The science-policy interface on farm animal welfare in the EU

R&I ANALYSIS REPORT

14/11/2025

Regulatory Science for Animal Welfare

Authors: Ciska De Ruyver and Frank Tuyttens

SCAR
Standing Committee on Agricultural Research

European Animal Health & Welfare Research
COLLABORATIVE WORKING GROUP

Independent Expert Report by Ciska De Ruyver and Frank Tuyttens from the Institute for Agricultural and Fisheries Research (ILVO), Belgium and the RefreSCAR project.

Commissioned and edited by the SCAR Animal Health & Welfare Collaborative Working Group members: Romano Zilli (IZS LT, IT), Marina Bagni (Ministry of Health, IT), Andrea Gyorffy (IZS LT, IT), Hermann Schobesberger (VetMedUni, AT), Jon Tinsley (DEFRA, UK), Gerard Gremaud (BLV, CH), Francesca Fusi (IZS LER, IT) and Hein Imberechts (Sciensano, BE).

SCAR CWG AHW study, 1July 2025- 30 September 2025

Disclaimer

This publication does not necessarily reflect the views of the European Commission or the authorities in the European Research Area. The information and views set out in this report are the result of a faithful disclosure of the authors of the findings of the conducted research and interview activities, but do not necessarily reflect the opinion of all the participants of the study. This report has been prepared by the authors to the best of their ability and knowledge. The authors do not assume liability for any damage, material or immaterial, that may arise from the use of the information contained therein.

For citation purposes, please refer to the report using the following reference: De Ruyver, C., & Tuyttens, F. (2025). *The science–policy interface on farm animal welfare in the EU* (R&I Analysis Report, 14/11/2025). SCAR Animal Health & Welfare Collaborative Working Group.

Design diagram, timelines, and cover photo credit: Foodscale Hub, RefreSCAR

Supported by the RefreSCAR project:

Funded by the European Union

The RefreSCAR project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement no. 101060553

SCAR
Standing Committee on Agricultural Research

European Animal Health & Welfare Research
COLLABORATIVE WORKING GROUP

Contents

Executive summary

The EU's agri-food sector is highly regulated, with animal welfare (AW) science gaining importance for ethical, sustainable, and evidence-based policies. Despite significant advances in both regulation and research, important gaps remain between the farm animal welfare scientific and policy domains. Therefore, the Standing Committee on Agricultural Research (SCAR) Collaborative Working Group (CWG) on Animal Health & Welfare (AHW) commissioned a study to map barriers and pathways and identify best practices to improve policy uptake of AW research, and align research with EU policy needs. The study examined how the EU science–policy interface on farm animal welfare currently operates and how it can be strengthened. Therefore, an interview protocol comprising thirteen questions on the current EU AW science-policy interface was developed. Interviews were conducted with 20 key experts representing a wide range of stakeholders, including four from different Directorate-Generals within the European Commission (EC), two from the European Food Safety Authority (EFSA), one from the EU Partnership on Animal Health and Welfare (EUPAHW), four from EU Reference Centres for animal welfare (EURCAWs), two from the SCAR CWG AHW Subgroup on Animal Welfare, four from regional or national research institutes, one from Eurogroup for Animals, one from COPA-COGECA (the voice of farmers and agri-cooperatives in the EU), and one from AVEC (the voice of Europe's poultry meat sector). The interviews were analysed following the framework of Miles and Huberman (1994) to ensure systematic interpretation of the data. This analysis provided a clear picture of the current state of affairs and highlighted opportunities for improvement. Firstly, this report examines existing hubs, highlighting key enablers and barriers for the AW science-policy interface, and giving dedicated attention to fish welfare policy, which remains only marginally addressed within livestock-focused hubs. Secondly, it presents policy recommendations across four domains: governance and coordination; research structures and funding; knowledge gaps and data; and societal and economic awareness. Thirdly, it suggests directions for policy-driven research, emphasizing project design, collaboration and co-creation, and the translation and uptake of research outcomes. Finally, it outlines possible pathways for developing a toolkit to strengthen science–policy knowledge transfer. The insights from this study are intended to guide both policymakers and researchers in advancing future farm animal welfare regulations, reinforcing the central role of science–policy collaboration in shaping the future of animal farming in the EU.

1. Introduction

The agri-food sector is among the most heavily regulated industries worldwide. Within the European Union, livestock farming and food safety of animal origin are governed by an extensive body of legislation and standards. In this context, animal welfare (AW) science has gained increasing prominence, driven by societal expectations for ethical farming, sustainability, and responsible veterinary practices. It also plays a key role in shaping evidence-based policies.

Despite significant advances in both regulation and research, important gaps remain between the scientific and policy domains. These are driven by diverging priorities, communication barriers, economic constraints, scientific complexity, and differing societal perspectives. Public opinion and political pressure add further layers of complexity to policymaking. Bridging these

gaps is essential to strengthen AW science–policy interfaces and to ensure that farm AW regulations are both evidence-based, practically sustainable and ensure minimal AW standards.

