI_{PK,r,t}}}) + (\boldsymbol{\gamma log} \frac{\boldsymbol{FECI_{NR,r,t}}}{\boldsymbol{GDPD_{ME,r,t}}}) + \boldsymbol{\delta * T} + \boldsymbol{log(R_{PK,r,t})} \quad (6)$$

If producer prices increase more than costs, then producers will become less reluctant to sell their animals and carcass weight would decrease.

The egg production modelling has been improved from the usual Agricultural Commodity Market Model. Egg products are also modelled with a similar formula to the one used for poultry, for each of the regional blocks (EU-14 and EU-13):

$$\boldsymbol{log\, QP_{EG,r,t}} = \boldsymbol{\alpha} + (\boldsymbol{\beta log} \frac{\boldsymbol{PP_{EG,r,t}}}{\boldsymbol{CPCI_{EG,r,t}}}) + \boldsymbol{\gamma log\, QP_{EG,r,t-1}} + \boldsymbol{log(R_{EG,r,t})}. \quad (7)$$

For the Member States that entered the EU before 2004, the egg market price clears the whole European market while the producer price in the Member States that entered afterwards is modelled as a fixed proportion of the other one, based on historical price differences.

Costs of production commodity index

The Agricultural Commodity Market Model represents costs through a univariate cost of production commodity index (or $CPCI$), in accordance with a univariate input-output profit model. That means that costs are represented by an index of the costs per unit of a composite input. The cost index is constructed as a weighted average of three cost sub-indices representing important input cost categories: energy (e.g. electricity and fuels), tradable (e.g. crop protection products, other specific crop costs, veterinary costs and other specific livestock costs, machinery, and buildings) and other non-tradable inputs (e.g. contract work, other farming overheads, depreciation, wages and own work).

The main equation for the cost of production commodity index for livestock products is defined as follows:

$$\boldsymbol{CPCI_{l,r,t}} = \boldsymbol{SHEN_{l,r,t}} \times \frac{\boldsymbol{XP_{OIL,t} \times XR_{r,t}}}{\boldsymbol{XP_{OIL,2008} \times XR_{r,2008}}} + \boldsymbol{SHTR_{l,r,t}} \times \frac{\boldsymbol{GDPD_{USA,t} \times XR_{r,t}}}{\boldsymbol{GDPD_{USA,2008} \times XR_{r,2008}}} + \boldsymbol{SHNT_{l,r,}} \quad (8)$$

where

- $CPCI_{l,r,t}$ is commodity production cost index for livestock commodity (beef and veal, pigmeat, poultry, sheep) l, in region r, in year t;
- $SHEN_{l,r,t}$ is the weight of energy inputs in total base year commodity production costs;
- $SHTR_{l,r,t}$ is the weight of tradable inputs in total base year commodity production costs;

- $SHNT_{l,r,t}$ is the weight of non-tradable inputs in total base year commodity production costs;
- $GDPD_{r,t}$ is the Gross Domestic Product Deflator in region r in year t;
- $XR_{r,t}$ is the nominal exchange rate in region r in year t with respect to the US Dollar;
- $XP_{OIL,WLD,t}$ is the World Crude Oil price in year t.

According to the OECD/FAO model framework, each of the 3 cost sub-indices are calculated as deflated indices of livestock commodities representing the cost sub-indices indicated: a deflated (to 2008) world crude oil price for the cost of energy in local currency, a deflated (to the US index in 2008) world consumer price index as proxied by the US GDP Deflator for the tradable inputs, and a deflated (to 2008) consumer price index in each country proxying for local price movements of non-tradable inputs.

The weights of the various cost categories (e.g. $SHEN_{l,r,t}$) are region specific. They were estimated based on historical cost structures in regions. They are weights to aggregate, from different cost sub-indices, a univariate input cost index. This cost index moves up and down depending on the price movement of each input and on the region-specific weights. The cost index represents a unitary cost of all the inputs used to produce that commodity.

The feed costs are endogenous to the model, and therefore they are not considered in these weights. The total cost of labour is included. Thus, own labour is accounted for at its opportunity cost. Land and capital costs are not included except for depreciation.

Animal welfare regulation presumably affects production costs, so the model for the 'commodity production cost index' (CPCI) is augmented by $A_{CPCI,t}$ to follow equation (9):

$$\boldsymbol{CPCI_t = [SHEN \times \Delta XP_{OIL,t} + SHTR \times \Delta GDPD_{USA,t} + SHNT \times \Delta GDPD_t] \times (1 + A_{CPCI,t}/100)}, \quad (9)$$

where $A_{CPCI,t}$ is a 'production cost' adjustment factor and the Δ is an operator deflating prices and translating into national currencies. The $A_{CPCI,t}$ variable is used to model higher or lower production costs or cost-increasing/decreasing productivity changes.

Consumer prices

In each of the regions considered in this exercise (EU-14 and EU-13), consumer prices (CP) differ from producer prices (PP) as they include taxes (TAX) and retail margins (MAR):

$$\boldsymbol{CP_{l,r,t} = (PP_{l,r,t} + MAR_{l,r,t}) \times (1 + TAX_{l,r,t}/100) + ADDTAX_{l,r,t}}, \quad (20)$$

where $ADDTAX_{l,r,t}$ stands for an additional tax. The retail margins are modelled as

$$\boldsymbol{log(MAR_{l,r,t}) = \alpha + \beta \times log(GDPD_{r,t}) + log(R_{MAR_{l,r,t}})}. \quad (31)$$

Consumer prices at the aggregate EU level are a weighted average of the regional ones

(weighted by population, POP, in each of the regional blocks):

$$\boldsymbol{CP_{EUN}} = (\boldsymbol{CP_{EU14}} \times \boldsymbol{POP_{EU14}} + \boldsymbol{CP_{EU13}} \times \boldsymbol{POP_{EU13}})/(\boldsymbol{POP_{EU14}} + \boldsymbol{POP_{EU13}}) \quad (42)$$

Scenario shocks

The measures proposed represent a change in costs. We assume that the producer price shocks impact the cost of production commodity index $CPCI$, while the consumer price shocks affect the consumer price retail margins MAR. The presented analysis only considers pigmeat, eggs, poultry production and dairy cows and beef & veal cattle, including direct/indirect and feed market interactions. The shocks for consumer prices are applied to a proportion of consumer price margins affected by the cost categories. For the purpose of calculating the proportions, consumer price margins are from the 2023 baseline in the Agricultural Commodity Market Model.

To illustrate the impact of a production cost increase, we consider the EU market effects in 2031 of cost shocks for each animal product, all starting in 2025. Table 1 shows the percentage shocks as percentage increases in consumer price margin (Kill and Transport category).

Table 1: Percentage changes to cost of production commodity index (Kept) and consumer price (Kill and Transport) margins

Percentage change (%)		Option I	Option II
Poultry	**Kept**	0.00	0.00
	Kill & Transport	8.06	7.88
Eggs	**Kept**	0.00	0.00
	Kill & Transport	0.25	0.25
Pork	**Kept**	0.16	0.05
	Kill & Transport	1.46	1.43
Dairy	**Kept**	0.00	0.00
	Kill & Transport	0.19	0.19
Beef	**Kept**	0.35	0.10
	Kill & Transport	8.55	8.37

How to incorporate the scenario shocks into the model

In order to implement producer shocks, we change the $A_{CPCI,t}$ term in equation (9)) for the increases/decreases in producer costs. Kept animal rules affect producer costs and are thus entered as shocks in the $A_{CPCI,t}$ variable from 2025 onward.

Regarding consumer shocks, we increase the retail margin $MAR_{l,r,t}$ in equation (10) with the cost increases provoked by the new transportation rules. These changes are introduced exogenously on the residual term $\log\left(R_{MAR_{l,r,t}}\right)$ in equation (11).

We model two different policy packages with regard to the duration of transport of animals and journey times. The first scenario corresponding to Policy Option I entails reduced journey times. The second scenario reflects a policy option that allows for longer journeys, while still limiting journey times. We take into account the fact that different journey times affect not only consumers through the prices they are willing to pay, but also but also the farmers.

Model limitations

The Agricultural Commodity Market Model can only depict European and global agricultural markets in a simplified manner. A model is a simplified approximation of reality and cannot fully capture the behaviour of all agents involved. Consequently, several limitations of this analysis should be mentioned. Most importantly, lack of data is the main limitation to acknowledge. Information on regional transport practices and the costs attached to them is difficult to obtain. It is also difficult to assess the potential for implementation of each measure in each region.

A differentiation of market impacts by Member State would have been desirable, instead of only having EU14 and EU13 regional aggregates. This limitation is due to the global templated structure of the model and cannot be easily overcome in the short term. However, this limitation is not so important in a situation of a well-functioning EU common market.

The basic assumption in the model is that of perfectly competitive markets and homogenous goods. In reality, there are many market imperfections, and goods are often differentiated with respect to their quality and/or other attributes. The latter aspect could be important with regards to the animal welfare at transport regulation. Some consumers might be willing to pay extra for animal products produced in the EU, if the new transport regulation is passed. However, the model does not differentiate between goods from different countries. Therefore, the simulation results might overstate the negative impacts on domestic EU production and EU trade, but the extent of this overstatement is difficult to evaluate.

With respect to costs, the model lacks an explicit representation and separation of the different transportation cost elements involved.

Last but not least, in the presented ex-ante analysis it is not possible to capture all underlying interlinkages with other parallel policy proposals (e.g. Farm to Fork or Biodiversity strategy). The magnitude of the scenario shocks (i.e. distance from baseline values) needs also to be considered since the model is calibrated to a common vision of the future and the precision of measured marginal changes may be decreased when extreme changes are predicted.

Nevertheless, even though limitations to this modelling framework exist, no better alternatives for the analysis of these future policy scenarios exist in the timeframe allowed. Although the current modelling framework has not been developed to analyse the animal transport sector and present limitations, because it is an aggregated agricultural commodity market model and

market impacts are close to negligible, the economic analysis performed can be identified as robust and transparent.

2.5. Costs and benefits

The source and base for the cost calculations can be found in the external study supporting this impact assessment[23].The benefits for society of improving animal welfare are expected to be greater than the costs but it is difficult to monetise them. While for some, the relationship is clearly established (poor animal welfare associated with increased risks of zoonosis and antimicrobial resistance) and has clear economic implications (diseases are a tremendous economic burden to society), there are major limitations when attempting to provide a price tag, due to the many different and unknown variables affecting this relationship. Other benefits simply cannot be expressed in monetary terms (animal welfare from the animal's point of view).

2.6. Assessment of food affordability

The impact of the **policy packages** for improved animal welfare legislation during the transport phase on final consumer prices for animal-based products, **considering an endogenous trade response**, has been estimated as summarised in Table 2. We distinguish between direct impacts on retails prices due to the changes in animal welfare requirements (pigs, poultry and eggs, cattle) and indirect impacts due to the new equilibrium in the agricultural sector following the implementation of those requirements (sheep and goat).

Table 2. Impacts on consumer prices of enhanced animal welfare legislation for transport by product in percentage

	Retail price increase by 2030 (%)			
	Package 1		**Package 2**	
	AW shock[1]	**Market feedback impacts[2]**	**AW shock[1]**	**Market feedback impacts[2]**
Product	*Endogenous imports*	*Endogenous imports*	*Endogenous imports*	*Endogenous imports*
Beef and Veal	4.45		4.37	
Sheep and Goat		0.18		0.17
Pig	1.15		1.12	
Poultry	2.77		2.70	
Eggs	0.20		0.20	
Fresh Dairy products	0.17		0.17	
Cheese	0.06		0.06	
Butter	0.08		0.08	

Note: 1) impacts derived from the application of new AW requirements; 2) impacts from the endogenous response in the model to (1).
Source: Agricultural Commodity Market Model simulations described above

In order to get an idea of how much would the price increases identified would affect food affordability of European citizens of different income groups, data is needed about four main concepts:

a. Share of food in total expenditure

[23] Transport study, p. 22 (see note 5, page 8).

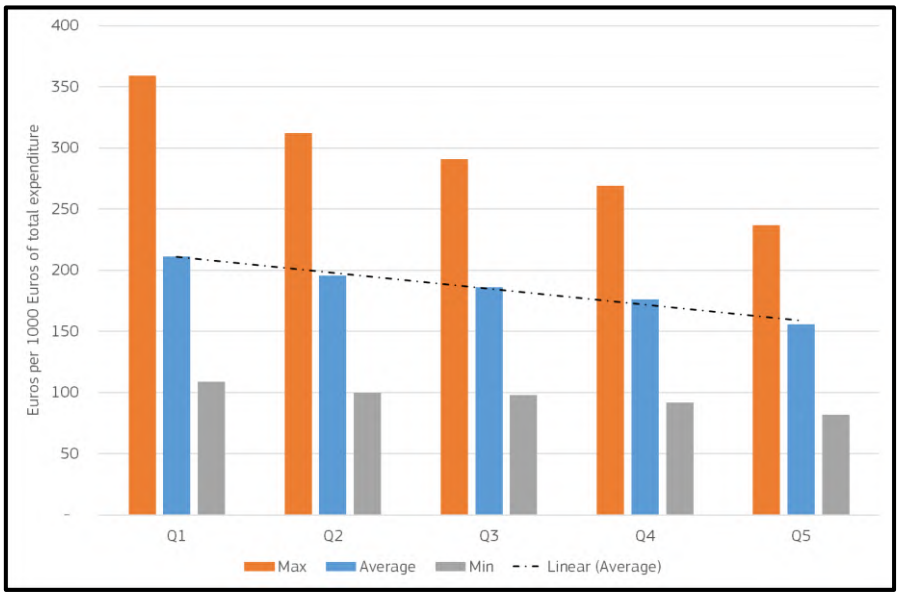
b. GDP growth to 2030
c. Share of products affected by animal welfare legislation (PAWL) in total food expenditure
d. Expected changes in diets

Considering these three aspects, we can project to 2030 the relative share of different meat products in food and total expenditure. We describe below each of the steps taken to do so.

Share of food expenditure in total expenditure

The first data source we use is that of **share of food expenditure in total expenditure** reported by Eurostat in its Harmonised Index of Consumer Prices data set[24]. Data is available for different aggregates following the Classification of individual consumption by purpose (COICOP) and split for different income quintiles. Data is reported every 5-years and the last available data is for 2020. On average the share of total expenditure on food ranges from 21.1% for the lowest income quartile to 15.6% to the highest one (Figure 1). Member State specific data is reported in annex 1.

Figure 1. Share of food expenditure in total expenditure by income quintile in the EU (2020).



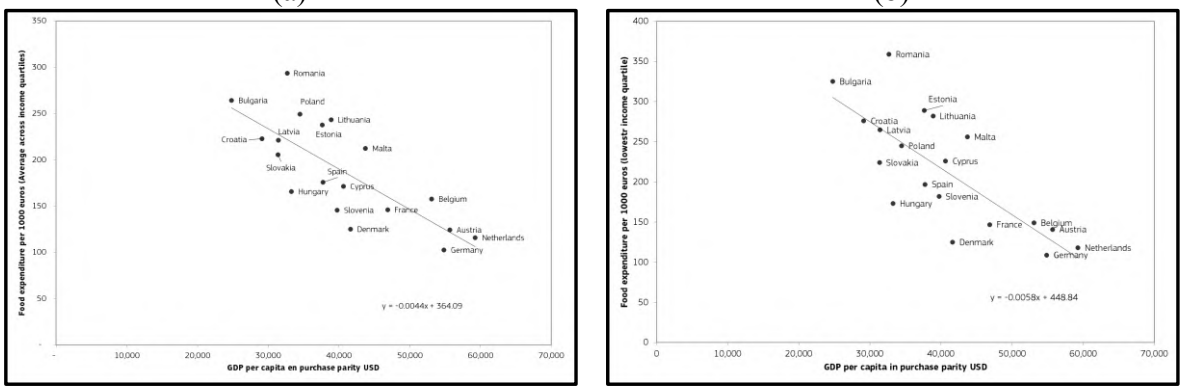
Source: Eurostat and own elaboration

These averages hide quite some heterogeneity across countries even within income groups, with the share of food on total expenditure reaching 36% of total expenditure for the lowest income group in Romania and just 11% in Germany. However, what can be seen from the inspection of the data is that the share of food in total expenditure falls with increasing income across income quartiles, confirming Engel's law. This is also the case when we inspect that across countries, in particular for the lower income quartile, even when taking into account differences in purchase power parity (Figure 2).

[24] Data extracted from Eurostat.

Figure 2. Relationship between GDP and food expenditure share for EU countries in 2020 on average (a) and for the lowest income quintile (b).

(a) (b)



Source: Eurostat, World bank and own elaboration

The impact of economic growth on the share of food expenditure in total expenditure

Based on the negative relationship observed between GDP and share of food in total expenditure, **we need to update the shares of food expenditure on total expenditure incorporating the growth in GDP that is expected from 2020 to 2030.** These growth rates are taken from the macro assumptions of the mid-term outlook for the European agricultural sector[25] with real GDP per capita growing on average by 24%, with a minimum of 14% for Luxembourg and a maximum of 55% for Croatia.

We need to take into account the decreasing share that food will have on total expenditure by 2030 assuming current growth rates. For this, we fit a fixed year and country effects panel data model with the shares of food expenditure in total expenditure per income quartile as dependent variable and GDP per capita as independent variable taking logs in both sides of the equation. Results of these regressions are shown in Table 3 with each additional 100 euros in GDP per capita reducing the share of food in total expenditures from 0.39 percentage points in the lowest income quintile to 0.68 percentage points in the highest one.

Table 3. Panel regressions for log food expenditure shares on GDP per income quartile

	Income quintiles				
	Q1	Q2	Q3	Q4	Q5
Constant	9.339063	10.14851	11.21318	10.99409	11.82129
Log(gdp)	-0.3986765	-0.4866958	-0.5991989	-0.5849352	-0.6836224
Observations	98	98	98	98	98
R-squared	0.9717	0.9652	0.9687	0.9640	0.9560
Country fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

Source: own elaboration

[25] European Commission, Directorate-General for Agriculture and Rural Development, *EU agricultural outlook for markets, income and environment 2022-2032*, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2762/29222.

We use the parameters obtained from the panel regressions to project the share of food expenditure in total expenditure taking into account the increased GDP. In order to avoid implausible results, if the share obtained in this way is above the 2020 share in the dataset we use the 2020 share. For the three cases studies selected below, this is the case for Germany in the lowest income quintile and for Portugal in both highest and lowest quintile.

We do the analysis for 2030 even when the cost shocks are for 2031 as there are no reliable GDP growth projections to 2031. Assuming that GDP would continue growing from 2030 to 2038 this means that our estimates are higher bounds as the higher the GDP the lower the share of food on total expenditure.

Share of food affected by animal welfare legislation in total food expenditure

Information regarding the **share in value of products affected by animal welfare legislation (PAWL)[26] in total food consumption** is only available at the aggregated level (e.g. not by income quintile). This data comes from the GTAP database[27] and on average for the EU 34.2% of total food expenditure is related to this group of products (Table 4). Country specific figures are provided in Annex 2.

Table 4. Shares of expenditure in products affected by animal welfare legislation on total and food consumption in the EU

	Share in total (food) consumption (%)		**Share in total (food) consumption (%)**
Expenditure Category	**Maximum**	**Minimum**	**EU Avarage**
Sheep and goats, horses	0.15 (0.75)	0.00 (0.00)	0.00 (0.01)
Pig	0.38 (2.29)	0.01 (0.12)	0.05 (0.50)
Raw milk	1.27 (5.28)	0.06 (0.30)	0.17 (1.55)
Other red meat products	0.46 (2.35)	0.04 (0.36)	0.12 (1.10)
Pork	3.00 (15.67)	0.29 (3.45)	0.94 (8.60)
Dairy products	3.70 (20.70)	0.27 (6.09)	1.21 (11.06)
Live Chicken	0.38 (2.37)	0.01 (0.08)	0.05 (0.43)
Poultry	1.91 (10.65)	0.02 (0.25)	0.50 (4.51)
Live cattle	0.42 (2.14)	0.00 (0.00)	0.00 (0.04)
Beef	1.18 (10.61)	0.10 (1.33)	0.71 (6.49)
TOTAL	**8.94 (54.49)**	**1.33 (23.98)**	**3.76 (34.2)**

Source: GTAP database

Changes in diets

Another aspect to take into account to see the affordability of these price increases relates to the changes in diets. According to the latest mid-term outlook for the European agricultural sector consumption of food affected by animal welfare legislation is expected to fall by 2030 compared to 2020 for beef, pork, fresh dairy products and butter, while it will increase for sheep, poultry, eggs and cheese Table 5.