Research on AW has expanded rapidly in Europe, growing at twice the pace of animal health research, with international organisations investing in tools to advance the field (Bagni et al., 2016). Against this backdrop, the SCAR Collaborative Working Group on Animal Health and Welfare (CWG AHW) commissioned a study to identify best practices for translating scientific knowledge into policy, enhance the uptake of AW research by EU policymakers, align research agendas with policy needs, and map existing pathways and barriers.

The study was carried out in four phases. It began with a desk study on the basis of which an interview protocol was developed that addressed the Terms of Reference (ToR) of the study commissioned by the CWG AHW. Next, a group of selected experts was interviewed through online meetings. Building on these outcomes, the main hubs, and mechanisms of the EU science–policy interface on AW were identified. Finally, recommendations were formulated to guide both policy makers and researchers.

Chapter 1 reviews existing hubs, identifies key enablers and barriers, and provides dedicated sections on fish welfare policy—addressing aquaculture and fisheries separately—which to date has received only marginal attention within predominantly livestock-focused hubs. Chapter 2 presents policy recommendations across four domains: governance and coordination; research structures and funding; knowledge gaps and data; and societal and economic awareness. Chapter 3 recommends directions for policy-driven AW research, emphasizing research project design, collaboration and co-creation, and the translation and uptake of research outcomes. Chapter 4 outlines possible pathways for developing a toolkit to enhance science–policy knowledge transfer on AW.

This report is based on expert interview findings, and the resulting recommendations are intended solely to inform policy-driven research. "Blue skies" or basic AW research did not fall within the scope of the study (*Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities*, 2015).

2. Methodology

The study was conducted between 1 July and 30 September 2025. Three meetings between the CWG AHW and the two researchers executing the project were held on 27 June, 13 August, and 18 September 2025, via Teams. These meetings served to clarify the tasks, methodology, and approach, to discuss progress, and to conclude the activities. The study combined a desk review, which informed the development of an interview protocol for key experts, with a thematic analysis of the insights obtained from the interviews. The findings were subsequently synthesized into an overview and a set of recommendations.

2.1 Desk review

The first phase consisted of a review of the four background papers included in the ToR (Guyomard et al., 2021; Molitorisová & Burke, 2023; Paulović et al., 2022; Sundrum, 2024). This analysis highlighted several themes relevant to the dynamics of science–policy interactions in the

field of AW. The reviewed literature emphasized the systemic complexity of AW issues, which cut across ethical, social, environmental, health, and economic dimensions. It further underscored the persistent gap between scientific knowledge and practical implementation, which is shaped by institutional barriers, economic constraints, and methodological limitations. In addition, the review pointed to the importance of multi-level governance, requiring coordination across local, national, and international levels, and to the central role of societal engagement, given that public values strongly influence the development of animal welfare policy. Together with the objectives set out in the ToR, these findings provided the foundation for the formulation of the questions in the interview protocol.

2.2 Development interview protocol

In the second phase, we developed a protocol for the semi-structured interviews comprising thirteen questions (see Annex 1). These questions were designed to reflect both the findings of the desk review and the objectives specified in the ToR.

2.3 Key expert Interviews

The third phase involved conducting interviews with key experts. Participants were identified in consultation with the CWG AHW during the first two meetings, held on 27 June and 13 August 2025. Between July and August 2025, 22 experts were contacted from a range of stakeholder groups, including policy makers, researchers, NGOs, and industry representatives related to farm AW. Between 22 July and 12 September 2025, the first author conducted a total of twenty interviews with twenty-five participants. Of these, three interviews involved two respondents simultaneously, whereas seventeen were conducted individually. The interviews included representatives from the EC (n=4), EFSA (n=2), the EUPAHW (n=1), EURCAWs (n=4), the CWG AHW Subgroup on AW (n=2), regional and national research institutes (n=4), Eurogroup for Animals (n=1), COPA-COGECA (n=1), and AVEC (n=1).

All interviews were carried out online via Microsoft Teams, which allowed us to overcome geographical constraints, reduce costs, and to use the platform's transcription function to produce verbatim records. Interview duration ranged from 48 minutes to 1 hour and 17 minutes, with most lasting approximately one hour. Prior to participation, all interviewees were provided with an information sheet, the informed consent form, and the interview questions, and gave their informed consent. Ethical approval for the study was granted by the Ethics Committee of the Faculty of Political and Social Sciences at Ghent University (approval no. 2021-13).

2.4 Data analysis and draft report

The transcripts of the interviews were analysed by the first author (C. De Ruyver). The analytical approach combined a priori codes, derived directly from the questions, with inductive codes that emerged from the interview data. Following the framework proposed by Miles and Huberman (Miles & Huberman, 1994), the analysis proceeded through four stages: the systematic reduction of data through coding, the organization of data in matrices, the interpretation of the patterns identified, and the drawing of conclusions. This qualitative content analysis enabled the identification of cross-cutting themes, challenges, and opportunities at the science–policy interface.

The findings presented in this report are based on the interviews and on literature provided by the interviewees and the CWG, the authors' interpretation of these sources were verified during the drafting stage of the report. The interviewees were offered the opportunity to review the draft report, sent to them on Saturday 27 September and to submit their comments on Tuesday, 30 September 2025. Given the restricted timeframe of the study, they had only one full working day available for this purpose. They were invited to propose adjustments and to correct any inaccuracies, nine interviewees did so. The CWG AHW also discussed the report at its meeting of 15 October 2025 and was able to request final adjustments.

The results of the interview findings are presented in the following chapters. The chapters differ in terms of scope and output, which reflects the nature of the findings derived from the interview results.

3. Exploring the science-policy interface: Different perspectives and common ground

This report opens with the results of the final interview question (Question 13), which invited participants to assess six statements on the farm AW science–policy interface. Although the interviewees may appear to represent divergent interests, their responses and the overall interview results reveal notable common ground, with no discernible polarisation or sharply opposing viewpoints on the EU farm animal welfare science–policy interface.

For each statement, respondents were invited to indicate their level of agreement or assessment using a five-point scale. On the provided scale, 1 meant "strongly disagree, not at all, never, or not useful"; 2 meant "disagree, slightly, rarely, or slightly useful"; 3 meant "neutral, somewhat, occasionally, or moderately useful"; 4 meant "agree, mostly, often, or useful"; and 5 meant "strongly agree, very much, always, or extremely useful." Participants were then asked to apply this scale to the following statements:

1. There is a structured two-way exchange between scientists and policymakers in the field of animal welfare.
2. Scientific research is consistently taken into account during the development of animal welfare regulations and guidance documents.
3. Interdisciplinary approaches are essential for addressing complex animal welfare issues from a policy perspective.
4. Political and budgetary constraints significantly affect the uptake of animal welfare research.
5. Animal welfare scientists conduct research that is aligned with regulatory or legislative needs.
6. New scientific findings in the field of animal welfare influence decision-making regarding animal welfare regulations.

Statement / Assessment	Strongly disagree / Not at all / Never / Not useful	Disagree / Slightly / Rarely / Slightly useful	Neutral / Somewhat / Occasionally / Moderately useful	Agree / Mostly / Often / Useful	Strongly agree / Very much / Always / Extremely useful
There is a structured two-way exchange between scientists and policymakers in the AW field.	x	xxx	xxxxxx	xxxxxxxx	x
Scientific research is consistently considered during the development of AW regulations.		x	xxx	xxxxxxxxxx	xxx
Interdisciplinary approaches are essential to addressing complex AW issues from a policy perspective.	x			xxx	xxxxxxxxxxxxxxxx
Political and budgetary constraints significantly affect the uptake of AW research.			xx	xxxx	xxxxxxxxxxxxxx
AW scientists conduct research that aligns with regulatory or legislative needs.	x		xxxxxxxxxx	xxxxxxxxx	xx
New AW scientific findings influence decision-making regarding AW regulations.	x	xx	xxxxx	xxxxxxxxxx	

Table 1 Results of question 13. One policymaker did not respond to Question 13, and some interviewees refrained from answering specific statements when they felt insufficiently qualified to do so.

Based on the findings presented in Table 1, common ground and nuances can be identified that support the insights obtained from the interviews across the different stakeholder groups. The responses show the existence of shared perceptions of the science–policy interface among stakeholders involved in AW regulation. None of the stakeholder groups (policy, research, NGOs, industry) expressed strongly opposing views on the statements to other stakeholders. Outliers were due to specifically aquaculture issues responses and one industry interviewee. Respondents broadly acknowledged the relevance of AW research for policymaking, yet the perceived quality of two-way exchange between scientists and policymakers was characterised as limited and coordination could be improved. This indicates that while channels of interaction exist, they are not yet seen as sufficiently systematic or robust. Many interviewees considered scientific evidence to be taken into account in regulatory processes, yet the ambivalence regarding the alignment of research agendas with legislative needs suggests a structural gap between the generation of knowledge and its practical utility for policy. The statement on interdisciplinarity emerged as an unequivocal consensus: respondents overwhelmingly agreed that complex AW issues cannot be addressed without crossing disciplinary boundaries. However, a widespread concern is noted that political and budgetary constraints constitute barriers to the uptake of AW research. Finally, although many respondents agreed that new scientific findings exert some influence on decision-making, the absence of unanimity underscores that such influence remains slow rather than at the pace of research findings, reinforcing the broader picture of an underused but valued science base by all interviewees. According to the interviewees there is no need for new institutions, fora, or initiatives; rather, the priority lies in ensuring overview of the landscape and effective information flow between all stakeholders, as outlined in the following report chapters.

4. Knowing the hubs for policy-driven research

Insights from the interviews revealed a notable divergence in the attention given to different species within AW science and policy. Whereas terrestrial farm animals are already supported by well-established hubs for the AW science–policy interface, aquatic animals have only recently begun to receive attention. For this reason, aquatic animals are discussed separately in this chapter.

4.1 Existing hubs for the animal welfare science-policy interface

European Commission

The European Commission's Directorate-General for Health and Food Safety (DG SANTE) is the department responsible for developing and overseeing EU policy on food safety and public health, as well as monitoring the implementation of relevant legislation. Its mandate is to protect the health of EU citizens, alongside ensuring animal health and welfare, plant health, and food safety, through a One Health approach. In addition, it ensures that Europe's food systems are safe and sustainable, while safeguarding the welfare of farm animals and protecting the health of crops and forests.