[26] Including sheep and goat, pig, raw milk, other read meat products, pork, dairy products, live chicken, poultry, live cattle and beef.

[27] Aguiar, A. et al., 'The GTAP Data Base: Version 10', *Journal of Global Economic Analysis*, Volume 4, 1, Purdue University, 2019.

Table 5. Per capita consumption of products affected by animal welfare legislation (kg)

	2020	**2030**	**% change 2030-2020**
Beef and Veal	10.4	9.7	- 6.6
Sheep and Goat	1.3	1.3	+ 0.6
Pig	32.1	31.3	- 2.5
Poultry	23.6	24.0	+ 1.5
Eggs	13.5	14.3	+ 5.4
Fresh Dairy products	82.9	77.4	- 6.6
Cheese	21.0	21.3	+ 4.0
Butter	4.8	4.7	- 0.7

Source: DG AGRI Mid-Term Outlook 2022

Dealing with aggregation for impacts on eggs

We have no data on expenditure for eggs as a standalone product in the sources focusing on expenditure, as the expenditure on eggs is reported aggregated with dairy.

Therefore, to include the impact on eggs we need to weight changes in eggs consumption and expenditure in relationship with the other product groups included in the dairy aggregate. As our focus in changes in expenditure, we use this concept to construct weights. For this, we use the data from the Agricultural Commodity Market Model baseline, which does split consumption in all of the components of the dairy product group.

	Share of total expenditure	Share of expenditure in group	Change in price		Change in quantity	
			Package I	*Package II*		
			Endogenous imports	*Endogenous imports*	*Package I*	*Package II*
Cheese	8.832	71	0.06	0.06	4.0	
Butter	1.369	11	0.08	0.08	-0.7	
Eggs	2.252	18	0.20	0.20	5.4	
Total for group	**12.453**	**100**	**0.09**	**0.09**	**3.74**	

Note: Total for group calculated as sum for first two columns and as weighted average by share of expenditure for the last five columns.
Source: Agricultural Commodity Market Model database, Agricultural Commodity Market Model modelling results, DG AGRI Mid-Term Outlook 2022 and own calculation.

Conclusions

In summary, the assumptions for our affordability calculations of the packages of options for revised animal welfare legislation considering endogenous trade response and keeping imports at baseline level are as follows:

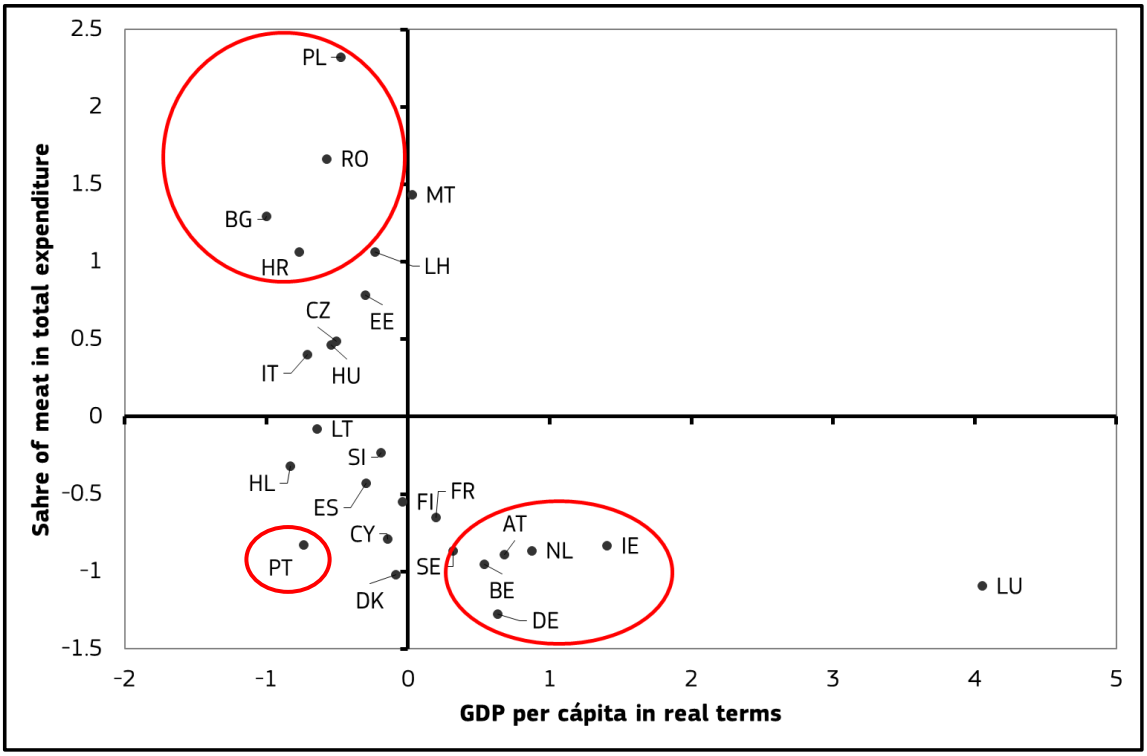
a. Share of food expenditure in total expenditure falls with GDP growth as observed during the period 2005-2020 during the period 2020-2030.
b. GDP in EU countries grows as in the macro assumptions of the MTO 2022.
c. Quantity of products affected by animal welfare legislation changes homogenously across income quartiles as projected in MTO 2022.
d. Share of different components of food expenditure is the same across income quartiles and remains stable until 2030 except for changes in consumption.
e. PAWL prices increase as per the Agricultural Commodity Market Model simulations

The impact on affordability is calculated as follows:

a. We calculate the total expenditure on FAWL products that is expected in 2030 using the modified quantities and the baseline prices.
b. We calculate the total expenditure on FWAL products that is expected in 2030 using the modified quantities and modified prices.
c. The difference between (a) and (b) is the impact on affordability of the change in animal welfare legislation keeping the same level of FAWL consumption.

The impact is reported as additional expenditure in euros per year and as share of total income. To show case the diversity of impacts we select three countries to taking into account differences in meat expenditure and GDP (Figure 3). As it can be seen in Figure 3 the relationship between expenditure and GDP shown for overall food expenditure also holds for expenditure on foods affected by animal welfare legislation. The wealthier the country the less importance expenditure on PAWL on total expenditure. We choose one country with a low GDP and high share of FAWL on total food expenditure (PL), one with low GDP and low share of FAWL on total food expenditure (PT) and one with high GDP and low share of FAWL on total food expenditure (DE).

Figure 3. Intensity of expenditure in foods affected by animal welfare legislation and GDP for EU MS (2020)



Note: figures normalised.
Source: GTAP and Agricultural Commodity Market Model.

Taking all this together the expected impacts in terms of additional food expenditure is reported in Table 6. We can see that the increase in price of animal products due to enhanced animal welfare requirements in package I will represent at most EUR 14.38 per person and year (highest income group in Portugal) a minimum of EUR 2.87 per person and year (lowest income group in Germany). When package II is chosen, the expected costs is reduced on average by 2.15%; with the highest cost being EUR 14.09 per person a year (also for the highest income group in Portugal) and the lowest EUR 2.81 (again for the lowest income group in Germany).

In terms of impact on total expenditure, the figures are very small, with a maximum of 0.096% of total expenditure for the lowest income group in Poland a minimum of 0.035% of total expenditure for the richest income group in Germany in package I. In package II, these shares are reduced to 0.094% and 0.034% respectively.

Table 6. Change in in expenditure (euros per person and year) in FAWL in 2030 due to package I and package II measures for new AW transport legislation with endogenous trade response

	Poland				**Germany**				**Portugal**			
	Poorest Quintile		Richest Quintile		Poorest Quintile		Richest Quintile		Poorest Quintile		Richest Quintile	
Option / *Product*	1	2	1	2	1	2	1	2	1	2	1	2
Sheep and goat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pig	0.10	0.09	0.33	0.32	0.04	0.03	0.17	0.17	0.02	0.02	0.08	0.08
Raw milk	0.02	0.02	0.08	0.08	0.03	0.03	0.13	0.13	0.01	0.01	0.03	0.03
Other read meat	0.10	0.10	0.34	0.34	0.17	0.16	0.83	0.81	0.16	0.16	0.76	0.75
Pork	0.74	0.72	2.54	2.47	0.64	0.63	3.18	3.10	0.47	0.46	2.25	2.19
Dairy	0.06	0.06	0.22	0.22	0.05	0.05	0.23	0.23	0.05	0.05	0.24	0.24
Live chicken	0.30	0.30	1.04	1.02	0.04	0.04	0.20	0.20	0.03	0.03	0.13	0.13
Poultry	1.23	1.19	4.22	4.11	0.65	0.63	3.22	3.14	0.48	0.47	2.29	2.24
Live cattle	0.00	0.00	0.02	0.02	0.01	0.01	0.06	0.06	0.00	0.00	0.01	0.01
Beef	0.48	0.47	1.66	1.63	1.25	1.23	6.22	6.10	1.81	1.78	8.58	8.43
Total	3.03	2.96	10.45	10.20	2.87	2.81	14.24	13.94	3.04	2.98	14.38	14.09
Share of total income (%)	**0.096**	**0.094**	**0.074**	**0.073**	**0.038**	**0.037**	**0.035**	**0.034**	**0.072**	**0.071**	**0.072**	**0.071**

Source: own calculations

Table 7. Share of food and non-alcoholic beverages in total expenditure by income quintile and Member State (euros per thousand euros)

	Latest year available	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Austria	2020	141	127	128	118	107
Belgium	2020	149	157	160	158	164
Bulgaria	2020	325	284	267	243	202
Croatia	2020	276	236	221	198	183
Cyprus	2020	226	198	170	146	117

Czechia	2015	237	232	227	208	187
Denmark	2020	125	132	129	125	115
Estonia	2020	289	252	238	224	185
Finland	2015	128	122	129	123	110
France	2020	147	150	154	150	128
Germany	2020	109	104	103	103	93
Greece	2020	222	227	211	197	176
Hungary	2020	173	169	171	163	152
Ireland	2015	137	133	118	112	101
Italy	2005	282	236	212	187	133
Latvia	2020	265	238	218	217	167
Lithuania	2020	282	242	238	242	213
Luxembourg	2020	123	100	98	92	82
Malta	2020	256	251	207	186	161
Netherlands	2020	118	115	117	116	114
Poland	2020	245	259	263	255	225
Portugal	2015	183	168	156	144	116
Romania	2020	359	312	291	269	237
Slovakia	2020	224	214	206	199	185
Slovenia	2020	182	158	141	130	116
Spain	2020	197	188	177	170	147
Sweden	2015	122	119	124	118	109

Source: Structure of consumption expenditure by income quintile and COICOP consumption purpose [HBS_STR_T223__custom_4982177]

Table 8. Shares of expenditure in products affected by animal welfare legislation on total (food) consumption for each Member State

	Sheep and goat		Pig		Raw milk		Other read meat		Pork		Dairy		Live chicken		Poultry		Live cattle		Beef		**Total**	
	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	Total	Food	**Total**	**Food**
Austria	0.00	0.01	0.08	0.91	0.14	1.65	0.06	0.74	0.63	7.46	0.84	9.89	0.06	0.68	0.37	4.33	0.00	0.04	0.49	5.78	**2.67**	**31.47**
Belgium	0.00	0.00	0.09	0.70	0.12	0.90	0.14	1.09	0.45	3.45	1.40	10.77	0.03	0.24	0.24	1.84	0.00	0.02	0.64	4.95	**3.11**	**23.98**
Bulgaria	0.00	0.00	0.19	0.95	0.99	4.89	0.37	1.81	3.00	14.85	1.36	6.72	0.28	1.40	1.18	5.82	0.00	0.01	0.33	1.64	**7.70**	**38.10**
Croatia	0.15	0.75	0.20	1.01	0.07	0.34	0.15	0.76	2.88	14.53	2.59	13.09	0.17	0.87	0.84	4.24	0.42	2.14	0.67	3.37	**8.15**	**41.09**
Cyprus	0.00	0.03	0.28	2.29	0.12	0.99	0.19	1.56	1.38	11.12	1.11	8.99	0.24	1.93	0.86	6.93	0.00	0.01	0.20	1.60	**4.39**	**35.45**
Chech R.	0.00	0.01	0.07	0.55	0.17	1.24	0.08	0.61	1.78	13.19	1.36	10.07	0.08	0.58	0.66	4.91	0.00	0.00	0.58	4.26	**4.78**	**35.43**
Denmark	0.00	0.01	0.04	0.42	0.12	1.40	0.07	0.80	0.64	7.59	1.05	12.33	0.01	0.10	0.14	1.63	0.00	0.03	0.54	6.32	**2.60**	**30.63**
Estonia	0.00	0.00	0.38	2.04	0.58	3.11	0.08	0.43	1.16	6.25	3.58	19.22	0.15	0.80	0.48	2.56	0.00	0.01	0.48	2.58	**6.89**	**37.01**
Finland	0.00	0.00	0.01	0.12	0.07	0.81	0.11	1.24	0.92	10.47	1.45	16.49	0.01	0.08	0.45	5.11	0.00	0.01	0.87	9.89	**3.90**	**44.24**
France	0.00	0.00	0.02	0.14	0.10	0.85	0.19	1.65	0.68	5.91	1.49	12.94	0.02	0.19	0.67	5.84	0.00	0.01	1.18	10.22	**4.34**	**37.77**
Germany	0.00	0.00	0.04	0.42	0.22	2.22	0.05	0.54	0.76	7.69	0.65	6.62	0.02	0.19	0.31	3.10	0.00	0.04	0.40	4.05	**2.45**	**24.88**
Greece	0.00	0.01	0.07	0.45	0.16	1.09	0.29	1.91	0.54	3.62	1.87	12.48	0.09	0.62	0.53	3.54	0.00	0.01	0.38	2.56	**3.93**	**26.29**
Hungary	0.00	0.02	0.14	1.02	0.13	0.94	0.05	0.36	2.20	15.67	1.60	11.40	0.15	1.07	1.49	10.65	0.00	0.02	0.22	1.55	**5.99**	**42.70**
Ireland	0.00	0.01	0.07	1.62	0.20	4.62	0.04	0.93	0.29	6.68	0.27	6.09	0.07	1.60	0.29	6.63	0.01	0.14	0.10	2.19	**1.33**	**30.51**
Italy	0.00	0.00	0.06	0.59	0.09	0.89	0.12	1.19	1.07	10.70	1.31	13.13	0.04	0.36	0.33	3.36	0.00	0.02	1.06	10.61	**4.07**	**40.85**
Latvia	0.00	0.00	0.07	0.36	0.66	3.36	0.09	0.45	1.41	7.14	1.47	7.46	0.14	0.70	1.08	5.50	0.00	0.02	0.26	1.33	**5.19**	**26.33**

Lithuania	0.00	0.00	0.10	0.52	0.06	0.30	0.08	0.40	1.90	9.46	3.70	18.49	0.08	0.42	1.23	6.12	0.00	0.01	0.36	1.78	**7.51**	**37.50**
Luxembourg	0.00	0.00	0.01	0.12	0.07	0.75	0.23	2.35	0.75	7.60	1.78	18.18	0.01	0.12	0.02	0.25	0.00	0.00	0.30	3.02	**3.18**	**32.40**
Malta	0.00	0.00	0.19	1.68	0.14	1.24	0.19	1.67	1.61	14.04	2.38	20.70	0.14	1.20	0.62	5.41	0.00	0.01	0.98	8.55	**6.26**	**54.49**
Netherlands	0.00	0.00	0.03	0.34	0.10	1.11	0.11	1.21	0.79	8.73	1.34	14.94	0.02	0.28	0.27	3.02	0.00	0.02	0.55	6.16	**3.22**	**35.80**
Poland	0.00	0.00	0.30	1.88	0.50	3.12	0.08	0.52	2.33	14.46	2.43	15.03	0.38	2.37	1.55	9.58	0.00	0.02	0.41	2.54	**7.99**	**49.52**
Portugal	0.00	0.00	0.04	0.28	0.09	0.74	0.09	0.73	1.00	7.91	1.27	10.02	0.02	0.19	0.41	3.22	0.00	0.01	1.03	8.16	**3.96**	**31.26**
Romania	0.00	0.01	0.14	0.58	1.27	5.28	0.46	1.92	2.87	11.89	1.66	6.89	0.17	0.69	1.91	7.92	0.00	0.01	0.45	1.87	**8.94**	**37.05**
Slovakia	0.00	0.00	0.14	0.96	0.08	0.56	0.09	0.63	1.66	11.07	2.18	14.57	0.17	1.12	0.90	6.02	0.00	0.02	0.58	3.86	**5.81**	**38.81**
Slovenia	0.00	0.00	0.03	0.20	0.46	3.05	0.10	0.68	1.42	9.43	1.56	10.38	0.11	0.76	1.26	8.36	0.00	0.03	0.89	5.94	**5.85**	**38.82**
Spain	0.00	0.00	0.02	0.21	0.11	1.09	0.11	1.17	0.96	9.87	0.94	9.66	0.01	0.12	0.40	4.14	0.00	0.02	0.48	4.96	**3.04**	**31.24**
Sweden	0.00	0.00	0.02	0.19	0.08	0.80	0.13	1.39	0.84	8.77	1.26	13.09	0.02	0.21	0.37	3.87	0.00	0.01	1.00	10.46	**3.72**	**38.79**

Source: GTAP

2.7. Comparison of the options and of the packages of options

Section 7. of the main report and Annex 9 include a systematic comparison of the options, as well as of the two packages of options considered, according to criteria of *effectiveness*, *efficiency*, *coherence* and *proportionality*.

This comparison is presented in the format of a narrative underpinning comparison tables using qualitative scores (using the --- to +++ scale[28]) and is based on the analysis performed in section 6., including the MCDA and cost-benefit analysis.

In particular, the comparison of options and packages in terms of *effectiveness* is based on the assessment of the animal welfare impact in the MCDA in section 6, when linked to animal welfare objectives only[29]. The comparison of the specific objective 5 on enforcement is based on the overall assessment of the options in section 6.

With regards to *efficiency*, this criterion has been assessed based on a cost-benefit analysis. For the options, a cost-benefit analysis has been integrated in the comparison tables, qualitatively assessing the total costs and the total benefits (i.e. qualitative scores), based on the analysis of section 6 (including the MCDA, which is based on quantitative data whenever possible)

The comparison of the packages is also based on the analysis performed in section 6 (including the MCDA) as well as a cost-benefit analysis of the packages presented in section 6.2.1..

3. SOURCES AND CHALLENGES

Multiple data sources and related analytical methods were applied to provide evidence for the impact assessment of the policy elements and options:

- **Literature and document review**
- **Comparative legal analysis**
- **Secondary data analysis**
- **Case studies**
- **Stakeholder consultations**

Evidence - including stakeholders' views – has mostly been gathered within the framework of the external study. The Commission has performed additional desk research and undertaken additional stakeholder consultation activities[30], including through a thematic subgroup that was established for this purpose under the EU Animal Welfare Platform[31], and which have held in

[28] The scores are given on the expected magnitude of impact: + + + being strongly positive, + + positive, + moderately positive, 0 neutral, – moderately negative, – – negative and – – strongly negative.
[29] Specific objectives 1, 2, 3, 4, 6 and 7.
[30] Between July 2021 (publication of the Inception Impact Assessment) and March 2023, DG SANTE has held 72 such dedicated meetings with stakeholders, a as an additional means to gather their views and data.
[31] European Commission, *Thematic sub-groups*.

total, 10 meetings (with minutes publicly available) since March 2022 as part of the consultation strategy.

All methods applied encountered a varying degree of difficulty in relation to lack of quantitative data. Despite a growing body of relevant literature and evidence, not enough data was found to quantify all relevant impacts of every policy measure discussed in the policy options for the future of the legislation. Whenever possible, reasonable assumptions were made to assess the impacts, but this lack of quantitative data is a key limitation to the analysis.

Limitations of the approach

- **Scale used for the scoring in the MCDA**

To note is that the scale used for the scoring of impacts and options does not possess cardinal properties as the distance between the score values is not uniform. For example, the distance between score 2 ("desirable") and score -2 ("not desirable") cannot be interpreted as score 2 being "twice as good" as score -2. Hence, the impact scores only allow for an ordinal ranking of the policy options.

- **Data limitations**

The supporting study animal welfare during transport, reported challenges related to data availability or reliability.