Other Directorate-Generals within the EC are directly or indirectly involved in farm AW legislation, including DG AGRI (Directorate-General for Agriculture and Rural Development), DG MARE (Maritime Affairs and Fisheries), DG RTD (Research & Innovation), and DG ENV (Environment). DG SANTE serves as the primary legislative body for AW, while DG AGRI integrates AW rules into its Common Agricultural Policy instruments; DG MARE is involved in matters related to aquaculture, and DG AGRI support AW research through Horizon Europe projects, with DG ENV also contributing to AW initiatives of the other DGs.

An Interservice Coordination Group (ISCG) is an internal mechanism of the European Commission tasked with ensuring coherence and alignment of initiatives across different policy domains. A dedicated ISCG for the EUPAHW was established in February 2024 for the strategic monitoring of, and for ensuring interaction with, the Partnership. It serves to integrate agricultural, environmental, and aquaculture perspectives. The ISCG is composed of DG AGRI (chair, secretariat), DG SANTE, DG MARE, DG ENV, DG RTD, DG JRC and the European Research Executive Agency (REA).

https://commission.europa.eu/about/departments-and-executive-agencies/health-and-food-safety_en

EFSA

The European Food Safety Authority (EFSA), established in January 2002 as a decentralised agency of the European Union, provides independent scientific advice on existing and emerging risks associated with the food chain. Its remit extends across food and feed safety, nutrition, animal health, and welfare, as well as plant protection and plant health. EFSA's core activities are to provide independent scientific advice, risk assessments, and communication on risks related to food and feed safety, animal health and welfare, plant health, nutrition, and the environment to support EU policy and decision-making. In addition, EFSA fosters cooperation with mirroring organisations in EU Member States, international organisations, and other stakeholders, thereby strengthening trust in the EU's food safety system by ensuring that policymaking is grounded in reliable scientific evidence.

https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/search-all-eu-institutions-and-bodies/european-food-safety-authority-efsa_en

CWG AHW under SCAR

The Collaborative Working Group on Animal Health and Welfare Research (CWG AHW), established in 2005 under the Standing Committee on Agricultural Research (SCAR), serves as a forum for research funders and programme owners with the aim of strengthening collaboration in research prioritisation and procurement. By fostering synergies and concentrating resources, the group seeks to generate the critical mass required to address the animal health and welfare research needs of both EU policymakers and the European livestock sector. Today, the CWG AHW brings together 28 partners from 20 countries. Its work covers emerging and major infectious diseases, production-related diseases, and the welfare of production animals within the EU, while also addressing issues of research capacity, capability, and infrastructure. The group's remit further extends to fish and bees, as well as conditions that pose risks to human health, although it explicitly excludes food safety concerns linked to livestock product handling and wildlife diseases, except where wildlife serves as a reservoir of infection for humans or production animals (Manfrin et al., 2018).

EU Platform on Animal Welfare

One of the key priorities of the Commission is to promote an enhanced dialogue on AW issues that are relevant at EU level among competent authorities, businesses, civil society, and scientists. To achieve this goal, in 2017 the Commission established the expert group 'Platform on Animal Welfare' (Decision 2017/C 31/12) with the aim to develop and exchange of coordinated actions on AW with a particular focus on:

- better application of EU rules on animal welfare, through exchanges of information and best practices and the direct involvement of stakeholders,
- the development and use of voluntary commitments by businesses to further improve animal welfare,
- the promotion of EU animal welfare standards to valorise the market value of the Union's products at the global level.

The EU Platform on Animal Welfare is an interactive network which aims at promoting dialogue among competent authorities, businesses, civil society organisations, and scientists on AW issues that are relevant for the Union. This dialogue intends to build mutual understanding, foster trust and encourage voluntary commitments between Platform members to achieve concrete results in improving the welfare of animals. The Platform therefore relies on the contribution of each of its members, hence the motto "Everyone is responsible".

https://webgate.ec.europa.eu/awp/

https://food.ec.europa.eu/animals/animal-welfare/eu-platform-animal-welfare_en

EURCAWs

Article 95 of the Official Controls Regulation stipulates that the European Commission designates European Union Reference Centres for Animal Welfare (EURCAWs) through implementing acts. These centres are tasked with developing and disseminating knowledge and tools to assist National Competent Authorities (NCAs) in carrying out effective official controls and ensuring the enforcement of EU AW legislation. Their primary target groups are therefore NCAs, policy workers, and their support bodies. Currently, four EURCAWs exist, each dedicated to a specific group of animals: pigs; ruminants and equines; poultry and other small, farmed animals; and fish. Collectively, these centres contribute to the implementation of EU legislation by providing scientific and technical expertise, developing practical welfare indicators, offering training, and supplying guidance to competent authorities and relevant stakeholders (Blokhuis, 2021; European Commission, 2024).

EURCAW-Pigs: https://eurcaw-pigs.eu/

EURCAW-Poultry & Other Small Farmed Animals (EURCAW-Poultry-SFA): https://www.eurcaw-poultry-sfa.eu/en/minisite/sfawc/welcome-european-reference-centre-animal-welfare-poultry-and-other-small-farmed eurcaw-poultry-sfa.eu

EURCAW-Ruminants & Equines: https://www.eurcaw-ruminants-equines.eu/

EURCAW-Aqua (Aquatic Animals): https://www.eurcaw-aqua.eu/

EUPAHW

Launched in 2024, the European Partnership on Animal Health and Welfare (EUPAHW) is set to invest €360 million over 7-10 years to strengthen research and foster cooperation across sectors.

Its scope extends beyond traditional animal health and welfare actors, encouraging cross-sectoral collaboration and applying a One Health and One Welfare approach to generate tangible societal impact. The partnership's objectives are structured through an "intervention logic," which maps the relationship between identified needs, objectives, inputs, processes, outputs, and outcomes, thereby ensuring coherence and effectiveness in its activities. Closely aligned with key European Commission initiatives, particularly the European Green Deal and the Farm to Fork strategy for a fair, healthy, and environmentally sustainable food system as well as the EC's Vision for Agriculture and Food, the EUPAHW also integrates considerations of the EU's open and sustainable trade policy, which highlights the role of trade in supporting climate transitions. In addition, the partnership contributes to the development of international trade standards designed to prevent the spread of animal and human pathogens, reinforcing its global relevance alongside its European mission.

https://www.eupahw.eu/

EUP AH&W European Partnership on Animal Health and Welfare

EUROFAWC

The European Forum for Animal Welfare Councils (EUROFAWC) serves as a platform for debate, knowledge exchange, and networking among AW advisory bodies across Europe. Its primary aim is to facilitate the exchange of views and expertise on AW and ethical issues, thereby supporting advisory bodies in formulating informed recommendations. This exchange takes place in an informal and non-binding manner, enabling open discussions on sensitive topics that may extend beyond national comfort zones, while also providing opportunities to share information on welfare priorities and completed work. The Forum strengthens collaboration among participants not only during meetings but also through ongoing networking, and it engages with international organisations such as the European Commission, the World Organisation for Animal Health (WOAH), and EFSA to exchange experiences concerning AW legislation and practices. In addition, it promotes best practices in the functioning of AW advisory bodies by facilitating the exchange of information on their structures and organisation, enhancing their efficiency, and encouraging their establishment in countries where such advisory mechanisms have not yet been developed.

https://www.eurofawc.com/

Member States National Competent Authorities

National Competent Authorities (NCAs) for AW are responsible for implementing and enforcing European Union AW legislation at the national level, including on farms, during transport, and at slaughter. They conduct official controls and inspections to ensure compliance, represent their countries in the EU Platform on Animal Welfare, and, where applicable, designate National Reference Centres for Animal Welfare.

Research institutes

Research institutes play a key role in supporting evidence-based policymaking within the European Union. They conduct regional/national, or EU (co-)funded research projects (e.g. under programmes such as Horizon Europe and EUPAHW) and develop animal-based welfare indicators. In addition, they can train inspectors and national authorities through the EURCAWs, act as national reference centres on AW, and publish scientific advice that informs policy development and impact assessments.

NGOs

Non-governmental organisations (NGOs) play a central role in shaping AW policy within the European Union. They contribute to policymaking by providing input to public consultations launched by EU institutions, and by participating as stakeholders in the EU Platform on Animal Welfare. NGOs also engage in advocacy by lobbying Members of the European Parliament (MEPs) and national governments, while raising public awareness through reports, campaigns, and large-scale citizen initiatives such as 'End the Cage Age'.