Data for specific indicators to build the baseline (and thus assess the impacts of the proposed policy options against the baseline) are limited, particularly quantitative data on certain aspects. The gaps were completed with qualitative data from stakeholders (the data collection activities were designed to provide multiple sources for triangulation of findings), detailed analysis in the case studies, and expert judgement. Specific data availability limitations were:

While TRACES was used to map the current trends in animal transport as a basis for the analysis of the options, it has some gaps, including:

- data on transports within Member States are not included;

- limited detail to distinguish specific groups of animals, such as unweaned calves or piglets;

- not all relevant data are routinely recorded in TRACES (e.g. the actual arrival time of a transport was missing in a large number of cases) – as a mitigation measure other data (e.g. the estimated arrival time, average journey times) was used to perform the analysis;

- the data received did not include data on export to third countries;

- data from countries that export without transiting through other Member States are not included - therefore the analysis of the impact of the options on export was based on Comext data.

In addition, availability of data on costs to transporters, industry and national authorities (e.g. adjustment costs, administrative and enforcement costs) is variable and, when available, can be qualitative only or lack detail. Information on these costs was collected through the stakeholder consultations (e.g. questions about the perceived significance of such costs in the survey; in-depth questions in the case study interviews). Information about other economic impacts (e.g. on the impact of a ban on long journeys, on exports of live animals outside the EU) was extrapolated from statistical data on trade (e.g. Comext) showing the impacts in terms of number of journeys impacted, as it was not possible to quantify the indirect economic impact on operators other than transporters.

Furthermore, information on environmental impacts linked to the transport of live animals (environmental impacts per transport of different types of animals, transport means, etc.) is not available. Thus, the survey and interview questions were used to collect stakeholder feedback on these environmental impacts. General data on transport's environmental impacts (e.g. GHG emissions, air pollutants, soil pressure) from existing statistical sources (e.g. European Environment Agency, Eurostat) and the number of transport kilometres were used as proxies for environmental impacts.

The study also reported that the assessment of impacts on animal welfare was also limited. Despite large numbers of indicators to measure potential changes in welfare, no harmonised animal welfare indicators are in place at European level. In addition, that measurement is complex, the indicators can only measure a certain degree of change implied by the policy options and leads to difficulties to measure the gain in terms of welfare of one option against another. Regarding transport, quantitative data (e.g. on mortality or injuries) are generally perceived to be insufficiently sophisticated to measure the animal welfare impact of transport. There is no general consensus on acceptable thresholds for animal welfare related to transport, nor on maximum transport distances or duration that can be used as a generally accepted standard. Accordingly, the analysis of these impacts is qualitative and reliant on the EFSA opinions on requirements that may reduce risks to animal welfare, as well as stakeholders' perceptions and experts' judgement.

- **Challenges related to large scope of impacts assessed**

The study also faced several challenges given its large scope. First, many types of animals and means of transport needed to be considered: the type of animals transported varies from day-old chicks (DOC), small fish to mature cattle, while the means of transport varies from climatised trucks and airplanes to large livestock vessels. As collecting information for each situation was impossible, the impacts are described in more general terms (e.g. general animal welfare impacts rather than per species, general economic impacts rather than per country/region). However, a more detailed analysis of the impacts in specific situations is provided through the case studies, which cover specific animal transport aspects, animal species and geographical regions.

Second, animal transport is part of a larger value chain of food production ranging from agriculture/farm level, through transport, slaughter and processing to retail. The Transport Regulation regulates the transport part of the value chain and directly impacts only the stakeholders directly involved in moving animals i.e. transporters and public authorities who carry out official controls. Other stakeholders in the value chain such as farmers, breeders,

exporters, slaughterhouses, retailers or consumers may experience indirect impacts. Considering the broad scale of the topic (animals and modes of transports concerned) together with the complexity of the value chain and impossibility to account for all potential indirect impacts along it, the assessment in this study is focused on the direct impacts of animal transport and the stakeholders directly concerned by this activity. For example, the analysis of economic impacts focuses on impacts to the transporters and competent authorities and the analysis of environmental impacts focuses on the impacts of transport. Indirect impacts such as the environment consequences of animal production or the economic impacts on farmers, slaughterhouses, exporters or other stakeholders are discussed only where they are expected to be significant and where information is available.

- **Challenges related to timeline restrictions**

In regard to animal welfare during transport, expert judgement and analysis of TRACES data was used to complement the information gathered from stakeholders and, to the extent possible, assess the detailed options.

4. CORRELATION TABLES WITH EXTERNAL STUDY FOR THE MCDA

One major source for the performance of policy options within the MCDA were the scorings provided by the external study accompanying the Impact Assessment.

The study contains impact scores for certain policy options in the four dimensions (animal welfare, economic, social and environmental impacts). While the scores are based on a methodology provided by the European Commission, the presentation of the policy options are in some cases somewhat different. Some policy options are not at all (or only partially) addressed in the supporting study. This is because some of the policy options have been fine-tuned in the process of preparation of the impact assessment. In such cases, the Commission has made use of other, triangulated evidence as a basis for the scoring of the options in this assessment. That evidence, which includes academic literature and stakeholders' views gathered in the thematic subgroup under the EU Animal Welfare Platform, has also been used to generally complement and qualify the scoring suggested in the supporting study. Hence, the scoring of options in this assessment sometimes differs from the scoring suggested in the supporting study.

The following tables indicate the correspondence of the examined policy actions in the external study with the policy options mentioned in section 6. on the impacts of the policy options **in the main document** as well as in Annex 9 of this impact assessment. Where there is no corresponding option in the supporting study, the tables summarise the main considerations taken into account for the scoring.

Section 6.1.1 "Journey times and space allowance during transport" of the main document

Policy code SWD	**Policy option in study**
1.O.1A + 1.O.2A + 1.O.3	Partially corresponding to Option A of journey time + the Option on space allowance. Deviation for the social score as

	the combined effects of reducing journey times and increasing space allowance leads to a neutral impact.
1.O.1A + 1.O.2B + 1.O.3	Partially corresponding to Option B/C + the Option on space allowance. Deviation for the social score as the combined effects of reducing journey times and increasing space allowance leads to a limited impact.
1.O.1B + 1.O.2B + 1.O.3	Partially corresponding to Option D + the Option on space allowance. Deviation for the social score as the combined effects of reducing journey times and increasing space allowance leads to a very limited impact.

Section 6.1.2. "Export of live animals" of the main document

Policy code SWD	**Policy option in study**
2.O.1A + 2.O.2A	Option A, with more negative economic impact due to the importance of the direct impact of the ban on operators.
2.O.1B + combination of 2.O.2C (animal welfare officer) and 2.O.2E (white and grey flag)	Option B/C
2.O.1B + combination of 2.O.2B (vet on board) and 2.O.2D (white flag)	No corresponding option in the supporting study. The following considerations were taken into account for the scoring: Animal welfare impacts: slightly higher impact compared to 2.O.1B + 2.O.2C and 2.O.2E due to the requirement of only white flag for sea transports and the requirement of a vet on board. Environmental and social impacts: same as in 2.O.1B + 2.O.2C and 2.O.2E. Economic impacts: more severe economic impacts compared to 2.O.1B + 2.O.2C and 2.O.2E due to the requirement of a veterinarian on board and of white flag only.

Section 6.1.3. "Transport of unweaned calves" of the main document

Policy code SWD	**Policy option in study**
3.O.1	Option C

Section 6.1.4. "Transport in hot temperatures" of the main document

Policy code SWD	**Policy option in study**
4.O.1	No corresponding option in the supporting study. The following considerations were taken into account for the scoring: Animal welfare impacts: Positive impacts as less animals will suffer from hot temperatures. Environmental impacts: same as in the baseline. Economic and social impacts: Some negative impacts due to the logistical challenges of organising journeys at night or rerouting journeys, with economic and social consequences.

Section 6.1.5. "New technologies" of the main document

Policy code SWD	**Policy option in study**
5.O.1A + 5.O.2	Option A/B with deviations for economic and social impacts: - Economic: the reduction of administrative burden for operators will bring economic benefits. This, combined with the need for more staff in public administrations results in a neutral impact overall. - Social: Due to expected increase in staff needed in administrations, a slight positive social impact could be

	expected in terms of employment. Furthermore, for operators, the simplification thanks to digitalization will mean improved working conditions.
5.O.1B	Option D

Section 6.1.6. "Transport of cats and dogs" of the main document

Policy code SWD	**Policy option in study**
6.O.1A	Option C with some adaptations: Slight negative economic impact due to the additional costs associated with the option.
6.O.1B	Option D with some adaptations: Positive animal welfare score but slightly lower than 6.O.1A due to the animal welfare benefits associated with an age limit. Slight negative economic impact due to the additional costs associated with the option, however to a lesser extent than 6.O.1A. Positive social impact due to the benefits of the vaccination requirements for human health, as well as positive social impacts for pet buyer to be able to buy puppies and kittens at a younger age and socialise them at home.

5. SENSITIVITY ANALYSIS

In addition to Scenario 1 being presented in the main document to this impact assessment, the following scenarios that differ in the weighting of the four impact dimensions of interest (animal welfare, economic, social, and environmental impacts) have been taken into account in a sensitivity analysis of the scorings provided by the multi-criteria analysis. In order to ensure better compatibility with the external study, the original scale was retained for the sensitivity analysis.

Scenario	Relative weight of criteria			
	Animal welfare	Environmental	Economic	Social
Scenario 1 – No weight	0,25	0,25	0,25	0,25
Scenario 2 – Study scenario	0,35	0,25	0,20	0,20
Scenario 3 – Animal welfare	0,40	0,20	0,20	0,20
Scenario 4 – Economic	0,20	0,20	0,40	0,20
Scenario 5 - Environment	0,20	0,40	0,20	0,20

Measure 1: Journey times and space allowance

Scoring Scenario/Policy Option	Baseline scenario	1.O.1A + 1.O.2A+ 1.O.3	1.O.1A + 1.O.2B+ 1.O.3	1.O.1B + 1.O.2B +1.O.3
S1	0	0.18	0.25	0.18
S2	0	0.47	0.48	0.39
S3	0	0.54	0.58	0.5
S4	0	-0.22	0.08	0.02
S5	0	0.24	0.16	0.06

Measure 2: Exports

Scoring Scenario/Policy Option	Baseline scenario	2.O.1A + 2.O.2A	2.O.1B + combination of 2.O.2C (animal welfare officer) and 2.O.2E (white and grey flag)	2.O.1B + combination of 2.O.2B (vet on board) and 2.O.2D (white flag)
S1	0	-0.3	0.2	0.08
S2	0	0.09	0.43	0.35
S3	0	0.16	0.5	0.42
S4	0	-0.64	0.04	-0.18
S5	0	-0.12	0.22	0.12

Measure 3: Transport of unweaned calves

Scoring Scenario/Policy Option	Baseline Scenario	3.O.1
S1	0	0.33

S2	0	0.59
S3	0	0.66
S4	0	0.12
S5	0	0.36

Measure 4: Hot temperatures

Scoring Scenario/Policy Option	Baseline Scenario	4.O.1
S1	0	0.25
S2	0	0.5
S3	0	0.6
S4	0	0.1
S5	0	0.2

Measure 5: New technologies

Scoring Scenario/Policy Option	Baseline Scenario	5.O.1A + 5.O.2	5.O.1B
S1	0	0.5	0
S2	0	0.65	0
S3	0	0.8	0
S4	0	0.4	0
S5	0	0.2	0

Measure 6: Transport of cats and dogs

Scoring Scenario/Policy Option	Baseline Scenario	6.O.1A	6.O.1B

S1	0	0.68	0.75
S2	0	0.84	0.89
S3	0	0.94	0.98
S4	0	0.48	0.58
S5	0	0.54	0.6

As can be inferred from the tables, for most of the examined options, the chosen option continues being scored highest across all considered scenarios. The options within measure 3 (unweaned calves) and measure 4 (hot temperatures) score higher than the baseline in all scenarios. The preferred option under measure 2 (exports), measure 5 (new technologies) and measure 6 (cats and dogs) is unchanged under all scenarios.

In the case of measure 1, however, the highest scored option changes in scenario 5 which gives a higher weight to the environmental impact. Scenario 1 was given precedence in this situation due to the already existing economic strain on farmers as well as the dual objective of providing higher welfare while contributing to sustainable agriculture and food production.

ANNEX 5: COMPETITIVENESS CHECK

1. OVERVIEW OF IMPACTS ON COMPETITIVENESS

Dimensions of Competitiveness	Impact of the initiative (++ / + / 0 / - / -- / n.a.)	References to sub-sections of the main report or annexes
Cost and price competitiveness	0	Section 6. of main report, and Annex 9
International competitiveness	-	Section 6. of main report, and Annex 9
Capacity to innovate	+	Section 6. of main report, and Annex 9
SME competitiveness	0	Section 6. of main report, and Annex 9

2. SYNTHETIC ASSESSMENT

2.1. Cost and price competitiveness

Moving towards higher animal welfare standards is **in the strategic long-term interest of operators concerned** in order to maintain their competitiveness. In the absence of such changes, consumer demand for animal products, in particular red meat, is likely to further decrease, notably as a result of reputational damage for the sector. There is a large body of evidence of high willingness to pay on the part of European consumers for products associated with high animal welfare standards.

In addition, there is evidence that countries which adopt higher welfare standards for transporting animals, even where competitors do not follow the same standards, are able to maintain or enhance the **competitiveness and profitability of their sector**. This is the case of Germany, who recently implemented a minimum age of 4 weeks for the transportation of unweaned calves. This decision was supported by transporters who stated that animals were better fit for transport at that age, more stable, which resulted in fewer death and damaged animals at arrival which translated in a higher value[32].

The cost of livestock transportation depends on several factors such as the type of animal and the distance travelled[33]. Labour costs account for a significant part of the total transport costs,

[32] Based on stakeholder interview.

[33] Van Wagenberg, C., *The economics of animal transport – long distance animal transport in the EU*, Wageningen University and Research, 2019, p. 14; European Commission, Directorate-General for Health and Food Safety, *Study on shifting from transport of unweaned male dairy calves over long distance to local rearing and fattening – Final report*, Publications Office of the European Union, 2022, p. 39, https://data.europa.eu/doi/10.2875/072915; European Commission, Directorate-General for Health and Food Safety, *Welfare of animals exported by road – Overview report*, Publications Office, 2020, p. 5, https://data.europa.eu/doi/10.2875/946999.

as well as fuel, equipment, animal health checks and tolls[34]. It is therefore very difficult to estimate and generalise transport costs.

However, transport costs represent a small share of the total costs of animal products production and an even smaller share of the final retail price. One study informs that the transport costs of transporting live lambs from Hungary to Italy represents 11% of the value of the animals, while transporting spent hens (very low value animals) from the Netherlands to Poland represent 16% of the value of those animals (to be noted that the value of animals is less than the value of retail meat)[35]. In terms of retail value, a study estimated that for breast fillets from EU producers sold in Germany, transport costs account for an average of two cents per kilogram, i.e. less than 1 % of the total price for the meat[36].

As a result, even the costliest measure, the increase in space allowance (which indirectly limits the number of animals which can be transported in a trucks) will have a minor impact. This is confirmed by the Agricultural Commodity Market Model, which predicts a minimal impact on producer price and limited increase for the consumer (between 0.08 and 4.37%). The limited impact on production also indicates that most operators will be able to make the necessary investments. No data exists regarding the extent to which costs will be passed on through the supply chain, as those could be absorbed by retailers.

The cost of transporting animals representing a marginal component of the animal value, and it is part of the reason why it has become economically feasible to transport animals over long distances. The development of competitive integrations benefits from the economies of scale by sourcing animals from other Member States. These efficiency gains outweigh the additional transport costs for long journeys. Therefore, limiting journey time has an impact on the total production costs for farmers, as i.e. fattening farms which are sourcing their animals at a cheaper price at a distance exceeding the proposed new journey limitation will have to source their animals at a closer distance, which may come at a higher price. In addition, the measures on unweaned calves and hot temperatures may also impact fattening operations and slaughterhouses respectively. Whereas the former bear the responsibility to ensure operators respect rules on the fitness for transport at loading they may thus need to keep their animals longer on their establishment, the latter may to switch to slaughtering during the night, which is likely to result in higher labour costs, or they will have to increase the capacity of waiting areas since the whole day production will arrive during nighttime. Those impacts are difficult to quantify, however, as demonstrated in the analysis in annex 9, only 16% of bovines and of sheep and 9% of pigs are currently above proposed limitations and are therefore expected to be affected by the measure.

Finally, improving transport conditions leads to a reduced share of transported animals with lameness, injuries, or infection decreased and reduced animals reported 'dead on arrival'. Such issues have financial consequences for operators. Operators are therefore expected to see a

---

[34] The economics of animal transport – long distance animal transport in the EU, p. 6. (see note 33, page 61).
[35] The economics of animal transport – long distance animal transport in the EU, p. 6 (see note 33, page 61).
[36] Van Horne, P. L. M., *Competitiveness of the EU poultry meat sector, base year 2017 - International comparison of production costs,* Wageningen University and Research, 2018, p. 6.

reduction in veterinary costs linked to a decrease in infection and wounds, a reduction in costs due to less carcass to discard, and higher revenues due to increased yields and meat quality.

2.2. International competitiveness

The selection of the preferred options has taken into account impacts on international competitiveness and how to mitigate these. As demonstrated below, the value of exports is not impacted by the measures assessed in the supply chain analysis exercise. However, the measure concerning exports is excluded by this exercise. This measure, which aims at improving conditions for live animals at export by imposing stricter transport conditions, is not expected to impact the value of EU export significantly as the main commercial partners of the EU for live animals have limited opportunities to import live animals from other partners. Where geography does not create a natural limitation, other partners can not import from Australia and New-Zealand as these have recently proposed a ban on the export of live animals.

Trade and Production Impacts from Animal Welfare Reform on Transportation

The proposed EU legislation is projected to increase or decrease the costs for transporting and, in some case, producing animals. A change in the production costs of meat or other products of animal origin may have an impact on the producer[37] and consumer prices, but also on the quantities produced and consumed, as well as the quantities imported and exported. There is therefore a direct relationship between the analysis of competitiveness impacts and the analysis of cost changes through the supply chain analysis. Those effects on prices and quantities, resulting from a change in cost, can be assessed with the help of an agricultural economic model. The model used here is Agricultural Commodity Market Model, and the main results are described below.

For poultry, this cost increase is projected to minimally affect the producer's margin, because it would decrease demand and reduce producer prices. An increase in consumer price will drive down demand and lead to a decrease in domestic production. For the beef and veal market, the effects are similar but slightly higher in percentage terms.

Poultry meat is a heavily traded commodity in both directions (imports and exports). Having said that, the EU produces more than it consumes in the internal market (i.e. there is a surplus of approximately 1.2 Mt in 2022). Given an increase in poultry consumer price (+ EUR 180/175, +2.8/2.7[38]%, for option I and II), the animal transportation reform would imply a slightly lower level of domestic production (-92/90 kt, -0.68/0.66%, for option I and II). The drop in domestic production and consumption (-134/130.5 kt, -1.1/1.07%, for option I and II) would imply a slight increase in exports (+29/28 kt, for options A and B 1.23/1.20%), given also that internal producer price (EUR 2029) would be lower than the baseline (EUR 2036, -0.3%) but higher than the world market price (expressed in Euro EUR 1020 in the baseline in 2031). The drop in consumption, coupled with a lower drop in production, increases exports.

[37] The producer's price is the price received by the producer in exchange for a good.
[38] The values of options I and II are reported separated by a slash sign (/) both for percentages and absolute values, if there is a relevant change between options.

At present, the EU has a tariff rate quota on poultry product imports (809kt in 2022) that is binding (imports are 920kt in 2022).

Just over half of the value, but less than a quarter of the volume, of EU poultry exports in 2020 are high-value boneless meat exports to the UK and Switzerland sold at high prices, namely EUR 2.87 per kg carcass weight equivalents (cwe) and EUR 4.97 per kg cwe, respectively. In the medium-term, it is possible that similar animal welfare legislation will be adopted in those countries or that consumers in these countries may have a preference for high standards of animal welfare in their products. Moreover, most other EU poultry exports consist of meat sold at very low prices. This includes bone-in meat (almost all frozen) where the average price is below EUR 1.60 per kg cwe for every significant market (excluding Switzerland and Canada), and often below EUR 1.00. Most boneless poultry meat exported to partners other than the UK, Switzerland and Canada sells on average for less than EUR 1.00.

EU poultry exports are highly segmented, consisting of two kinds of products. On the one hand, fresh boneless cuts are essentially sold to the UK and Switzerland, where consumers are willing to pay high-animal welfare products at a premium over standard products. On the other hand, frozen bone-in cuts and low-value boneless cuts are sold to partners that do not necessarily require such high animal welfare, nor are inclined to pay a premium for those product characteristics. These cheap exports are essentially poultry brown meat, a by-product of chicken breast production.