Industry

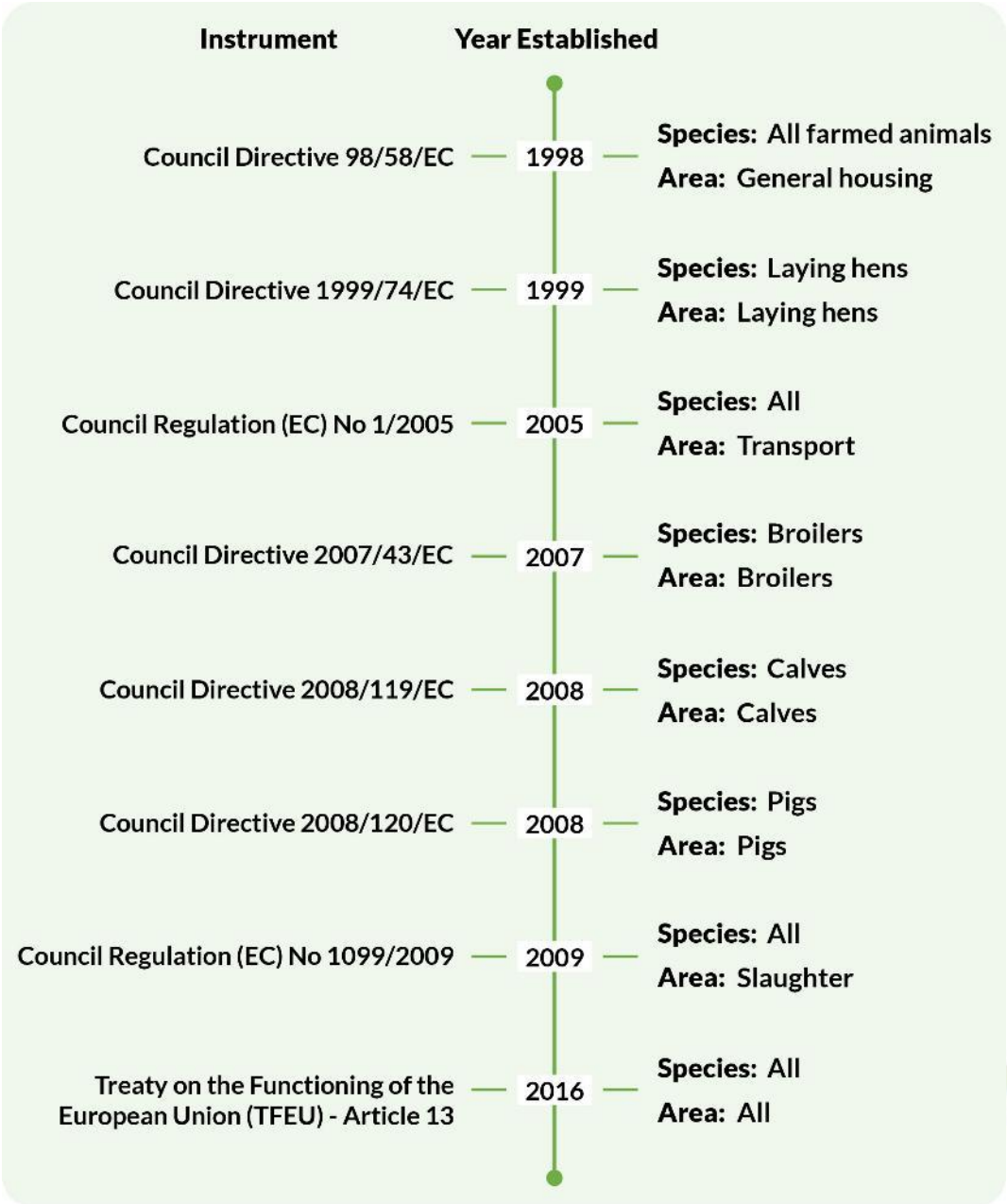
Industry boards and sectoral associations play an influential role in shaping animal production policy within the European Union. They represent their sectors in consultations organised by EU bodies, and provide data and technical expertise, for example on the feasibility and economic impact of proposed AW measures. In addition to lobbying the European Parliament and the Council of the European Union, these organisations influence the development of voluntary certification schemes and private standards within their industries. They also participate in multi-stakeholder platforms such as the EU Platform on Animal Welfare, contributing sector-specific perspectives to policy discussions.

4.2 Creation dates of hubs

Figure 1 Creation dates of identified AW science-policy hubs

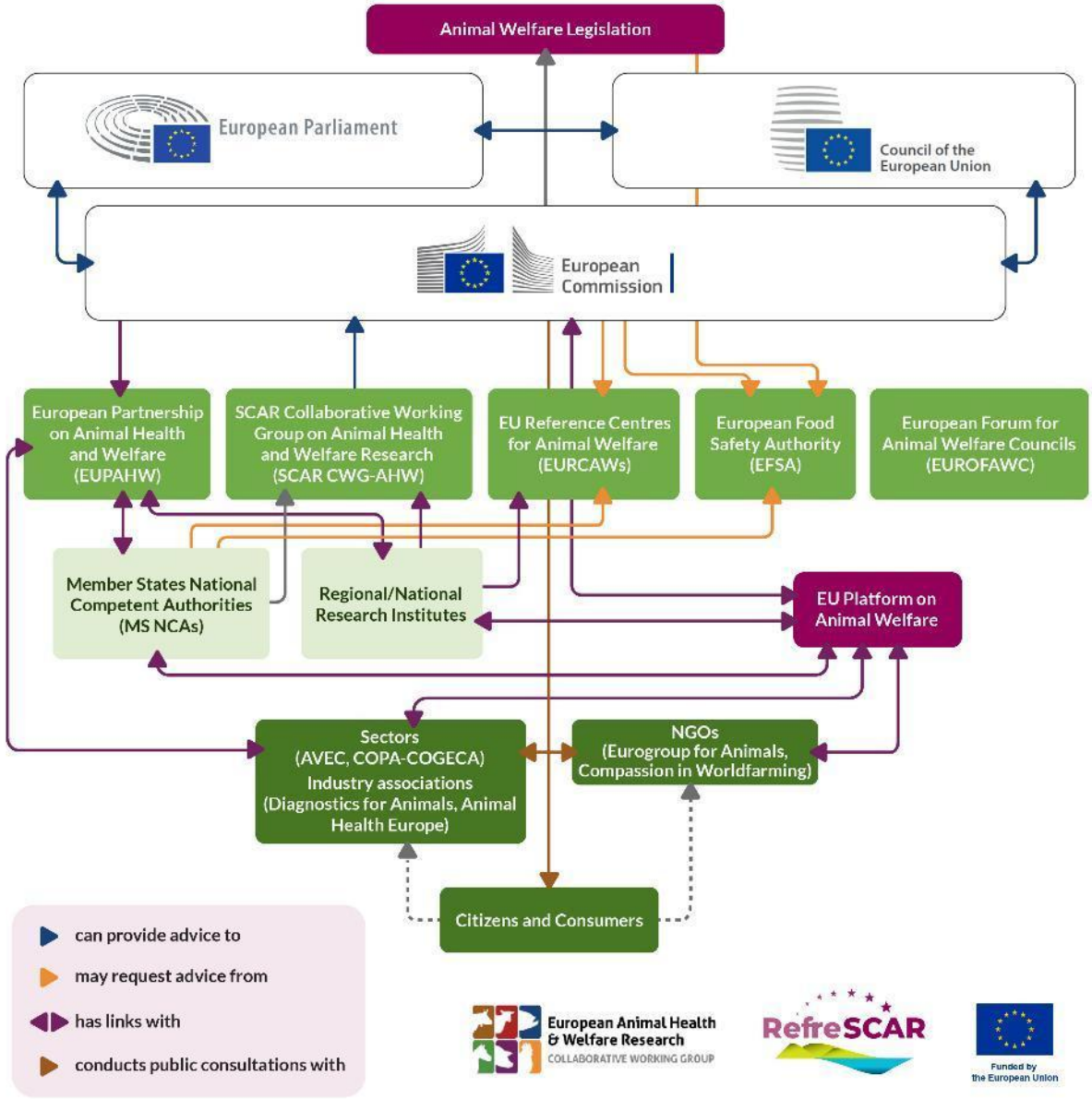
4.3 Creation dates of legislation

Figure 2 Creation dates of EU AW legislation and regulation



4.4 Diagram of hubs

Figure 3 Diagram of the EU science–policy interface hubs for farm animal welfare, as described by the interviewees (non-exhaustive).



The diagram illustrates the institutional and advisory links within the EU AW science-policy framework hubs identified by the interviewees. European legislation is primarily created through the 'ordinary legislative procedure' whereby the EC presents legislative proposals, and the European Parliament and Council of the European Union must agree on the final text. Other bodies and groups identified by the interviewees feed into policy development and/or research prioritisation. The EC tasks EFSA with risk assessments on AW and may seek advice from EURCAWs, while Member State NCAs can also consult these bodies. The SCAR-CWG AHW provides advice to the EC and includes representatives from the MS NCAs and research institutes. The internal EC body known as the ISCG provides strategic monitoring of, and ensures interaction

with, the EUPAHW. No formal links were identified by the interviewees between EUROFAWC and the other bodies. EUPAHW maintains reciprocal links with industry, MS NCAs, the ISCG, and research institutions, while EURCAWS also cooperates with research institutions. The EU Platform on AW is organized by the EC and links the EC, industry, NGOs, EFSA, research institutions, and MS NCAs. EFSA may be invited to provide presentations during a Platform meeting. Finally, the EC engages with industry, NGOs, and citizens through public consultations. EUPAHW, ISCG, and EURCAWs were identified by the interviewees as promising hubs for advancing policy-driven research in the future.

QUOTE "The European Reference Centres for Animal Welfare are growing and should be one of the areas we invest more in for the future." (Respondent 2 (R2))

4.5 Using hubs for the animal welfare science-policy interface

A trend toward science-policy alignment

Most interviewees observed a discernible trend toward greater coordination between policy and science, driven by public demand and EU initiatives, which points to a positive trajectory for evidence-based AW policies. This development suggests an increasing reliance on science-informed policymaking over time, not only at the EU level but also within Member States, where research is increasingly commissioned to address politically salient questions. A key dimension of this evolution is the growing national and EU-level integration of animal-centred approaches, reflecting the recognition of animals as "sentient beings" in EU law.

Strengthening consultation mechanisms

Beyond institutional mechanisms, the European Commission organises stakeholder and public consultations to enable broader engagement in policymaking, ensuring that perspectives from civil society, scientists, industry, and NGOs are considered. While these consultations are designed to be inclusive, interviewees noted that they can fail to reach national or regional research institutes and practitioners. Suggestions from interviewees included that communication should employ accessible language, provide plain-language summaries and response templates, and be actively disseminated through relevant professional and practitioner networks (https://ec.europa.eu/newsroom/sante/items/888620/en).

Enhancing EFSA opinions

According to several interviewees, a key gap lies in the fact that, although scientific opinions from EFSA constitute the most authoritative formal channel for informing policy, they are infrequent as the production of such scientific opinions typically follows cycles of three to four years. Interviewees suggested that shorter update cycles of one to two years and a broader question-setting process involving both EFSA and the Commission could enhance responsiveness. Accounting more explicitly for climatic and regional diversity could help ensure that findings are equally applicable across the EU.