However, in the Agricultural Commodity Market Model, this segmentation is not included. The model treats poultry as a homogenous commodity, thus, it may overstate the negative impact on international competitiveness from the proposed animal welfare legislation because more exports of high-value cuts (to countries with a higher propensity to pay for high animal welfare) will be preserved in the future than low-value cut ones.

In the case of **pigmeat**, the EU is mainly an exporter country (4 Mt exported in 2022) with low pork imports (126kt) and a production of 22.5 Mt. Given an increase in EU consumer price (+ EUR 108/106, +1.15/1.12% in 2031) and in producer price (+ EUR 3.6/3.2, +0.25/0.22% in 2031), there is a slightly higher production (+12/15kt, +0.06/0.07% 2031) but also consumption (+51/50kt, +0.29/0.28% in 2031) due to cross-price elasticity effects. This implies slightly lower exports (-39/35kt, -1.16/1.05%) given the export price increases less than the domestic price (+ EUR 2.7/2.4, +0.16/0.15%). The lower increase in EU pork export price compared to the increase in domestic producer prices implies a lower demand toward export markets.

Pork exports are less segmented than poultry. By far, the largest market by both volume and value is China (slightly more than half of the total) with limited evidence of willingness to pay for animal welfare improvements. Moreover, China is increasingly growing its capacity to produce pigmeat domestically for an increasing middle class. The 2023 OECD-FAO Agricultural Outlook projects a drop of 16% in the next ten years (between 2031 and 2022). However, almost a third (30.6%) of EU exports by value and a quarter (24.8%) by volume go to English-speaking or EFTA partners known to potentially be willing to pay an animal welfare premium. In the case of pigmeat, the EU has a tariff rate quota (at 212kt in 2022) but it is not binding, meaning that imports are lower (at 126 kt in 2022). If the imports were projected to increase beyond the tariff rate quota, then imports would be protected more than they are now,

by a high out-of-quota tariff. However, imports increase only very slightly (+0.23/0.2%, +0.26/0.23kt) reaching approximately 115.5kt, but not reaching the tariff rate quota limit.

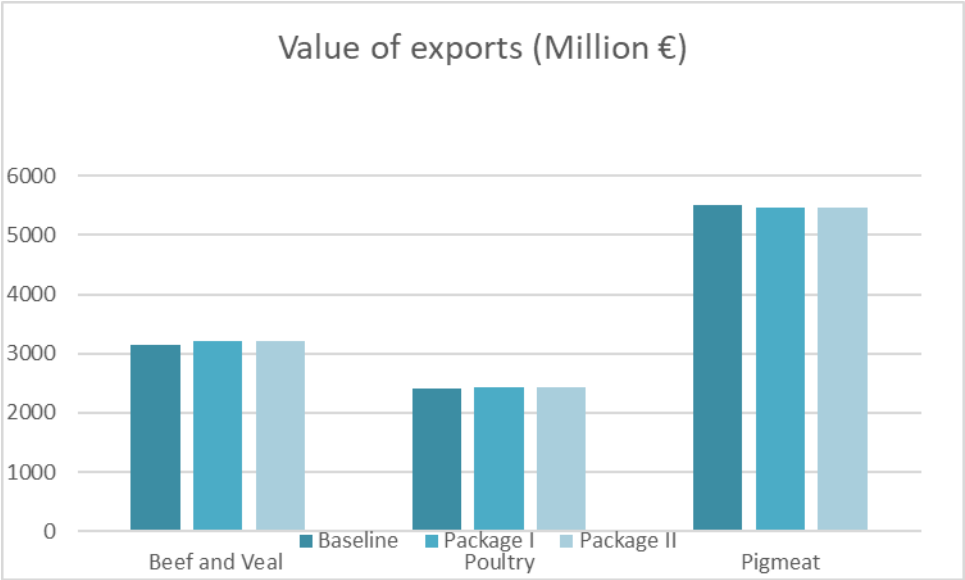
In the case of **beef and veal**, the EU baseline exports in 2022 (744 kt) are around 10.5% of what is produced (7 Mt) and imports approximately 5% (355 kt) of production. In the scenario, given an increase in EU consumer price (+ EUR 624/612, +4.45/4.37% in 2031), there is a drop in quantity demanded (consumption drops by -94/92kt, -1.54/1.51% in 2031), production (-44/42kt, -0.7/0.64% in 2031) and producer price (- EUR 68/-70, -1.67/1.73% in 2031). Exporters sell at a price that is only marginally decreasing (- EUR 9.6/9.75, -0.244/0.247%). Given the lower drop in exporter price, these changes imply a slight increase in exports (+18.6/19.2kt, +2.33/2.4%).

The EU beef and veal production is comparatively more competitive than pigmeat in the EU in terms of costs (lower cost of production index in 2022). Domestic (both consumer and producer) prices are also expected to be higher in absolute terms for beef and veal than for pigmeat. However, the EU produces more than three times more pigmeat than beef and veal. The EU beef and veal market is protected by a tariff rate quota (in 2022 at 324kt), which is more than filled by imports (at 356kt in 2022). This higher amount means that the tariff rate quota is binding effectively protecting the EU from (much) higher imports. The out-of-quota tariff rate for high-quality bovine meat is set to a high equivalent ad-valorem rate. In comparison, the EU exported 744 kt of beef and veal in 2022.

Value of Exports

The value of exports is reported below in Million Euro. On average, beef and veal value of exports will increase between baseline and package I and II (+EUR 65/68M going from EUR 3145M in the baseline to EUR 3210/3213M in the packages I and II) while pigmeat value of exports will decrease from EUR 5510M in the baseline to EUR 5456/5461M in the packages I and II by EUR -54/49M and poultry value of exports will grow by EUR 27/26M going from EUR 2400M in the baseline to EUR 2427/2426M in the packages I and II. All taken into consideration, there is a negative impact on pork value of exports that is more than offset by the increases in poultry and beef and veal values of exports in either package. Compared to the baseline values, the drop in value of exports of pork is lower than the increases for poultry and beef and veal.

	Beef and Veal	Poultry	Pigmeat
Baseline	3145	2400	5510
Package I	3210	2427	5456
Package II	3213	2426	5461



2.3. Capacity to innovate

The measure restricting transport of unweaned calves is expected to trigger further research on innovative means to feed animals during transport.

In addition, measure 5 on the use of real-time positioning and a digital application is expected to increase the use of digital technologies, creating opportunities for transporters to better use proprietary data to improve operations.

2.4. SME competitiveness

Over 98% of transporters are SMEs. The impact on the competitiveness of SMEs of the preferred package is considered proportionate. In some cases, the preferred option is positive for SMEs, such as the introduction of real-time positioning which will reduce the administrative burden for SMEs. The impact on SMEs is described in Annex 6.

ANNEX 6: SME TEST

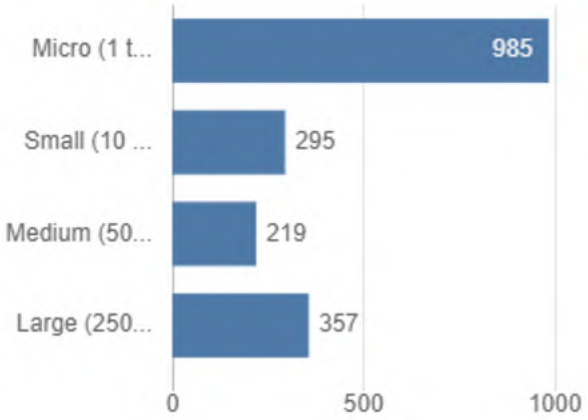
1) Identification of affected businesses

The overwhelming majority of companies transporting live animals in the EU are small[39]. With SMEs defined as enterprises with less than 250 employees, nearly all transporters in the EU are SMEs, with at least 98.5% of the approximately 1.3 million enterprises active in the transport sector (2020) being SMEs.

As described in section 6. of the Impact Assessment, measures on transport also affect other operators of the chain such as slaughterhouses and farmers. Although the large majority of those operators are also SMEs, there has in the later decades been a clear trend towards greater concentration, with fewer but larger farms and slaughterhouse, and this trend is expected to continue. As described above, this concentration is one of the reasons for long distance transport of animals.

2) Consultation of SME stakeholders

The public consultation captured the input from SMEs. Of the respondents, 985 (1.66%) identified themselves as micro companies (1 to 9 employees), while 295 (0.5%) identified themselves as small companies (10 to 49 employees) and 219 (0.37%) as medium-sized companies (50 to 249 employees):



Of these SMEs, 2.13% (32 out of 1 499) were transporters. In most cases (63%, 945 out of 1499), no information on the category of SMEs were provided. SME respondents mainly came from Germany (14.94%), France (13.21%), Spain (11.27%), Sweden (8.67%), Hungary

[39] For instance, in 2016 the vast majority of the farm labour force (on average 90% of the roughly 20 million persons employed regularly at the farms) in the EU were the farm holders and their family members (data extracted from Eurostat).

(6.67%) and Czechia (4.87%). Views from transport SMEs were also collected from the feedback received on the Inception Impact Assessment.

In addition, the external study performed in support of the impact assessment has paid particular attention to the impacts on SMEs. Among the businesses that responded to the targeted survey, half represented large enterprises and half represented SMEs. The umbrella organisations consulted through the other channels also represent the SMEs in their respective sector. For instance, interviewed farmers' organisations have argued that the cost increase for farmers caused by increased space allowances on trucks would have a larger impact on SMEs since the overall value chain is sender – trader – buyer.

In general, however, there were no considerable differences in the positions stated compared to those of larger companies and organisations.

3) Assessment of the impacts on SMEs

The options have been designed to contribute to a smoother functioning of the internal market. As any other company, SMEs will face fewer barriers to trade and will operate in a clearer and harmonised regulatory environment.

As described above, the agri-food sector is becoming increasingly concentrated and specialised, with some regions specialising in a part of the production (e.g. dairy cows), some in other (e.g. fattening of calves), and finally some in other part of the supply chain (e.g. slaughterhouses due to lower labour costs in some regions). Long distance transport of animals is a result of this concentration. By limiting journey time, as under measure 1, to an extent that still allows most animals to be transported through current routes, the preferred option contributes to limiting this concentration effect. This encourages small enterprises to remain anchored or be created locally within regional supply chains. Clients and suppliers will be found more regionally, which will ensure their survival.

The costs on SMEs would in general be the same as for large companies, while remaining proportional to the size of the business. This is for instance the case under measure 3 on the transport of unweaned calves, where feeding systems are required. Large companies with a high number of livestock trucks will need to upgrade more trucks than a smaller company. In addition, the cost for installing a feeding system in an existing truck is proportionate (see Section 6.1.3 of the main report). Only the cost of a new truck may be important for SMEs.

Measure 5 introducing real time positioning of the trucks and a central database will reduce the administrative burden for SMEs thanks to automation.

Finally, in the case of transport of cats and dogs (measure 6), most transporters are SMEs. However, the costs of veterinary checks and of vehicles replacements are proportionate. The same conclusion applies to the cost on breeders to keep animals longer.

It can therefore be concluded that no impacts on SMEs could be identified as disproportionate.

The choice of the preferred option also takes into account the impact on companies including SMEs. In the case of measure 2 for instance, imposing a veterinarian on board of vessels would have represented a massive burden to companies, due to the struggle to find veterinarians

willing to embark for the journey without a massive financial compensation. Instead, the option on training a member of the crew as animal welfare officer has been retained. Similarly, imposing on livestock vessels to upgrade to reach the low risk assessment would impose a disproportionate burden on those carriers, while standard risk is sufficient to ensure maritime and livestock safety.

4) **Minimising negative impacts on specific vulnerable segments of the different sectors**

The preferred options take into account the costs for operators and therefore foresee transition periods when relevant. These transition periods have been defined to allow operators to adapt to the new requirements in a reasonable period.

ANNEX 7: EFSA OPINIONS

Used in tables: nr = not relevant, na = not available

EFSA'S MAIN RECOMMENDATIONS ON THE WELFARE OF ANIMALS DURING TRANSPORT:

To measure the level of animal welfare the experts recommend to develop and validate thresholds for animal based measures (ABM)s as indicators for animal welfare. When the animals are properly inspected, ABMs can be utilised, these could include behavioural and physiological indicators. It is essential that the staff is well educated and trained. There is a general understanding that animals should not be transported in the latest stages of their pregnancy.

EFSA found that a maximal journey time of **12 hours** was the least intervening journey time for the majority of the farm animals. At a journey time beyond 9 hours the animals showed physiological changes indicative for thirst and beyond 12 hours the animals showed physiological changes indicative for hunger.

If weather forecast is between 25°C and 30°C, only short journeys (max 8 hours) should be allowed, with access to water for the animals. In general if the weather forecast is higher than 30°C only transport at night (i.e. between 21h00 and 10h00should be allowed).

EFSA found needed space allowance by using the Allometric equations ($A = kW^{2/3}$) for the respective species (The equations provide estimates of space requirements rather than definitive calculations of areas).

Lying is considered a behavioural need of cattle, sheep, goat and pigs the deprivation of which leads to stress responses and development of abnormal behaviour over time. The result of the allometric equation would secure sufficient space for the animal to lay down and to be able to perform movement to lay down and stand up again.

Space allowance during transport	**Pigs (=minimum space to lie down semi recumbent)**	**Cattle**	**Not weaned calves**	**Ovine/ Goats**	**Not weaned lambs**	**Horses**
K value to be used in the allometric equation (Areal = kWeight$^{2/3}$)	0,027	0,034	0,027	0,037	0,027	Equation cannot be used see 2) under this table.
Horned animals	nr	5–10% more space.	nr	5–10% more space.	nr	nr
Vertical space need	Pigs 10–25 kg: 62 cm, Pigs 100–120 kg: 88 cm, Pigs>120 kg: 100 cm.	40 cm above the withers for adult cattle.	nr	15 cm above the highest point of the animal in vehicles with mechanical ventilation and 30 cm in naturally ventilated vehicles.	nr	Minimum internal height of the compartment should be the height of the withers of the tallest animal in a compartment + 75 cm. 40 cm more in total than the width of the widest point of the horse transported.40 cm. 40 cm of free space in addition to the body length of the horse (measured from the tail to the nose while the neck is parallel to the ground) plus 50 cm if feed in a hay net is provided in transit. For unhandled horses, a stocking density of no greater than 200 kg/m2. Unhandled horses should be transported loose in a small group of familiar conspecifics (Max 4 horses).

Age at transport	nr	nr	Calves should be at least 5 weeks of age and of 50 kg weight when transported. The temperature inside vehicles should not exceed 25°C. Maximum journey duration should journeys not exceed 8 h taking into account the last feeding of the calf. And allow a 3-h post-meal rest.	nr	For not weaned lambs, procedures of unweaning and prolonged transport immediately after are stressful and exhaust body reserves. From an animal welfare point of view, weaning lambs sometime before transport would be advantageous.	nr
Microclimate	Thermal comfort zone, temp for **sows** is 20°C and upper critical temperature estimated to be 22°C. For **finishing pigs** temp is 22°C and max 25°C and for **weaners** of ~ 30 kg., temp is 25°C and max. 30°C. Pigs are more vulnerable to heat stress.	Upper critical temperature is estimated to be 25°C.	Thermal comfort zone, temp is 25 °C.	Thermal comfort zone, temp is 25 °C and temp. max is 28°C for **fleeced sheep** /goat and 32 °C for **shorn sheep/ goat.**		Thermal comfort zone, temp is 20 °C and temp. max is 25°C.

Feed	The tendency for pigs to develop motion sickness when fed just before a journey meant that in-transit feeding was not considered an option.	Not possible to feed during transport. Feed and water should be provided during transport break, sufficient time to drink, eat and ruminate needed before reloading.	See under calves on farm.	Not possible to feed during transport. Feed and water should be provided during transport break, sufficient time to drink, eat and ruminate needed before reloading.	See under lambs on farm.	During transport, horses should be provided with feed and water ad libitum or at least at regular intervals (of no more than 4 h) for a period of 30 min while the vehicle is stationary.
Water	Access to provide water during journeys. Extra space required for provision of nipple drinkers, along with the ability for pigs to manoeuvre to access these.	Thirst after 9 h of transport.	See under calves on farm.	Thirst after 12 h of transport.	See under lambs on farm.	
Transport time	Maximum12 hours transport time.					
Bedding	Sufficient bedding (in terms of quality and quantity) should be provided for the journey, made of adequate materials such as sawdust. In addition, without adequate bedding (type and/or quality and/or quantity) animals will be less motivated to rest lying down during journeys and may be exposed to slips, falls and weakness.					
Unloading	24 hours rest and feed and water supply and resting time as well as time to ruminate.					

Milking	Sows should not be transported before after a sufficient time after weaning the piglets.	Lactating cows should be milked every 12 h.	nr	Lactating sheep/goats should be milked every 12 h.	nr	Horses should not be transported before after a sufficient time after weaning the foal.
Pregnant animals	There is a general understanding that animals should not be transported in the latest stages of their pregnancy.					
Cull animals	If these animals are fit for transport, the journey to a slaughterhouse should be kept to a minimum, be direct and not involve any unloading and reloading at any interim premises. If these animals are not fit for transport and are without the prospect of recovery in a reasonable period of time, they should be killed on farm as soon as is possible.					
Control post (CP) requirements	Individual divided pens so that animals can be kept in the same groups as in the vehicle avoiding mixing animals, milking equipment. Sufficient bedding should be provided for the transit stage, made of adequate materials such as straw for young cattle, straw for adult cattle in winter and straw or sawdust for adult cattle in summer. During cold weather conditions, CPs should provide indoor heating, and/or sufficient quantity of bedding and shelter so pigs can bury themselves into the bedding.					

1) The Allometric equation however does not take into account that there might be other needs for space such as vertical space and width space, max height and space for moving and it does not comply for all animal species. It does also not consider the need for transport of animals loose in smaller groups.

2) The allometric equation does not work for calculation of needed space for horses during transport. Horses seldom lay down during transport, but they need some extra space to move as well as space to keep different head postures to be able to keep balance during transport.

Transport Poultry:											
To calculate space allowance for birds this equation was used: space allowance (cm^2/bird) =k x $W^{2/3}$, (where k is a constant varying for different livestock and postures and W represents live weight in kilograms (Petherick and Phillips, 2009).) Very feathered birds might need more space.											
Recommended space allowance (cm^2/kg) and related stocking density (kg/m^2) for different bird categories at different live weights during transport					Poultry are very sensitive towards the combination of temperature and the relative humidity.						
Bird category	**Day old chicks**	**Quails**	**Pullets, gamebird**	**End-of-lay hens (average feather cover)**	**Broilers, end-of-lay hens (poor feather cover)**	**Broilers, end-of-lay breeders, Ducks**	**Broilers, end-of-lay breeders, Ducks**	**Broilers, Ducks, Geese**	**Turkeys, Geese**	**Turkeys, Geese**	**Turkeys, Geese**
Live weight of bird (g or kg)	nr	250g	Up to 1,5kg	Up to 2,0 kg	Up to 2,0 kg	2-3 kg	3-4 kg	4-5 kg	Up to 9 kg	9-15 kg	15-22 kg
Space allowance (cm^2/kg) **(calculated with the allometric equation)**	nr	458	310*	268’	231	202	184	171	140	119	105

Recommended Height of cages (cm)	nr	-	25	25	25	25	25	25	-	40-45	-
Microclimate poultry **Apparent equivalent temperature (AET)**	nr	Safe zone below 40,0 Alert zone 40,0-65,0 Danger zone above 65,5 Broilers and end of lay hens are very sensitive to the combination of humidity and change in temperature.									
Bird category	**Day old chicks**	**Quails**	**Pullets, gamebird**	**End-of-lay hens (average feather cover)**	**Broilers, end-of-lay hens (poor feather cover)**	**Broilers, end-of-lay breeders, Ducks**	**Broilers, end-of-lay breeders, Ducks**	**Broilers, Ducks, Geese**	**Turkeys, Geese**	**Turkeys, Geese**	**Turkeys, Geese**
Feed and water	Day-old chicks subject to feed and water deprivation longer than 48 h (from hatching to access to feed and water at placement) will experience prolonged hunger and thirst which is detrimental to their welfare.	na	na	Laying hens with access to water should be feed no later than 4 hours prior to transport and not later than 10 hours prior to slaughter.	Broilers and Turkeys with access to water should be fed no later than 6 hours prior to transport and not later than 12 hours to slaughter.						

Transport time	Do not transport day-old chicks that prevents prolonged hunger and thirst, change to transport of fertilised eggs and use on farm hatching.	Should not exceed 12 Hours.			

*: This is instead calculated with the planimetric equation because pullets require more space than that resulting from the allometric equation.

Transport Rabbits:										
Weight class ± 0,25 kg	**Not weaned rabbits**	**1,0**	**1,5**	**2,0**	**2,5**	**3,0**	**3,5**	**4,0**	**4,5**	**5,0**
Space allowance cm2/kg(position 1) allometric equation*	nr	270	236	215	200	188	179	171	164	159
Height of cage	nr	40 cm (Inability to stretch their ears can reduce their ability to cope with heat stress).								
Microclimate temperature–humidity index'(THI) calculation: THI=db°C-((0:31-0:31RH)(db°C-14:4))	nr	Safe zone below27,8 Alert zone 27,8-28,9 Danger zone above 28,9								

Transport time	Not weaned rabbits should not be transported.	12 hours
Pregnant animals	nr	There is a general understanding that animals should not be transported in the latest stages of their pregnancy.
Feed and water	After 12 hours they will experience thirst and hunger. No feed withdrawal periods longer than 6 h. Withdrawal periods longer than 12 h will results in weight loss and experiences of prolonged hunger. No water deprivation periods longer than 12 h.	

*: Space allowance (cm2/kg) = (270×live weight (kg2/3). (Batchelor, 1999).

Specific means of transport:	
Transport with livestock vessel	Due to the similarity in the Welfare concerns and hazards alignment with the recommendations for road transport is recommended. (space allowance, microclimate, etc.). Sufficient ventilation on the deck where the animals are located. Contingency plans in case of emergencies e.g., disease outbreaks, fire, refusal to unload at port of destination. Animals should be transported in their thermal comfort zone. Sufficient space to allow all the animals to have access to troughs and drinkers without competition.
Transport with Roll on roll of ferries	Animals on a roll on roll ferries also experience long journeys as they are not unloaded from the truck during sailing. Due to the similarity in the welfare consequences (WC) and hazards, alignment is recommended with the recommendations for road transport. Sufficient ventilation on the deck where the animals are located should be ensured. Due to the exposure to the hazards generic to road transport plus the additional concerns listed, voyage duration should not be considered resting time.

	Transporters must ensure that they have contingency plans in case of emergencies are in place e.g., ferry disruptions. No transport if the weather forecast predicts improper weather conditions for ship journeys. The driver or animal attendant must be able to have access to the animals at regular intervals during the voyage in order to check and care for them.

Used EFSA opinions:

EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of cattle during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07442), 2022.

EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of pigs during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07445), 2022.

EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of equidae during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07444), 2022.

EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of small ruminants during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07404), 2022.

EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of domestic birds and rabbits transported in containers', *EFSA Journal*, Vol. 20, Issue 9 (e07441), 2022.

ANNEX 8: OTHER EU LEGISLATION AND POLICIES

Other EU legislation of relevance for welfare during transport

Other pieces of EU legislation with indirect relevance for animal welfare, and which have been taken into account in this impact assessment, are:

- Regulation (EU) 2017/625 on official controls along the agri-food chain (OCR). The EU rules on official controls, which are risk based, provide the main framework for ensuring compliance with the EU animal welfare requirements, including EU legislation on the protection of animals during transport.

- Regulation (EC) No 561/2006 on driving times, breaks and rest periods for truck drivers. The rules on resting times for drivers are currently different from the ones provided in the current Council Regulation (EC) No 1/2005. While being legally compatible with each other, the current requirements are difficult and costly to reconcile. The preferred option on journey times proposed in this impact assessment eliminates this inconsistency and reconciles the two Regulations.

- Directive 2010/63/EU on the protection of animals used for scientific purposes. The welfare of animals used for scientific purposes are covered by the EU legislation on animal welfare during transport, and consistency with the principles and requirements in Directive 2010/63/EU must be ensured.

- Regulation (EU) 2016/429 on transmissible animal diseases (Animal Health Law). This legislation regulates the conditions for trade of live animals (and animal products) in the EU internal market when it comes to contagious animal diseases, in order to avoid the spread of such diseases in the EU. Therefore, it sets conditions also affecting the transport of animals. The Animal Health Law and legislation on the protection of animals during transport are therefore strongly inter-related and designed in a way that both animal health and animal welfare requirements can be implemented simultaneously by operators. Furthermore, animal welfare requirements, by reinforcing the general health status of animals, ensuring that they are less exposed to stress and injuries, supports the objectives of the Animal Health Law.

- Regulation (EU) 2019/6 on the authorisation and use of veterinary medicinal products (VMP Regulation). It follows from Article 107(1), that antimicrobial medicinal products may not be applied routinely nor used to compensate for poor hygiene, inadequate animal husbandry or lack of care or to compensate for poor farm management. The revised rules on the protection of animals during transport will facilitate operators' compliance with the VMP Regulation since better welfare standards reduces the need for medication, including use of antimicrobial products (since risk factors of disease transmission may be improved due to the measures).

- Regulation (EU) 2019/1715 for the functioning of the information management system for official controls and its system components (IMSOC Regulation) has been

considered and is consistent with option related to new technologies and in particular related to the real-time tracking of trucks with animals.

- Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation) has been taken into account under the new technologies and real-time tracking option.

Other EU policy initiatives

Trade policy

The EU's trade policy also plays a role to promote higher welfare standards. This is mainly done via provisions on animal welfare in trade agreements with third countries and bilateral cooperation.

The proposal includes new and clearer provisions on animal welfare rules applicable for the transport of live animals from a third country into the Union, as well as provisions on animal welfare rules applicable for the transport of live animals from the Union to a third country of destination. In both cases (imports and exports), operators are to ensure that EU animal welfare rules are complied with from the point of departure to the point of destination. A transition period of 5 years is provided in both cases allowing operators to adapt.

When it comes to export, the European Court of Justice ruled in 2015 that the current Regulation on animal transport requires EU operators that EU rules on the protection of animals during transport are applied also for animals exported from the EU, until the point of destination in the non-EU country. Measures 2.O.1B, 2.O.2B, 2.O.2C, 2.O.2D and 2.O.2E of this impact assessment aim at introducing additional tools and mechanisms to improve the implementation of this rule.

The Commission's work to promote animal welfare at international level will continue, both in multilateral fora as well as in bilateral relationships with non-EU countries. The enhanced cooperation with the World Animal Health Organisation (WOAH) to develop and adopt international standards for animal welfare will remain a priority with a potential to grow based on the latest scientific and technological progress.

The Commission will continue to encourage having more free trade agreements with animal welfare provisions. Existing dialogues with the EU trading partners will be used to promote a common approach to animal welfare, in particular animal welfare rules during transport.

Environmental policy (emissions)

In addition, the Commission is revising the Regulation (EU) 2019/1242 on CO2 emission standards for heavy-duty vehicles[40], including trucks used for animal transports. The Regulation, which requires manufacturers to reduce the average CO2 emissions of their fleet by 15% as from 2025 and by 30% as from 2030, includes a review clause. On 14 February 2023, the Commission tabled a legislative proposal (COM(2023) 88 final) to revise that Regulation. This objective of reducing emissions is therefore fully coherent with the objective of this animal welfare initiative to reduce journey times for the transport of live animals.

[40] Regulation (EU) 2019/1242 of the European Parliament and of the Council of 20 June 2019 setting CO2 emission performance standards for new heavy-duty vehicles and amending Regulations (EC) No 595/2009 and (EU) 2018/956 of the European Parliament and of the Council and Council Directive 96/53/EC, OJ L 198, 25.7.2019, p. 202–240.

ANNEX 9: DETAILED IMPACT ASSESSMENT

1. JOURNEY TIMES AND SPACE ALLOWANCE

The current EU animal welfare legislation (Council Regulation 1/2005) establishes an eight hour limit for short journeys, but also allows long journeys (above eight hours) under certain conditions (e.g. journey log, additional provisions for the means of transport and conditions on watering, feeding, ventilation etc.), with different journey time limits depending on the species (i.e. up to 24 hours in the case of pigs and horses and up to 29 hours for large and small ruminants), after which animals need to be rested 24 hours at a control post. Then, the journey may resume again, without a limit in the number of subsequent long journeys.

Current rules on space allowance provide a specific number of m^2 by category of animals according to their species, weight or age, mainly provided in the form of tables in the Annex to the Regulation. They do not provide a formula covering all specific cases, thus leaving the rules unclear in certain circumstances.

The measure proposed are:

1. Journey times and space allowance	Journey time for slaughter (5 years transition period): 1.O.1A: 9 hours	1.O.1B: 12 hours
	Journey time for other journeys (5 years transition period): 1.O.2A: 12 hours	1.O.2B: 21h + 24h rest + 21h
	Space allowance (5 years transition period): 1.O.3: Space allowance according to EFSA opinions	

The space allowances introduced for each specie follow the EFSA recommendations, which provide the k-value for each specie, allowing to determine the space allowance for each animal based on its live weight. Space allowance for transport by road, by rail, by roll-on-roll-off or by livestock vessels is therefore calculated using the following allometric equation:

$$A = kW^{(2/3)}$$

whereby: A=area per animal [m^2 for free transport, cm^2 for transport in containers], W=live weight [kg], k= k-value (specific to species/category, as laid down in tables below).

The space allowance in area per animal [m^2] during transport by road, by rail, by roll-on-roll-off and by livestock vessel, proposed are:

	A	B	C	D
Average live weight [kg]	**Pigs k=0,027**	**Equidae k=0,029**	**Bovine animals k=0,034**	**Sheep and goats k=0,037**
25	0,23			0,32
50	0,37	0,40	0,46	0,50
75	0,48	0,52	0,60	0,66
100	0,58	0,63	0,73	0,80
125	0,68	0,73	0,85	
150	0,76	0,82	0,96	
175	0,84	0,91	1,06	
200	0,92	1,00	1,16	
225	1,00	1,08	1,26	
250	1,07	1,16	1,35	
275	1,14	1,23	1,44	
300	1,21	1,31	1,52	
325	1,28	1,38	1,61	
350	1,34	1,45	1,69	
375	1,40	1,52	1,77	
400	1,47	1,59	1,85	
450		1,71	2,00	
500		1,84	2,14	
550		1,96	2,28	
600		2,08	2,42	
650		2,19	2,55	
700		2,30	2,68	
750		2,41	2,81	
800		2,52	2,93	
850			3,05	
900			3,17	
950			3,29	
1000			3,40	

	E
approximate live weight	**poultry k=290**
1	290
1,5	380
2	460
2,5	534
3	603
3,5	669
4	731
4,5	790
5	848

1.1.1. Background and non-action scenario

Animals are transported for different reasons, such as slaughter, breeding, and production.

Given the high number of transports with a journey time exceeding twelve 12 hours (347 746 journeys in 2020)[41], large numbers of animals experience fatigue, prolonged hunger and thirst. Currently, **more than 32 000 animal transports per year occur between Member States with a journey time which is even longer than 21 hours[42]**.

Without an EU intervention, the welfare of the animals transported will continue to be compromised. Without stricter rules, transport over multiple journeys (so called 'journey hopping') will continue, **resulting in stress and health risks for the animals**.

A decrease in the number of animals to be transported until 2038 is expected (e.g. by 11% in the total number of bovines and 13% in the total number of pigs) due to an overall reduction of the EU livestock population[43]. Although the extent of the changes would differ per animal specie[44], this is expected to represent an overall decrease in the number of transports, distance travelled, transport costs and emissions compared to the current situation.

1.1.2. Animal welfare impacts

All policy options would present an improvement compared to the current situation.

Options 1.O.1A for journeys to slaughterhouses and 1.O.2A for all other types of journeys are expected to have a high positive impact on animal welfare, as they provide for a much shorter journey duration of respectively 9 hours and 12 hours. A journey time of maximum 12 hours prevents animals from suffering of hunger during the journey. In terms of thirst, EFSA reported that behavioural and physiological signs of thirst can be present after between 8 and 12 hours depending on the species. This option also does not imply any stop in a control post where animals are exposed to various welfare consequences (**such as group stress, handling stress, heat stress, injuries, prolonged hunger, prolonged thirst, restriction of movement and resting problems**)[45].

---

[41] Transport study, p. 335, table 127, (see note 5, page 8).
[42] Transport study, p. 72, table 14 (see note 5, page 8).
[43] Transport study, p. 84 (see note 5, page 8).
[44] No change is expected in the number of poultry being transported, while a 9% increase in the total number of sheep and goats is expected.
[45] EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of cattle during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07442), 2022; EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of pigs during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07445), 2022; EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of equidae during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07444), 2022; EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of small ruminants during transport', *EFSA Journal*, Vol. 20, Issue 9 (e07404), 2022; EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of domestic birds and rabbits transported in containers', *EFSA Journal*, Vol. 20, Issue 9 (e07441), 2022.

Alternative option (1.O.1B) for journeys to slaughterhouses, limiting them to 12 hours, would also represent a major improvement in terms of animal welfare compared to the current legislation.

For other type of journeys, **option 1.O.2B proposes a maximum journey time of 21 hours, followed by a mandatory resting period of 24 hours in a control post, before allowing the journey to resume for a maximum of 21 hours.** While stopping in a control post exposes animals to the hazards mentioned above, setting a maximum duration for the whole journey is an improvement for animal welfare.

In terms of space allowance, option 1.O.3A proposes to follow the EFSA recommendations defined for each species. Insufficient and vaguely defined norms regarding space for the animals is one of the major shortcomings of the current Transport Regulation. Both in the public consultation as well as in the Inception Impact Assessment Feedback, there was support from respondents of industry, NGOs and Competent Authorities for improved animal transport conditions. They also emphasised the need for more specific rules with regard to requirements for different animal species during transport[46]. The recommendations take the minimum space allowance set by the first factor reducing the ability of the animals to undertake relevant biological functions during transport. Providing animals with this space during transport will allow them to adjust their posture in response to acceleration and other events related to driving, and to rest in a normal position, including room to lie-down and get up[47], which will substantially improve their welfare compared to current conditions.

1.1.3. Economic impacts

The restrictions to the journey times coupled with the projected reduction of most of the livestock species in the EU are expected to result in a decrease of the number of transport hours with associated decreases in the number of kilometres travelled and the transport costs. However, increasing the space allowance for animals will increase the number of kilometres travelled to transport animals, as more trucks will be needed. As a result, the measures will affect transport costs for transporters, but the limitations on journey time will mostly affect the rest of the supply chain (farmers, slaughterhouses, control posts and assembly centres operators).

Most stakeholders involved in long-journey transport (including farmers, transporting companies and most slaughterhouses) are small[48]. In 2020 there were approximately 1.3 million enterprises in the transportation and storage sector in EU-27 countries (of which 98.5% were SMEs)[49].

<u>Impacts on transporters:</u>

---

[46] Transport study, consultation activities (see note 5, page 8).
[47] Transport study, p. 92 (see note 5, page 8).
[48] Recent data from Eurostat shows that nearly all companies in the transport sectors (and especially land transport) have fewer than 250 employees.
[49] Transport study, p. 67 (see note 5, page 8).

Transporters charge their customers a price based on the number of kilometres a journey takes. Implementing the restricted journey times (number of kilometres decreases) and the increased space allowances (number of kilometres increases) in the different alternatives impacts the total number of kilometres travelled.

Impacts on other operators:

While it is difficult to precisely quantify the economic impacts on the rest of the production chain[50] due to the high complexity of the factors involved, the impacts can be estimated by looking at the number of livestock that would be affected by a limitation on journey time.

In the case of animals sent for slaughter within the EU, none of the options have major impact, as shown in the table below. While data is available only where there is a cross-border movement within the EU (i.e. no data available for transports within a Member State, even if EU transport rules also apply to such journeys), it can be assumed that the impact is close to that shown in the table. Few journeys to a slaughterhouse within a Member State are expected to take more than 9 hours, mainly in some remote regions in Sweden and Finland. For those remote regions, the Regulation would foresee a derogation where no slaughterhouse is available within the allowed journey time.

Table 16: Transport of animals (within the EU, with a cross-border movement) for slaughter by journey time, expressed as a percentage of the animals slaughtered in the EU (source: TRACES)

Species	>9h	>12h
Bovine	0.3%	0.2%
Pigs	0.5%	0.4%
Sheep and goats	3.4%	3.0%
Poultry	0.1%	0.1%

In the case of animals transported for the purpose of fattening or further production (e.g. milk production), **option 1.O.2A** would impact 4.2% of bovines and 4% of pigs which are currently transported more than 12 hours. The **option 1.O.2B** would impact 1.4% of bovines and 0.2% of pigs which are currently transported for more than 42h (21h + 21h).

Table 17: Transport of animals (within the EU, with a cross-border movement) for fattening by journey time, expressed as a percentage of the animals slaughtered in the EU (source: TRACES)

[50] Farmers, slaughterhouses and retailers.

Species	>12h	>21h	>42h
Bovine	4.2%	1.7%	1.4%
Pigs	4.0%	1.1%	0.2%
Sheep and goats	1.4%	0.8%	0.1%
Poultry	0.2%	0.0%	0.0%

In the case of animals transported for breeding, when looking only at transports within the EU involving a cross-border movement, the impact is more significant. Under option 1.O.2A, 49% of bovines and 47% of sheep would be impacted as they are currently transported for more than 12 hours, while under **option 1.O.2B**, 16% of bovines and of sheep and 9% of pigs would be affected (as they are currently transported for more than 42h).

Table 18: Percentage of animals transported between MS for breeding by journey time, expressed as a percentage of the animals transported between MS for this purpose (source: TRACES)

Species	<12h	12-21h	>21h	>42h
Bovines	49%	27%	8%	16%
Goats	58%	15%	17%	10%
Pigs	54%	22%	15%	9%
Poultry	80%	14%	5%	0%
Sheep	47%	24%	14%	16%

Journey time limitations would have an impact on all **primary producers/farmers** of slaughter and production animals in an area. Since more animals need to be sold in a more regional market, prices for all producers will be affected, irrespective of whether they used to sell animals that were on long journeys or not. The more limited the journey is, the higher is the impact.

Due to production specialisation in different areas of the EU, prices and production costs differ between regions. For example, purchasing piglets in another Member State to fatten them locally could be cheaper than local sourcing, transport cost included. Regional specialisation has led to a limited local capacity in some region for specific parts in the production chain, resulting in a surplus of production animals and the need for a substantial movement of animals between Member States. Reduced ability to sell this local surplus due to journey time limitation is likely to have significant consequences on the regional market and market prices. The impacts on farmers' income will depend on the regional reorganisation of those markets. This

effect will be very important for option 1.O.2A but limited for 1.O.2B as it concerns a fewer number of transports and animals.

As mentioned above, **slaughterhouses** would be marginally impacted as very few animals are transported to slaughterhouses for a longer period than 9 or 12 hours[51]. However, reorganisation of regional productions due to the limitations for other types of journeys will have an impact on slaughterhouses, as local supply may increase or decrease. Given the limited gross margins of slaughterhouses[52], a decrease of supply can have impact on the profitability.

Control posts (meaning control posts as referred to in Regulation (EC) No 1255/97) would be differently affected depending on the options. Currently, within the EU, 141 control posts are registered and those are privately owned[53]. However, the number of control posts differs substantially between Member States, some Member States having none, as well as the size and facilities available. Options 1.O.1A, 1.O.1B and 1.O.2A would make the control posts redundant. Option 1.O.2B foresees a mandatory rest for animals after 21 hours, which would not impact the existing control posts.

Overall, at EU level, the yearly net costs incurred by implementing option 1.O.1A combined with 1.O.2B and 1.O.3 could amount to, for all stakeholders, EUR 642 million for the pig sector, EUR 35 million for the laying hen sector, EUR 914 million for the broiler sector and EUR 1 069 million for the cattle sector. Implementing option 1.O.1A combined with 1.O.2A and 1.O.3 would amount to EUR 695 million for the pig sector, EUR 35 million for the laying hen sector, EUR 944 million for the broiler sector and EUR 1 194 million for the cattle sector[54].

Public authorities

None of the options would have a major impact on public authorities. The enforcement and administrative costs of public authorities are to some extent determined by the number of transports checked (sample size). Due to the combination of limiting journey time and increasing space allowance, the overall number of transports is expected to increase but to a limited extent.

As regards to administrative costs tied to control posts, options 1.O.1A, 1.O.1B and 1.O.2A would greatly limit the need to use control posts and therefore limit their checks and subsequent costs. Option 1.O.2B would have no impact, or a marginal increase in costs in case the number of control post increases due to the needs.

Internal market

---

[51] Transport study, p. 78 (see note 5, page 8).
[52] Data from the Netherlands and Belgium indicates that for large scale slaughterhouses these margins are between 2% and 3%, and for smaller slaughterhouses these margins are expected to be even lower.
[53] European Commission, *List of approved control points*, 2022.
[54] *Modelling of policy options to support the Impact Assessment accompanying the revision of the EU legislation on the welfare of animals during transport*, 2023, doi: 10.2875/061480

The limitation of journey times will have more consequences in the Member States with the largest number of animals transported on journeys time exceeding those foreseen by the respective options.

As mentioned above, currently, due to production specialisation in different areas of the EU, prices and production costs differ between regions which leads to substantial animal movements. A limitation in those movements would lead to a geographical reorganisation of the supply chain, which would be more pronounced under option 1.O.2A. Options 1.O.1A, 1.O.1B and 1.O.2B would have a limited effect in that regards due to the relatively low percentage of animals affected.

Finally, common rules will improve the level playing field for operators, which will be also helped by the clearer rules, facilitating enforcement by all national competent authorities.

Trade

While a reorganisation of the supply chains may lead to an increase in prices, this is not expected to affect trade.

See measure 2 on exports of live animals, and analysis of competitiveness in Annex 5.

Consumers

Where the restriction of journey times results in oversupply or shortage of locally slaughtered animals, transport of meat instead of live animals may occur. This would better meet consumers' (and citizens') expectations, who are in favour of limiting long journeys of live animals and prefer the transport of meat and genetic materials instead (for breeding)[55].

It is difficult to estimate whether the options will impact consumer price and to what extent. This will depend on the extent to which the supply chain is reorganised, but research shows that a difference in production costs (of which transport costs are part) only to a small extent determines the differences in consumers' price[56].

Supermarkets are important buyers of meat and meat products to slaughterhouses and cutting plants. They implement their own pricing policy, influenced to a limited extent by the purchase price. Many factors such as the price at competitors, promotional campaigns and the role of meat in the total product range of supermarkets also play a role. Annual contracts are used for trade between slaughterhouses and supermarkets, and operators have to compete in these markets with suppliers from the whole EU, making it difficult to pass on cost increases to consumers[57]. As a result, price movements of industry have a limited correlation with the consumer price. Therefore, if the policy options would result in higher production costs, this does not necessarily translate to higher costs for consumers.

---

[55] Transport study, consultation activities (see note 5, page 8).
[56] Agrimatie, *Prijs varkensvlees weer gestegen*, Wageningen University and Research; Transport study p. 104 (see note 5, page 8).
[57] Transport study, p. 104 (see note 5, page 8).

1.1.4. Social impacts

Employment

There is currently a shortage of truck drivers in the EU[58]. The options on restricting journey times would likely reduce the number of drivers needed, however increasing space allowances (option 1.O.3) will increase the numbers of trucks needed and therefore the number of drivers.

The combined effect of option 1.O.1A and 1.O.2A with 1.O.3 would lead to a decrease in the number of drivers needed of 613 drivers[59]. This would have a negative effect on employment but given the shortage of truck drivers, this should not pose an issue. The combination of options 1.O.1B and 1.O.2B with 1.O.3 would lead to a need increase of 404 drivers[60], which would be positive for employment but may pose an issue due to the shortages of drivers. Given the very little differences in terms of number of transports affected between 1.O.1A and 1.O.1B, the impact is expected to be similar.

1.1.5. Environmental impacts

FAO indicates that post farmgate emissions (transports, slaughter etc.) account for only 2.8% of the emissions from livestock supply chains[61]. The direct environmental impact of transport is related to emissions from fuel use – particularly CO_2 and NOx emissions[62].

Reduced journey times would result in a reduction of distance travelled and thus a decrease of fuel use and as a consequence also a reduction of CO_2 and NOx emissions. **Option 1.O.1A** for slaughter transport and **option 1.O.2A** for other types of journeys are estimated to have the largest reduction of CO_2 and NOx emissions from transport, while **option 1.O.1B and option 1.O.2B** have intermediate reduction compared to the current situation. For other journeys, options 1.O.2A has the largest reduction of CO^2 and NOx emissions[63]. Combined with the increase in space allowance, The combination of options 1.O.1A with 1.O.2A and 1.O.3 is estimated to have the largest reduction of CO_2 and NOx emissions from transport, as despite the additional number of trucks required, the total number of kilometres travelled would be lower compared to today. With the 1.O.1A, 1.O.2B and 1.O.3 combination, and the 1.O.1B, 1.O.2B and 1.O.3 combination, the increase in the number of trucks needed is expected to see a marginal increase in emissions.

1.2. EXPORTS

The exports of animals to third countries are currently allowed by the EU animal welfare legislation, but operators are responsible to ensure that EU welfare rules are followed until the

---

[58] Transport study, p. 107 (see note 5, page 8).
[59] Transport study, p. 108, table 41 (see note 5, page 8).
[60] Transport study, p. 108, table 41 (see note 5, page 8).
[61] Food and Agriculture Organization of the United Nations (FAO), *Global Livestock Environmental Assessment Model (GLEAM)*.
[62] Transport study, p. 109 (see note 5, page 8).
[63] Transport study, p. 110, table 43 (see note 5, page 8).

final place of destination in third countries (as established by the European Court of Justice[64]). Exports should respect the same time limits as those journeys within EU territory, i.e. the animals should rest for 24 hours at a control post after a journey of e.g. 29 hours in the case of cattle, after which the journey can continue following the same pattern of journey and resting periods until the place of destination is reached. A significant share of the exports occurs through sea transport. The journey of animals exported by livestock vessels begins with a road trip from their place of origin to the EU exit port. Considering the existing definitions for 'journey' in the Transport Regulation, both the road (from the place of origin to the departing port, and from arrival at receiving port to destination) and the sea transport are **parts of a single journey**.

The measures proposed are:

2. Exports	Road (5 years transition period): 2.O.1A: Ban exports of ruminants	2.O.1B: Limit journey time and limit transport in hot temperatures.
	Ship (5 years transition period): 2.O.2A: Ban exports of ruminants	2.O.2B: Improved conditions: vet on board 2.O.2C: Improved conditions: only white flag 2.O.2D: Improved conditions: animal welfare officer on board 2.O.2.E: Improved conditions: white and grey flags

1.2.1. Background and non-action scenario

The overall extra-EU trade is significantly smaller than the intra-EU trade for most species, except for sheep and goats. The total value of the EU export of animals to third countries is more than EUR 3 749 million. The largest share is related to the export of bovines (nearly one million animals per year) and sheep and goats (3.2 million animals per year)[65].

EU exports to third countries take place by road and by sea, often both. Of all bovines, 60% are exported by sea and 39% by road, with the main countries of origin as Portugal, Romania, Spain and Croatia, and the main destination as the Middle East. 92% of the sheep are exported by sea and only 8% by road[66], with more than half originating from Romania, and Middle East for main destination.

The rules at exports have been proven very difficult to enforce.

Currently, 88 livestock carriers are EU-approved[67]. Most of the livestock vessels transporting livestock from an EU port sail under a grey or black flag under the Paris Memorandum of Understanding on maritime safety (i.e. are considered as posing a risk or a high risk in relation to maritime safety), something which raises high concerns. Only 6 of the currently listed vessels are flagged under the "white list".

---

[64] Judgment of the Court of Justice of 23 April 2015, *Zuchtvieh-Export GmbH v Stadt Kempten*, C-424/13, EU:C:2015:259.
[65] Transport study, p. 82 (see note 5, page 8).
[66] European Parliamentary Research Service, *Protection of animals during transport: Data on live animal transport*, PE 690.708, 2021.
[67] Data extracted from the THETIS database.

Without an intervention at EU level, the export of live animals to third countries will continue without safeguards for the animals' welfare once they leave the EU territory or on board of vessels.

A decrease in the number of animals exported can be expected in the coming years, especially regarding cattle and pigs. On the other hand, a slight increase in the number of sheep transported is anticipated as their population is expected to grow due to increased demand, while the export of poultry should remain stable[68]. Overall, the current transport and trade patterns are expected to remain the same. Consequently, the trends in transport costs in the context of exports – including the administrative costs, and enforcement costs of public authorities – are expected to follow the same pattern as the overall trends regarding costs for transports described in the section on intra-EU transport above, which shows a slight decrease over the years.

1.2.2. Animal welfare impacts

The ban of export of large and small ruminants envisaged under **options 2.O.1A for road transport and 2.O.2A for sea transport** would fully prevent the **risk of death of some animals due to heat stress, prolonged hunger and thirst and disease**. It would also fully prevent the **risk of injuries** due to handling stress, motion stress and low space allowance. Finally, it would prevent the death of thousands of animals due to livestock vessels hazards occurring regularly[69]. It would also avoid difficulties to guarantee **compliance** with the EU welfare standards in third countries until destination[70]. However, the impact on the overall welfare of animals transported internationally may be more limited as it is likely that importing countries would instead import animals from some other countries, to the extent that their animal welfare standards are lower than the ones in the EU.

For road transport (and if a journey includes a transport by vessel, the legs of that journey on the road), option **2.O.1B** proposes to establish the same rules regarding journey time, space allowance and travel under hot temperatures which would mitigate hazards for the animals and reduce the **risk of injuries and death on arrival**, due to the reduced journey times.

For transport on vessels (which include the legs of the journey on the road, before and after the leg on sea), limits regarding journey time would apply.

On board of the vessels, options **2.O.2B** proposes to impose the presence of a veterinarian on board, an option which would greatly improve the welfare of animals as welfare hazards would be limited due to the presence of a professional. Alternatively, option **2.O.2D** proposes the presence of an animal welfare officer on board, an improvement compared to the situation of today as such a person would be trained to identify welfare issues.

Option 1.O.2C proposes to only allow white flag carriers to transport animals of low or standard risks, which would be a great improvement for their safety at sea, and **1.O.2E** would

---

[68] Transport study, p. 112 (see note 5, page 8).
[69] European Parliament, Directorate-General for Internal Policies, Policy Department for Structural and Cohesion Policies, *Animal welfare on sea vessels and criteria for approval of livestock authorisation - PE 690.876*, 2021, p. 15.
[70] Welfare of animals exported by road – overview report (see note 33, page 61).

allow white and grey flags carriers to transport livestock (of low or standard risks), which would still improve their safety and welfare by decreasing the chances of hazards.

1.2.3. Economic impacts

Business operators

The largest economic impact of an export ban or increase of restrictions would be the loss of revenues from exported animals both for primary producers as well as for transporters. The largest loss would be expected from a ban.

The total value of EU exports of bovines and sheep and goats to third countries is just below EUR 1.5 billion (more than EUR 1 billion for bovines and almost EUR 0.4 billion for sheep and goats)[71]. Given the size of the economic value of EU exports of live animals, the export ban would have important impacts on the EU economy. Live animal exports account for 3.3% of gross indigenous production in the bovine sector, and 10% for sheep and goats[72]. Thus, the impact on both sectors, but in particular sheep and goats would be substantial as this quantity would have to be diverted either to meat exports or be sold on the EU market. Evidence suggests that the export of live animals can only partly be replaced by the export of meat[73]. Since demand for food tends to be price inelastic, the downward impact on prices (due to more meat having to be sold on the EU market) would likely be considerably higher than those percentages. It is estimated that an export ban would increase the supply of beef by 2.3% (i.e. by 162 713.88 tonnes). The supply of sheep meat would increase by 7.5% (i.e. by 39 298 tonnes)[74].

The overall short-term effect is estimated to be a loss of EUR 1.9 billion per year[75]. Losses due to reduced export would affect only stakeholders (farmers, traders) that export live animals, while losses due to a price decrease would affect all beef and sheep producers in the EU.

Under the options limiting journey time and generally imposing stricter conditions, export of livestock can continue as long as the journey duration stays within the authorised limits, effectively limiting some exports. For road journeys, a journey time of maximum 9 hours would be allowed for slaughter, while for other types of journey a leg of 21 hours followed by a mandatory rest in a control post of 24 hours, and a final leg of 21 hours would be authorised. For sea transport, the leg by road would be limited to 21 hours, followed by a transport on vessel without time limit which can be followed by one more road journey of 21 hours.

---

[71] Transport study, p. 120, table 48 (see note 5, page 8).
[72] Calculated as a percentage of meat production in carcass weight equivalent (EU agricultural outlook for markets, income and environment 2022-2032 (see note 25, page 41)).
[73] Transport study, section 5.3.2.3. (see note 5, page 8). Based on evidence related to the Australian ban on export of live animals to the Middle East. After the Australian ban, the gap in the markets was quickly filled by Europe. Therefore, it is expected that most of the products originating from the otherwise exported animals would need to be absorbed by the EU market.
[74] Transport study, p. 120 (see note 5, page 8).
[75] Transport study, p. 120 (see note 5, page 8). This estimate is calculated based on the values of exports of sheep, goats and cattle, the additional sales of meat (instead of live animals), and the price effect due to increased supply on the EU market.

This would imply that an important proportion of ruminants cannot be exported anymore since the travel time for slaughter of animals would be limited, except for those destinations where export by livestock vessel is an option**.**

For **bovines**, as the table below shows, the transport by road of roughly 190 000 animals for breeding or fattening and 53 550 animals for slaughter (243 550 animals in total, i.e. around 24% of exported bovines) would be impacted. This figure assumes that the controls on journey times after crossing the EU border will be correctly applied, which in practice will be difficult to ensure with certainty. In addition, part of these exports might be redirected towards transport by sea, thus resulting in a lower impact.

Table 20: Bovines exported to third countries by road with breakdown by purpose and by journey time (Source: TRACES)

	<9h	**9-12h**	**12-21h**	**21-42h**	**>42h**	**Total**
Breeding	11% (25 630	8% (18 640)	15% (34 950)	18% (41 940)	47% (109 510)	**100% (233 000)**
Production	27% (51 840)	8% (15 360)	5% (9 600)	16% (30 720)	43% (82 560)	**100% (192 000)**
Slaughter	49% (51 450)	17% (17 850)	16% (16 800)	9%	9% (9 450)	**100% (105 000)**
Grand Total	**25% (132 250)**	**10% (52 900)**	**12% (63 480)**	**16% (84 640)**	**38% (201 020)**	**100% (529 000)**

For **sheep and goats**, road transport accounts for a far smaller share of third country exports, with 94% by value and 96% by volume taking place by sea[76].

Regarding upgrading the conditions on board of vessels, under option 2.O.2B exporters would need to make sure a veterinarian is on board the vessel. However, discussions with stakeholders and Members States showed[77] that such a requirement would be extremely challenging to implement due to the shortage of veterinarians available and the low interest to work on livestock vessels due to poor and unsafe conditions, rendering the option very costly to attract veterinarians. Option 2.O.2D foresees the presence of an animal welfare officer, who would be a member of the transport crew specifically trained on animal welfare issues. The average cost

[76] Data extracted from Comext.
[77] Data extracted from Comext.

of training per person per year is estimated to EUR 241[78]. Since 88 vessels are currently approved at EU level, the cost at EU level would be EUR 21 208 per year.

Finally, **in both options 2.O.2C and D** some livestock vessels would have to be upgraded to comply with the stricter and higher maritime safety and welfare standards. Based on an extract from the THETIS database, the situation regarding EU approved livestock vessels can be summarised as follows:

White flag:

- Low risk: 2 vessels
- Standard risk: 6 vessels
- High risk: 0

"Grey" flag:

- Low risk: 0
- Standard risk: 41 vessels
- High risk: 0

Black flag:

- Low risk: 0
- Standard risk: 23 vessels
- High risk: 16 vessels

Under the option of "white or grey flag", 16 vessels which are currently high-risk ships flying a black flag would be required to make investments in order to obtain a standard or low risk status of a white or grey flag State. Upgrading existing vessels would cost around EUR 20 million per vessel[79]. Building new vessels to meet the new standards would require between EUR 50 and 100 million per vessel[80]. Of the 23 vessels of the category "standard risk" under a black flag, it is estimated that most vessels would only need to register under another flag State, without major investment. In total it is estimated that around 19 vessels would have to upgrade their vessels at a cost of around EUR 20 million.

Under the option of "white flag", it can be estimated that the 39 vessels currently under a black flag and some of the 41 vessels currently under the grey flag would be required to make similar investments. Overall, the estimation is that 44 vessels would need to make such investments.

The cost for the flag registration is a one-off cost of EUR 5000. Under the white flag option, the 39 black flags and 41 grey flags would face costs of new registration. Under the white and grey flags option, only the 39 black flags would need to register under a new flag.

---

[78] In consultation with national authorities.
[79] Transport study, p. 117 (see note 5, page 8).
[80] Transport study, p. 117 (see note 5, page 8).

Since only a limited number of exports are registered in Traces[81], there is no available data regarding the current volume of journey plans and journey logs submitted by transporters to the competent authorities of the Member States. However, under **the main options** it is likely that the current administrative costs of businesses to arrange animal transports would be saved compared to today, as intra-EU trade is regulated within a single set of EU rules, as opposed to varying requirements that need to be applied depending on the third country crossed and reached, which are likely to incur in addition to EU administrative costs. As for **the alternative option for sea transport,** since the total number of vessels allowed to undertake transports for exports would substantially decline, it is likely that the costs of businesses to arrange transports for exports would be lower than the current situation.

Internal market

Increasing the requirements and upgrading and clarifying the standards of all transport would ensure a better level playing field among **transporters**, as there would be less additional national measures and less divergent enforcement.

Banning or limiting the export of live animals may result in a decrease of revenues for **farmers**. The decrease in prices is most likely to have the largest effect on farms that are currently less competitive (smaller farms, farms in less favoured areas or new Member States)[82]. On the other hand, slaughtering locally instead of exporting animals might support local economies. For example, according to a Romanian study, Romanian farmers would profit significantly from a shift from transporting live animals to transporting meat, as, by transporting meat, the by-products would stay in the country, which could lead to an economic benefit (e.g. sale of high value leather products)[83]. However, that study assumes that the export of live animals can to a large extent be replaced by the export of meat and that the price of the meat and other products are competitive. This assumption may be debatable under the current market circumstances.

Export companies are likely to be seriously affected by a ban (**main options**) or stricter requirements (**alternative options**) on export, as it would de facto end some – or all – of their activities in that area. This would mostly affect companies based in the major exporting Member States.

Trade

A ban on exports will have a negative effect on trade. While part of those exports of live animals will be replaced by exports of meat, this will still result in a net loss. Enforcing limitations on journey time will have a negative effect on export, as some destinations will be out of reach. In this option, landlocked export destinations like central Asia are most affected, especially since the largest part of the animals transported to these countries are for slaughter.

---

[81] Only those that start in a different Member State than the Member State from which they leave the EU are registered in TRACES.

[82] European Parliament, Directorate-General for Internal Policies, Policy Department for Structural and Cohesion Policies, Hill, B. and Bradley, D., *Comparisons of Farmers' Incomes in the EU Member States - Study for the European Parliament,* IP/B/AGRI/IC/2014-68, 2015.

[83] Cazacu, C., *Romanian livestock industry - a comparison study on the impact of replacement of live exports of bovine and ovine with refrigerated/frozen meat Bucharest*, Original Media, Bucharest, 2018.

Public authorities

The ban on exports would result in a decrease of the enforcement and administrative costs of public authorities related to inspections of vehicles and vessels for export, which is onerous for the competent authorities (e.g. loadings on livestock vessels have an inspection rate of 100%). On the other hand, the number of transports between Member States of the otherwise exported animals might increase[84].

Upgrading transport conditions on road and sea will see an increase of the enforcement costs. There is also a risk of fraud (by the misdeclaration of animals as breeding animals instead of slaughter animals), which might lead to additional enforcement costs. However, the costliest measure is expected to be the requirement of having an official veterinarian (or animal welfare officer) present on the vessels. Estimates by the industry suggest that this cost could amount between EUR 5 000 and 20 000 euro per journey[85].

Consumers

Under **a ban of exports**, consumer prices of beef and mutton would likely decrease[86] as described above. In addition, the social expectations regarding animal welfare would be met. The options on limiting journey time and upgrading transport conditions are not expected to have an effect on consumer price.

1.2.4. Social impacts

The transport of animals to third countries by **trucks** is partly done by EU registered companies, which would therefore be negatively impacted by a ban. However, no data on the number of registered companies in or outside the EU performing export and their employees has been identified to allow quantification of these impacts. Primary producers will also abandon their export activities, which will have a negative impact on them.

In the short term, the slaughter animals that are currently transported to third countries would need to be transported to slaughterhouses within the EU, still generating demand for transport services but for different routes. Most of the **livestock vessels** are registered outside the EU and employees also mostly come from outside the EU[87]. For **the options on implementing stricter transport conditions and reducing journey time,** the negative impact on drivers of significantly limiting, or even de facto preventing, the export of live animals would be limited.

1.2.5. Environmental impacts

A ban on export would reduce the distance travelled. In addition, emissions by livestock vessels would be significantly reduced. Hence, a reduction in emission of CO_2/NOx caused by EU

[84] Transport study, p. 118 (see note 5, page 8).
[85] To note that the presence of an official veterinarian on board a livestock vessel during the entire first voyage of the vessel is required by Commission Implementing Regulation (EU) 2023/372 of 17 February 2023 laying down rules on the recording, storing and sharing of written records of official controls performed on livestock vessels, on contingency plans for livestock vessels in the event of emergencies, on the approval of livestock vessels and on minimum requirements applicable to exit points, OJ L 51, 20.2.2023, p. 32–39.
[86] Transport study, p. 121 (see note 5, page 8).
[87] Transport study, p. 124 (see note 5, page 8).

transporters is to be expected. If a ban of exports would result in a decline of production of especially sheep (since a large part of this production is exported to third countries), also a reduction of other GHG emissions could be expected. This environmental benefit may however be unchanged if third countries are importing live animals from other third countries.

Under the option limiting journey time, the emissions by trucks and livestock vessels would remain, though they could to some extent be reduced compared to the current situation.

Some evidence suggests that dead bodies of animals that die during sea transport are thrown in the Mediterranean Sea because they are considered high-risk waste and there is not an adequate system in place for accepting the dead bodies at the arrival ports (even in the EU), creating water pollution issues[88]. However, with better animal welfare conditions on board of the vessel due to the presence of qualified personnel, and improved vessels safety, less animals would be expected to die during transport. As the measure also foresees stricter conditions for livestock vessels which would greatly increase safety and compliance, the illegal disposal of carcasses in waters may also be reduced along with other illegal practices having negative environmental impacts (illegal disposal of fuel, etc).

1.3. TRANSPORT OF UNWEANED CALVES

Current EU animal welfare legislation (Council Regulation 1/2005) establishes a minimum age for unweaned calves to be transported: At least 10 days old for journeys over 100 km and at least 14 days old for long journeys without being accompanied by their mothers. Unweaned calves must also, after 9 hours of travel, be given a rest period of at least 1 hour for them to be given liquid and if necessary, to be fed. After this rest period, they may be transported for a further 9 hours. The maximum journey time is up to 19 hours before resting for 24 hours and again 19 hours without any limitation if the same pattern for journey and resting periods is respected.

The measures proposed are:

3. Transport of unweaned calves	3.O.1: Max journey times and minimum age and weight (2 years transition period for weight and age, 5 years for journey times)

1.3.1. Background and non-action scenario

Unweaned calves belong to the group of vulnerable animals and are especially exposed to animal welfare and animal health risks during transport activities.

Most of the approximately 20 million unweaned non-replacement dairy calves born each year in the EU enter into beef or veal beef production systems in the Member States in which they were born. Still, substantial numbers of these animals are transported to other Member States. In the period 2015 to 2020**, each year around 1.4 million unweaned calves (7%) were moved across Member State borders, of which 42% (578 000 animals) on long journeys** (i.e.

[88] Transport study, p. 125 (see note 5, page 8).

journeys beyond eight hours)[89]. These long journeys represent a higher risk for the welfare of animals than shorter journeys, and, because there is currently no system allowing to feed calves with milk or milk replacers while on the journey, EFSA recommends a maximum 8 hour journey duration for unweaned calves after which calves should be unloaded, fed, and rested for three hours[90].
The most important Member States of destination of unweaned calves for long journeys are Spain, the Netherlands, Italy and Belgium, accounting for over 93% of the animals. The most important Member States of origin for long journeys are France, Ireland and Germany[91,92]. The calf herd is expected to decrease by 10% by 2032, due to a reduction in the dairy herd[93].

At present, several Member States have already decided to limit long-journeys of unweaned calves and to increase their minimum age. This is either based on legislation (e.g. Sweden) or voluntary measures taken by operators (e.g. the Netherlands). The Dutch voluntary ban on long-journeys resulted in a replacement of the long-journeys from Eastern Member States by short-journeys originating in neighbouring Member States, especially Germany, within a few years[94].

Under a no-action scenario, it is expected that the overall number of transports of animals, including the transport of calves, will slightly decrease due to the expected changes in livestock numbers over the coming years[95]. In addition, the restrictions adopted by certain Member States regarding the transport of unweaned calves, as indicated above, will also result less calves transported in the long term. However, provided that such national measures will remain limited to a few Member States, such a decrease should not be significant[96].

The policy option to assess is the following:

Provided that a system allowing to effectively feed calves with milk replacers on the truck is approved based on a technical assessment at EU level during the transition period, unweaned calves would be transported for a maximum of 19 hours (9 hours – 1 hour rest – 9 hours), a minimum age of 5 weeks and minimum weight of 50kg. In the case of transport by roll-on roll-off (trucks loaded on vessels), the leg of the journey on board in not included in the 19 hours

---

[89] Transport study, p. 126 (see note 5, page 8).
[90] Welfare of cattle during transport (see note 45, page 86).
[91] Transport of unweaned calves between Member States is mainly destined for veal production (in the Netherlands and Italy) and young beef productions (Spain). Veal production in the Netherlands and Italy is organised in highly integrated value chains. The total production value of the veal calf sector in the Netherlands was EUR 6.2 billion in 2019, with veal calf farms accounting for EUR 2.3 billion, or 38% of the total, and supply and processing jointly for EUR 3.7 billion. In 2019, the added value realised in the veal calf complex amounted to EUR 1.8 billion, of which the primary sector contributed EUR 200 million, or 9% of the total. The total economic value of the 700 000 veal calves that are produced annually in Italy is approximately EUR 600 million (transport study, p. 135, (see note 5, page 8).
[92] Transport study, p. 126 (see note 5, page 8).
[93] Agricultural outlook for markets, income and environment 2022-2032 (see note 25, page 41).
[94] Transport study, p. 135-136 (see note 5, page 8).
[95] Transport study, pp. 84-85 (see note 5, page 8).
[96] Transport study, p. 132 (see note 5, page 8).

limitation. If there is no system allowing to effectively feed calves with milk replacers on the truck, the EFSA recommendations would be followed and the maximum journey time for unweaned calves would be 8 hours.

1.3.2. Animal welfare impacts

The main welfare concerns during transport of unweaned calves are **reduced immunity, handling difficulties, transport stress and health issues, prolonged thirst, hunger and challenges to feed calves in certain situations**. Those risks are aggravated by the very young age (14 days) and low weight of the calves transported[97].

Option 3.O.1 proposes to reduce long journeys for unweaned calves, which would reduce the risks of welfare consequences such as **immunosuppression, prolonged hunger and thirst, handling stress and restriction of movement that might lead to injuries and death**[98]. The option also proposes to increase the transport age to 5 weeks, and a minimum weight of 50kg, which would further reduce the welfare risks mentioned above.

The option is in line with the EFSA recommendations, as regards the age and weight requirements[99].

1.3.3. Economic impacts

In absence of approval of effective feeding solutions during the transition period, a ban of journeys of more than 8 hours for unweaned calves without a decrease in veal calf production in the Netherlands, Italy and Spain, would create a strong incentive for veal calf or beef integrations to ensure the supply of unweaned calves. This entails that these Member States will need to import unweaned calves from Member States that are closer to ensure journey times of under 8 hours. Consequently, the number of long-journeys would decrease but the total number of animals transported on short-journeys will increase. For several Member States, the supply of unweaned calves from neighbouring Member States will be insufficient to meet their demand[100]. However, as feeding systems are already being developed and reaching the market, those impacts will likely be avoided.

<u>Businesses</u>

If no effective on-truck feeding solution has been approved during the transition period, **transporters** would be mainly impacted with costs related to the increase in the space needed to transport older calves (minimum age requirement) and costs related to the 8 hours limitation. However, since feeding solutions are reaching the market already now, this is not expected to happen. The cost for installing a feeding system in an existing truck is estimated to be between EUR 25 000 – EUR 30 000, while a new truck equipped with such a feeding system is estimated

---

[97] Welfare of cattle during transport, pp. 72-81 (see note 45, page 86).
[98] Welfare of cattle during transport, pp. 72-81 (see note 45, page 86).
[99] Welfare of cattle during transport, p. 81 (see note 45, page 86).
[100] Transport study, p. 136 (see note 5, page 8).

to cost around EUR 500 000. Annual maintenance costs would be between 1000 and 2000 EUR[101].

Since calves would be transported at a higher age and weight than today, a lower number of calves will fit in the truck. An increased number of journeys or trucks to transport the same number of calves will be needed, however this increase is expected to be limited due to the forecasted reduction[102] in the number of calves. It should be noted that while the measure on space allowance applies to calves, the difference between the previous requirements and the new requirements for a calf of 50kg is a 5% increase in space allowance. The measure is therefore not expected to substantially affect transport capacity.

For **dairy farmers,** it is estimated on the basis of data provided by the sector in Germany, that keeping calves on the dairy farm for the additional weeks will cost approximately EUR 4.20 per calf per day[103]. In addition, having the animals longer at the dairy farm means that the number of animals on the farm is higher. This may have consequences for environmental permits that, in a number of Member States (e.g. the Netherlands and Germany) limit the number of animals present. Updating such permits can come with substantial costs and time[104].

Keeping calves longer on dairy farms means that the calves would be kept for a shorter amount of time at the fattening farm, incurring savings for **veal calves and beef producers**. Overall, the extra costs of dairy farms may be reflected in the selling price of calves to fattening farms.

For dairy farmers in Member States where calves on journeys over 19 hours originate, a lack of alternatives to fatten unweaned non-replacement calves locally or within the 19 hours may result in substantially lower prices of all unweaned non-replacement calves. Prices might even become so low that taking care of these animals might be jeopardized, resulting in welfare problems or killing of these calves on dairy farms[105].

Due to the increased resilience and overall better health of calves[106], fewer losses paired with lower costs related to the disposal of carcasses and decreased veterinary costs are expected for veal and beef producers[107]. A Belgian study showed that those calves that have suffered from bovine respiratory diseases or diarrhoea have a considerably lower body weight (up to 9.2 kg less) than calves that remained healthy[108]. Thus, there is a clear link between the growth of calves and disease. A study from 2021 carried out in The Netherlands establishes 4 weeks as the most beneficial age to transport animals in terms of economic value, given their immunity at that stage, they are not as fragile and the price in the market for these animals is the most

---

[101] Based on data provided by livestock truck manufacturer.
[102] Transport study, p. 84 (see note 5, page 8).
[103] Transport study, section 5.4.2.3. (see note 5, page 8).
[104] Transport study, p. 134 (see note 5, page 8).
[105] These negative consequences would not be mitigated by the envisaged 8 year transition period, as most dairy farmers view non-replacement calves as a low-value by-product of their dairy production. This is unlikely to change unless alternatives are identified (transport study, p. 134 (see note 5, page 8)).
[106] Dutch Ministry of Agriculture, Nature and Food Quality, *Scenariostudie Kalverketen - Scenario's voor een andere inrichting van de keten*, the Hague, 2021, p. 33.
[107] Scenariostudie kalverketen, p. 40-41 (see note 106, page 103).
[108] Pardon, B. et al., 'Impact of respiratory disease, diarrhea, otitis and arthritis on mortality and carcass traits in white veal calves', *BMC Veterinary Research*, Vol. 9, 97, BMC, 2013, https://doi.org/10.1186/1746-6148-9-79.

optimal.

Overall, the measure is expected to cost transporters around EUR 3 million per year.

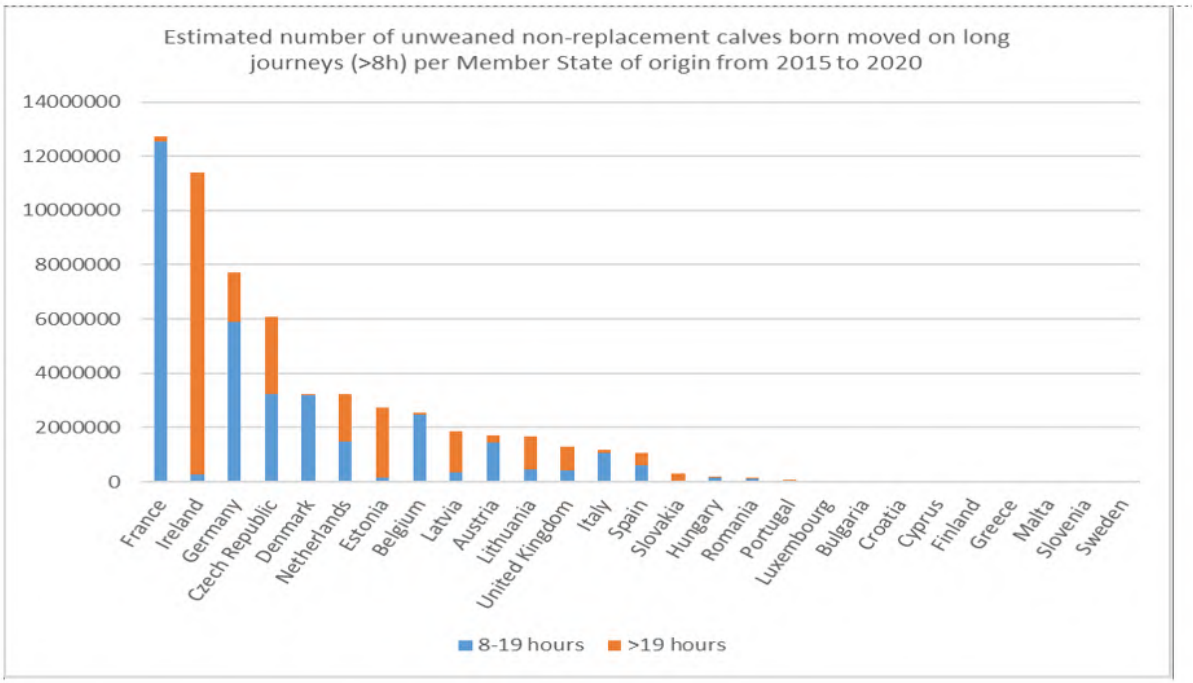
Public authorities

A limited increase of the enforcement costs may be expected compared to today if feeding systems are available on trucks, mainly related to inspection activities (planning, analysing data etc.) and the need for more veterinarians/inspectors to perform these inspections. In the situation that no effective feeding system has been approved yet and animals therefore need to be unloaded to be fed, there would be higher enforcement costs at the control post as more calves will need to rest and be fed. In this scenario, more control posts may have to be made available[109]. As stated however, as feeding systems are already being developed and reaching the market, this is not likely.

Internal market and competitiveness

An 8 hour journey time limitation may be expected to result in some disruption in the trade of unweaned calves in a number of Member States that are impacted, as shown by the graph below.

Figure 1: Long journey transports of unweaned calves



If an effective feeding system is approved, and calves can be transported for 19 hours (excluding transport on vessels), three Member States will be more specifically affected: **Estonia, Lithuania and Latvia.** Due to their location, it will not be possible to either send unweaned calves to the usual customers in other Member States within a road journey time

[109] Transport study, p. 133 (see note 5, page 8).

limit of 19 hours. A long transition period will therefore be necessary to allow for a restructuring in these countries.

In **Ireland** there are about 18 000 dairy farmers that produce the non-replacement calves[110], transporting 114 000 unweaned calves per year[111] to other Member States to be fattened, mainly the Netherlands, Italy and Spain. Irish calves spend a leg of the journey on board of vessels, and this time is not included in the 19 hours limit, therefore most of the Irish calves will be able to travel the usual route and reach their destination.

1.3.3.1.Social impacts

Employment

There might be a shift of location of farms, which would impact **farmers**. Limiting the transport duration of unweaned calves might result in more local fattening of unweaned calves[112].

1.3.3.2.Environmental impacts

The more limited journey duration compared to today has the potential to reduce transport-related GHG emissions. Furthermore, if no effective feeding system is approved, in the case of Ireland these limitations may mean a de facto ban of the transports of unweaned calves, meaning that around 114 000 animals/year would not be transported. Assuming a current journey of calves from Ireland to a destination of approximately 1 200 km from Cherbourg, in total 1 522 000 litres of fuel will be saved reducing NOx emissions by 5 tonnes and CO_2 emissions by 1 362 tonnes (this reduction excludes the reduction of the emission by the Ro-Ro vessel for which no data was available)[113].

Estimating the transport-related emissions for other Member States is less straightforward as the potential substitution effect (e.g. making more shorter journeys as a replacement for the previously longer journeys to keep trading the same number of animals) might offset the potential reduction in GHG emissions[114]. Additionally, increasing the number of journeys or truck needed, due to the higher age of the calves, would contribute to offset the potential reduction, while a reduction in the number of dead calves and higher yields would have a positive environmental impact.

There is no significant harm to be expected from implementing any of the options[115].

---

[110] Transport study, p. 136 (see note 5, page 8).
[111] Transport study, p. 126 (see note 5, page 8).
[112] The alternatives are described in Study on shifting from transport of unweaned male dairy calves over long distance to local rearing and fattening: final report (see note 33, page 61).
[113] Transport study, p. 139 (see note 5, page 8).
[114] Transport study, p. 139 (see note 5, page 8).
[115] Transport study, p. 139 (see note 5, page 8).

1.4. HOT TEMPERATURES

Current EU animal welfare legislation (Council Regulation 1/2005) requires that the means of transport must be designed, constructed, maintained and operated so as to protect the animals from extreme temperatures (Annex I, Chapter II, point 1.1.).Ventilation systems on means of transport by road must be capable of maintaining temperatures of no more than 30°C within the means of transport, for all animals, with a +/- 5 °C tolerance[116].

The measures proposed are:

4. Hot temperatures	4.O.1: Additional criteria when approving transport on long journeys subject to weather forecasts

1.4.1. Background and non-action scenario

One of the key animal welfare concerns during transport relates to animals being exposed to high temperatures. To protect animals from such "heat stress", EFSA recommends, for different categories of livestock transported, upper critical temperatures. These vary between 22°C for sows, 30°C for piglets up to 30 kg and 32°C for shorn sheep[117].

The Commission reminds Member States every summer to take the weather forecast into account before signing the journey log, when temperatures beyond 30°C are forecasted for the journey. As a result, combined with Commission audits and guidelines, the number of live animal transports by road to e.g. Turkey during summertime was reduced by 70% over two years[118].

Temperatures as recommended by EFSA can only be stably maintained within the vehicles by means of requiring air conditioning systems, which are neither economically feasible nor desirable from an environmental point of view[119]. In any other scenario, if temperature limits are exceeded within the vehicle, there is no corrective measure available. This limits the possible solutions to decide whether or not to sign the journey log (and therefore, allowing the journey to happen) relying on the weather forecast.

Some Member States already restrict the transport of animals in high temperatures. In Germany, if outside temperatures are expected to be higher than 30°C during transport to slaughterhouses, the total transport time is maximum 4.5 hours. In the Netherlands, animals may not be transported if the outside temperature reaches 35°C or higher, regardless of whether the transport happens within the country or to another Member State[120].

Due to climate change, the spring and the summertime are increasingly confronted with

---

[116] Transport study, p. 56 (see note 5, page 8).
[117] EFSA reports on animal welfare during transport (see note 45, page 86).
[118] Welfare of animals exported by road - overview report (see note 33, page 61).
[119] Transport study, p. 56 (see note 5, page 8).
[120] Transport study, p. 91 (see note 5, page 8).

extremely hot weather in the EU. As a result, there will be more tropical conditions (heat waves) occurring in countries with a temperate climate in northern and central Europe, and in particular in the southern European countries with a more subtropical climate. During these periods the temperature in animal transport vehicles rises above 30°C (or even 35°C)[121]. Based on EEA data[122], in 2038 Southern Europe is expected to have an average of 50 days per year over 30°C, Central Europe 15 days, and Northern Europe 3 days.

Policy measure 4.O.1 would require that, when the outdoor temperature is between 25°C and 30°C, the journey may not exceed 8 hours and the animals should have genuine access to water during the transport. Where the outdoor temperature is forecasted to be higher than 30°C, live animal transport would only be allowed by night (i.e. between 21h00 and 10h00).

There exists very little information on how effectively different transport ventilation designs are able to keep the animals within the required temperature ranges[123]. Furthermore, air cooling systems are often missing[124] or may cease to function due to electrical or technical problems. Hence, requirements are better based on outdoor temperatures.

1.4.2. Animal welfare impacts

Requiring that Member States should only grant approval of a journey, journey logs and travel plans when the outside temperatures are forecasted to be lower than the limits recommended by EFSA, would be beneficial for the welfare of the animals as it would allow them to avoid "heat stress"[125].

Transporting animals by night would require that slaughterhouses can either function during the night or can shelter all animals until slaughter resumes in the morning[126], with consideration for their welfare.

1.4.3. Economic impacts

Businesses

Restricting the journey duration and travel during night-time will likely increase also the administrative costs for **transporters**[127]. Those related to higher wages for night-time driving and other higher administrative costs: trucks must meet customs officers, border controls, veterinary inspection appointments, which may be impossible (or expensive[128]) to schedule at night. The extent of this increase depends on the number of days above 30°C, which will be dependent on the geographical location. The average wage per hour of a truck driver depends

---

[121] Hoorweg, F. A., et al., *Metingen temperatuur tijdens diertransport, KD-2020-063*. Wageningen University and Research, 2021, https://library.wur.nl/WebQuery/wurpubs/fulltext/559400.
[122] European Environment Agency, *Heat and cold – extreme heat*.
[123] Welfare of pigs during transport (see note 45, page 86).
[124] Welfare of animals exported by road - overview report, p. 8 (see note 33, page 61).
[125] EFSA reports on animal welfare during transport (see note 45, page 86).
[126] Transport study, p. 106 (see note 5, page 8).
[127] Transport study, p. 97 (see note 5, page 8).
[128] For the Netherlands, costs for Competent Authorities outside normal business hours are 30% higher than costs within business hours (source Dutch Competent Authorities).

on the geographical location, ranging from EUR 4.26 in Eastern Europe to 18.43 in Western Europe[129]. Assuming a 20%[130] bonus for night-time driving, the costs per hour would then range from EUR 5.1 to EUR 22.1.

Due to their usual short duration, journeys to slaughterhouses are expected to be the least affected while other type of journeys may be more strongly affected if the temperature above 30°C continues for more than a day.

Overall, this option is expected to have a very limited impact on transporters.

Slaughterhouses will need to either perform their activities during the night, or to provide a space to keep the animals until slaughter resumes in the morning[131]. Given that temperatures above 30°C are expected to remain relatively occasional in most Member States, it is more likely that slaughterhouses will have the occasional night shift. Availability of Competent Authorities to perform ante mortem and postmortem inspections during night-time will need to be ensured.

Overall, the measure is expected to cost per year EUR 5 million for broiler transporters, EUR 3 million for pig transporters, EUR 2 million for beef transporters, and EUR 1 million for calf transporters.

Internal market

The European regions projected to be most affected by high temperatures are the Iberian Peninsula, central Europe, the eastern Adriatic seaboard, and southern Greece[132]. Those regions are expected to be the most affected by mandatory night-time transport in case of temperatures above 30°C. However, a majority of transports take place in northern and Central Europe[133].

In terms of regional differences, impacts would be associated with differences in the Member State rules on night-time driving. The implementation of the option may thus be difficult or impossible in certain Member States, resulting in animals not being transported during high temperatures event in those countries and transports from neighbouring countries being diverted to other routes.

1.4.4. Social impacts

Employment

If the new temperature requirements would lead to the rejection of certain journey plans, and consequently a reduction of journeys performed, this would reduce the need for drivers. However, most likely the journeys would simply be delayed or rerouted. Hence, this impact might be negligible.

---

[129] European Commission, Directorate-General for Mobility and Transport, *Assessment of the impact of a provision in the context of the revision of Regulation (EC) No 1071/2009 and Regulation (EC) No 1072/2009 – Stakeholder consultation summary*, Publications Office of the European Union, 2021, https://data.europa.eu/doi/10.2832/993682.
[130] Latvian Road Transport Directorate, *Guidance on level of remuneration for drivers in EU Member States*.
[131] Transport study, p. 106 (see note 5, page 8).
[132] European Environment Agency, *Global and European temperatures*.
[133] Transport study, p. 106 (see note 5, page 8).

Travelling by night would require both the transporters and slaughterhouses personnel, as well as official veterinarians, to be available during the night hours.

1.4.5. Environmental impacts

The option is not expected to have a significant environmental impact. Night-time driving avoids traffic, which can reduce emissions, but the measure would still be applied on a limited number of days of the year.

1.5. NEW TECHNOLOGIES

Current EU animal welfare legislation (Council Regulation 1/2005, Article 6(9)) requires that transporters of domestic Equidae (except registered Equidae), and domestic animals of the bovine, ovine, caprine and porcine species over long road journeys must use a navigation system for all means of transport by road. They must keep the records obtained by such navigation system for at least three years and make them available to the competent authority upon request.

The measures proposed are:

5. New technologies.	(5 years transition period) 5.O.1A: Real-time positioning 5.O.2: A central database and digital application	5.O.1B: Retrospective checks tachographs based

1.5.1. Background and non-action scenario

The Fitness Check of the current EU animal welfare legislation identified a lack of tools to properly monitor, measure and report the result and impacts of the legislation, in particular as regards animal transports. Currently, many of the checks are paper based. An electronic version of the journey log for animal transport was implemented in 2021 but is not yet commonly used[134].

To support the enforcement of current rules and to comply with the *digital by default* policy of the EU, several actions are considered for introducing new technologies in official controls[135].

The measure assessed is to allow for sample-based real-time control of transports through a central EU database covering all journeys (including short journeys). The main objective of the database would be to allow competent authorities to assess, through GPS tracking, in real time, where trucks are and how long they have been driving, in order to properly enforce a maximum journey time. The database would also be the central repository of all relevant transport documents (e.g. journey log, authorisations, certificates, etc.) and would then enable the development of a digital app which would facilitate implementation and enforcement for all

[134] Transport study, p. 141 (see note 5, page 8).
[135] Transport study, p. 141 (see note 5, page 8).

actors along the chain (both at Competent Authority and operator level)[136].

1.5.2. Animal welfare impacts

Real-time positioning systems would make it possible to check in real time whether operators/drivers **respect the maximum journey times and in particular the resting periods**. It also allows the official controls to be better targeted (i.e. knowing who will pass by where and when). This is likely to result in improved animal welfare. This aspect is conditional upon the resources of competent authorities and their abilities to dedicate enough staff to track and control the real-time data[137], sampled on a risk-based need.

This scheme would have the most positive impact on animal welfare as it requires the use of real-time positioning and sensors for all journeys, which means all animals transported would be covered. The use of a central EU database also has the highest potential to improve controls, which in turn would ensure the welfare needs of animals during transport are met.[138] Retrospective tachographs checks would not bring significant change compared to the current situation.

1.5.3. Economic impacts

Implementation of an IT infrastructure to make the described above operational by developing a new system, itself connected to TRACES, that supports the tasks described previously will require some budget at EU level. There is however a lack of current data giving an insight into the costs and time to develop and implement such a system. These costs are therefore left outside the scope of the analysis of the economic impact[139].

Business operators

Introducing new technologies may entail direct costs to transporters for upgrading the vehicles to the latest standards. Most of the current transport trucks (77%) are already equipped with a satellite navigation system[140], a proportion that is expected to increase by 2031. Only limited costs (if any) have to be made to convert vehicles to the new standards. For vehicles needing a full upgrade, a one-off investment cost of EUR 20 000 – EUR 30 000 per truck is expected[141].

Limited evidence suggests that an automated IT platform would be estimated to save at least 30% of labour costs associated with administrative tasks (completing the journey log and submitting to the Competent Authorities). Therefore, it seems likely that the implementation

---

[136] Transport study, section 5.5. (see note 5, page 8).
[137] Transport study, p. 142 (see note 5, page 8).
[138] Transport study, p. 143 (see note 5, page 8).
[139] Transport study, p. 143 (see note 5, page 8).
[138] Baltussen, W. H. M., Gebrensbet, G. and Roest, K., *Study on the impact of regulation (EC) No 1/2005 on the protection of animals during transport*, 2011. The study showed that in 2016, already 77% of the trucks were equipped with a satellite navigation system. Given the normal replacement rates, to date most if not all trucks for transport between Member States and to third countries are equipped with these systems.
[141] Transport study, p. 144 (see note 5, page 8).

of a digital application that is also available for the businesses to apply and report journeys will result in a decrease of administrative costs associated with journeys[142].

This would result in a cost reduction of around EUR 71 million per year compared to the current situation[143]. Retrospective tachographs checks would not bring changes to the costs.

Internal market and competitiveness

Improving the enforcement of the animal welfare requirements by making more use of new technology would contribute to a more level playing field. This is considered by stakeholders to have a positive effect on the competitiveness among operators and on the internal market related to the free movement of animals, as well on EU exports[144].

Public authorities

The direct costs (one-off) linked to the development of a central EU database would be incurred at the EU level by the Commission service or agency responsible for the development and maintenance of the system. Member State administrations may incur costs related to training of staff on how to use a new system (although these costs may also be borne by the EU if training is provided centrally). An exact estimate of these costs cannot be provided at this time as they would be highly dependent on the technical specifications for such a database, which are unknown at this point[145]. However, since it will build on the existing TRACES system[146], costs would be limited.

In addition to the costs related to a central EU database, public authorities, especially at the Member State level, would also incur costs related to the processing of the data that would be generated by the sensors and real-time positioning[147].

Consumers

No significant impacts on consumers have been identified.

1.5.4. Social impacts

No significant impacts on working conditions, food security and food safety have been identified. The impact on the labour needs for transporters is related to the time saving for complying with the administrative procedures. The reduced administrative burden of transport companies related to filling in the journey log and submission to the competent authorities would result in a reduction of labour needs. On the other hand, labour needs of public administrations for processing the additional data collected and potentially perform more checks could increase[148].

---

[142] Transport study, p. 144 (see note 5, page 8).
[143] Modelling of policy options to support the Impact Assessment accompanying the revision of the EU legislation on the welfare of animals during transport, p. 145 (see note 54, page 90).
[144] Transport study, p. 144 (see note 5, page 8).
[145] Transport study, p. 146 (see note 5, page 8).
[146] Transport study, p. 146 (see note 5, page 8).
[147] Transport study, p. 146 (see note 5, page 8).
[148] Transport study, p. 147 (see note 5, page 8).

1.5.5. Environmental impacts

Additional data will be stored in a central EU database. In case the paper trail will be replaced by a digital trail the use of paper and storage facilities will decrease and be replaced by data servers. It is expected that this would decrease the GHG emissions associated with paper use and storage facilities but increase the GHG emissions associated with the higher energy use of these systems compared to the current situation[149].

Generally speaking, it has been estimated that the share of global data centre electricity consumption will rise from about 1.15% in 2016 to 1.86% in 2030[150] Although it cannot be estimated to what extent environmental benefits would occur from the lower paper and storage facility use and to what extent emissions would increase from the higher energy use, it can be expected that this scheme would have a slight negative environmental impact[151].

1.6. TRANSPORT OF CATS AND DOGS

Commercial transport of cats and dogs falls within the scope of Council Regulation (EC) No. 1/2005, but there are very few specific provisions. For journeys longer than 8 hours, an authorisation of the transporter is required. Dogs and cats of less than 8 weeks of age are not considered fit for transport, unless they are accompanied by their mother. Dogs and cats must be fed at intervals not exceeding 24 hours and watered at intervals not exceeding 8 hours. Moreover, cats and dogs must be given a rest period of at least one hour sufficient for them to be given liquid and, if necessary, fed. After this rest period, they may be transported for a further 14 hours. There are no requirements regarding the dimensions of the containers used for the transport[152].

The measures proposed are:

6. Transport of cats and dogs	(3 years transition period): 6.O.1A: Requirements for the transport of cats and dogs for economic purposes, e.g. age limits and temperature conditions	6.O.1B: Lower age limit

1.6.1. Background and non-action scenario

The options to be assessed are the following:

6.O.1A: Minimum age for transport fixed at 15 weeks. Clinical check before departure and

[149] Transport study, p. 148 (see note 5, page 8).
[150] Koot, M. and Wijnhoven, F., 'Usage impact on data center electricity needs: A system dynamic forecasting model', *Applied Energy,* Vol. 291, 116798, 2021, https://doi.org/10.1016/j.apenergy.2021.116798
[151] Transport study, p. 148 (see note 5, page 8).
[152] Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97, OJ L 3, 5.1.2005, p. 1–44.

additional vaccinations. Rules on temperature and humidity levels and technical conditions (specific conditions for brachycephalic breeds). Adult cats and dogs to be fed each 24 hours, and puppies each 8 hours. Watering to be continuous or provided at least every four hours. No muzzles allowed as they prevent thermoregulation. Approval of vehicles. Stricter rules on feeding (adults 1x/24h, puppies and kittens every 8h), continuous water availability.

6.O.1B: as in 6.O.1A except for minimum age fixed at 12 weeks.

1.6.2. Animal welfare impacts

Transport poses risks for the health and welfare of animals transported, **due to potential exposure to and spread of infectious diseases**. **Immunity in puppies drops from 8 weeks of age as the immunity acquired through colostrum is fading away**. In parallel, immunity from vaccinations from 6 weeks on does not develop until around 16 weeks of age. Therefore, there is a **period of low immunity between weeks 8 and 16 when pups are susceptible to infection with infectious diseases. A similar process happens in kittens.** Moreover, an **early separation from a familiar environment and social groups and exposure to inappropriate circumstances of transport cause serious stress in animals.** Avoiding transport at a too early age will allow for a better development of immunity against infectious diseases in transported cats and dogs and consequently improve welfare of these animals.

Given that puppies and kittens have a critical period for socialisation (3-12 weeks for puppies, and 2-9 weeks for kittens[153]) this recommended age limit on transporting them on long journeys should not and does not have to **impede normal socialisation**. Breeders must be required to ensure adequate socialisation opportunities for the animals. **The normal range of temperatures for cats and dogs in which they can maintain their body temperature, without expending energy to increase heat production or heat loss, is between 20°C and 30°C**, with variation depending on breeds[154][155]. **Humidity seems to influence significantly dogs' ability to thermoregulate** and should be maintained between 30 and 70%. Special consideration is needed for dogs of brachycephalic breeds or types as their ability to thermoregulate can be significantly reduced due to the anatomical specifics of the upper respiratory tract. Muzzles impair dogs' ability to thermoregulate and should be banned in time of transport[156].

Setting temperature and humidity ranges in the new legislation will help improve the welfare

---

[153] Casey, R. A. and Bradshaw, J. W. S., 'The effects of additional socialisation for kittens in a rescue centre on their behaviour and suitability as a pet', *Applied Animal Behaviour Science*, Vol. 114, 1-2, 2008, pp. 196–205. https://doi.org/10.1016/J.APPLANIM.2008.01.003

[154] Jordan, M. et al., *Temperature Requirements for Dogs – Are They Tailored to Promote Animal Welfare?* Purdue University – Center for Animal Welfare Science, Purdue University, 2016. ://www.extension.purdue.edu/extmedia/VA/VA-16-W.pdf

[155] McNicholl, J., Howarth, G. S. and Hazel, S. J., 'Influence of the Environment on Body Temperature of Racing Greyhounds', *Frontiers in Veterinary Science*, Vol. 3, 53, 2021, Frontiers Media SA, 2016, https://doi.org/10.3389/FVETS.2016.00053.

[156] Arhant, C. et al., 'Owner reports on the use of muzzles and their effects on dogs: an online survey', *Journal of Veterinary Behavior*, Vol. 41, Elsevier, 2021, pp. 73–81. https://doi.org/10.1016/J.JVEB.2020.07.006

of transported animals.

While a minimum of 12 weeks before transport should be sufficient to ensure immunisation, 15 weeks is preferable from the point of view of socialisation with the mother. Hence, option 6.O.1A would have a greater impact on animal welfare than option 6.O.1B. On the other hand, this option delays also socialisation with the owners compared to option 6.O.1B.

1.6.3. Economic impacts

Businesses

The commercial transport of dogs and cats is mostly done by the breeder or under the direct responsibility of the breeder. Consequently, the costs are to be borne by these business operators[157].

For option 6.O.1A, new requirements on temperature and humidity would increase the cost for transporters and breeders related to the improvement/replacement of current vehicles. To give an indication, commercially available new dog trailers without air conditioning but properly designed may cost between EUR 1 000 – EUR 3 000 for two to four dogs. Dog trailers with air conditioning may be five times as expensive, depending on the specifications, varying between EUR 5 000 – EUR 15 000, for two to four dogs[158].

Moreover, both options are likely to increase veterinary costs. A veterinary health check consultation may cost between EUR 10 and EUR 40, and additional vaccinations may cost between EUR 20 and EUR 70 euros per vaccination. The economic impact of the new requirements for feeding and watering are expected to be limited, since relatively similar rules apply already today[159].

Overall, under option 6.O.1B, it is estimated that, at EU level, transporters of puppies and kittens would face a reoccurring administrative cost of EUR 94.5 million and a single adjustment cost of EUR 15 million.

Public authorities

Enforcement and administrative costs of public authorities

It is expected that the introduction of more specific and detailed requirements will enable competent authorities to better enforce the rules. On the other hand, a prerequisite to putting in place proper checks is that sufficient staff (and budget) will be made available by the Member States to check compliance. In other terms, a greater number of inspections means more time needed to finalise the administrative checks, more administrative work and more personnel. Consequently, introducing more specific requirements for the commercial transport of cats and dogs will likely lead to an increase in enforcement costs and investments for authorities[160].

It should be specified that no specific data on the actual costs borne by the authorities have been identified; therefore, it is not possible to assess and calculate the variance of costs that

---

[157] Transport study, p. 151 (see note 5, page 8).
[158] Transport study, pp. 151-152 (see note 5, page 8).
[159] Transport study, p. 152 (see note 5, page 8).
[160] Transport study p. 152 (see note 5, page 8).

may incur between the actual situation and the one created by the different options[161].

SMEs

Most transporting companies are SMEs.

EU Single Market

The keeping, breeding, and trade of pets represent a major economic activity with the annual value of cat and dog sales in the EU estimated at EUR 1.3 billion and generating direct employment of 100 000 people[162]. One NGO estimates that the European online trade in puppies is worth almost EUR 1.5 billion per year and that almost 2.4 million dogs are traded each year across the major European classified sites that advertise dogs[163]. In 2020, the number of dogs transported commercially intra-EU amounted to 283 145 (compared to 180 752 dogs in 2015), and the number of cats to 32 642 (compared to 20 355 in 2015)[164].

Transporters and breeders are expected to continue the trade even if more stringent requirements apply. The free movement of dogs and cats in itself would hence not be compromised, but more stringent transport rules might slightly impact the trade patterns (and lead to less availability of cats and dogs). Better enforcement expected thanks to the inclusion of more specific rules would contribute to reducing illegal transport, which will increase the level playing field among breeders and transporters[165].

Going from minimum 8 weeks to minimum 15 weeks (option 6.O.1A) would have more negative impact in reducing the number of transport of cats and dogs, than if the limit is set at 12 weeks (option 6.O.1B).

1.6.4. Social impacts

Employment

The impact on EU transporters, and consequently on their workforce, cannot be identified and assessed, given the scarcity of studies and data on cats and dogs transport[166].

Human health

The lack of vaccination results in animals being very susceptible to infectious diseases[167,168]. Therefore, the additional vaccination requirements and the higher age at transport proposed in this measure may result in fewer sick animals after arrival. This would have a positive impact

---

[161] Transport study p. 153 (see note 5, page 8).
[162] Schrijver, R. et al, *Study on the welfare of dogs and cats involved in commercial practices, SANCO 2013/12364*, 2015, p. 6.
[163] FOUR PAWS International, *The illegal puppy trade*.
[164] Transport study, section 5.6.2.3. (see note 5, page 8).
[165] Transport study, p. 153 (see note 5, page 8).
[166] Transport study, p. 58 (see note 5, page 8).
[167] Cocchi, M. et al., 'A Three-Year Biocrime Sanitary Surveillance on Illegally Imported Companion Animals', *Pathogens*, Vol. 10, 1047, MDPI, 2021, https://doi.org/10.3390/pathogens10081047.
[168] EU Dog & Cat Alliance, *Literature review: Welfare of dogs and cats during transportation*, 2020.

also on human health because it would reduce the need to use antibiotics to treat these animals and, consequently, contribute to reduce AMR and zoonotic diseases development and spread.

Other social impacts:

Social impacts are more positive in case of a 12 weeks limit than 15 weeks transport limit as pet buyers would be able to buy the puppies and kittens at a younger age and socialise them in their home rather than in the establishment of origin.

1.6.5. Environmental impacts

No specific environmental impacts have been identified[169]. If stricter rules would result in a decrease in trade and, consequently, in transport, this would lead to a decrease in CO_2 emissions. However, this impact cannot be quantified and is likely to be negligible.

[169] Transport study, p. 158 (see note 5, page 8).