QUOTE "A study showing pigs thrive outdoors in January in Spain cannot be extrapolated to Finland." (R13)

QUOTE "We need another mechanism to regularly provide this kind of information . … rather than waiting three or four years for a formal European Food Safety Authority opinion. Of course, science takes time, and we cannot expect groundbreaking studies every month, but there could

be a structured forum—perhaps every two years—to present the latest developments in farm AW. This would allow policymakers, farmers' cooperatives, and national authorities to exchange feedback and identify priorities for future research." (R8)

Building EUPAHW's policy relevance

To strengthen its effectiveness and policy relevance, interviewees suggested that EUPAHW might consider exploring a range of mechanisms aimed at improving the uptake of research. Suggestions included quarterly one-page policy digests per theme could be provided to the EC and ISCG, ensuring a steady flow of concise and accessible updates. In addition, the implementation of targeted micro-calls would allow EUPAHW to conduct rapid, policy-oriented studies addressing data gaps identified in EFSA scientific opinions and EURCAW analyses, or responding to EC-defined questions, within a matter of months rather than years. Finally, aquaculture integration should remain a priority, as it represents the only bridge with the current hubs, with the EC's DG MARE actively engaged through the ISCG and dedicated fish welfare workstreams embedded in EUPAHW's annual work programmes.

Developing tools for narrow policy questions

Short, fast-track studies of six to nine months can effectively address narrowly scoped policy questions that are often too limited in scale to attract standard research projects. Policy-commissioned research, delivered through targeted calls and contracts, is typically faster and more directly aligned with identified policy needs, thereby facilitating quicker uptake of results. In addition, smaller subsidies, sometimes allocated through NCA's, can support bottom-up proposals that complement these efforts.

Broadening expertise and strengthening study design

Interviewees cautioned that the functions of EU AW science-policy hubs can sometimes overlap, and there is a limited pool of available researchers and experts. Identifying a sufficient number of independent specialists remains a challenge, underscoring the need for the diversification of participants, while also reflecting the inherently small size of the AW research and policy community. Several interviewees further emphasized that the quality of scientific evidence is equally critical, stressing the importance of rigorous study designs—such as longitudinal and cohort studies—for generating robust and persuasive data. One interviewee illustrated this point with concrete examples (Cozzi & Gottardo, 2005; Fletcher et al., 2024). Current research often lacks this level of robustness, limiting its persuasiveness for policymakers and industry.

Using market dynamics and corporate governance as drivers for animal welfare research

Some interviewees noted that market dynamics and corporate governance often drive AW improvements more rapidly than legislation. This was demonstrated by initiatives such as (i) Dutch retailer Albert Heijn's decision to discontinue battery-cage eggs, which accelerated sectoral change, (ii) McDonald's broiler welfare programme, which established measurement frameworks and funded research and development, including the automation of welfare metrics or (iii) the aquaculture welfare guidelines from the Spanish Aquaculture Business Association (González Lecuona, 2022). Such corporate actions can generate immediate supply-chain effects, advancing AW standards years ahead of formal regulation. Strengthening science–industry interfaces through mechanisms such as advisory boards or co-funded pilot projects could further accelerate

the uptake of innovations and contribute to the standardization of welfare metrics, thereby complementing the comparatively slower pace of legislative processes.

QUOTE "If tomorrow all consumers say I want this with more welfare; it's not a problem. Farmers and food business will produce it – if they can sell it at the right price." (R4)

Accounting for sectoral differences and evidence uptake

Interviews found that information flow for common species is generally sufficient, but the real challenge lies in its translation into policy. Despite a strong evidence base, gaps remain due to limited studies, insufficient replication, weak regional differentiation, exclusion of farmers' data, and poor follow-up. As one interviewee stressed, the focus should be on implementing existing knowledge rather than continually calling for new research. Sectoral differences further complicate matters: poultry and pigs receive more political and public attention than cattle, where welfare is often framed as a health issue, while societal debates such as cow–calf separation demand balanced, evidence-based solutions. Consumption patterns also shape priorities: poultry consumption is increasing globally and in Europe, pork and beef consumption are declining, and fish is gaining significance. Against this backdrop, future research must strike a balance between fundamental inquiry and practical needs, addressing pressing issues such as transport and slaughter, while also advancing strategic directions like positive welfare, which goes beyond reducing stress and pain to encompass the study of animal emotions, pleasure, and anticipation (Ducrot et al., 2024; Murphy & Legrand, 2023).

Reflections on AI and system limits

Some participants placed particular attention on precision livestock farming and artificial intelligence: while these tools may provide valuable support, they also risk driving further intensification and undermining traditional stockmanship. Research in this area should therefore critically assess not only the technological potential but also the behavioural and ethical implications, avoiding a narrow dependence on technological solutionism. Equally important is the need to examine the biological and ethical limits of existing production systems and to identify the thresholds beyond which further welfare improvements cannot be achieved without fundamental systemic change. One interviewee underscored this point by referring to the academic paper of Rusman (Rusman et al., 2023).

Regulatory landscape for animal welfare

One interviewee highlighted a significant structural difference between the regulation of animal health and animal welfare within the European Union. Animal health is governed by a strict and harmonised framework, most notably the Animal Health Law, which mandates systematic data collection, designates reference laboratories, and ensures coordinated implementation across all Member States. By contrast, the regulatory landscape for AW remains fragmented, with national autonomy that results in variation in implementation. This fragmentation underscores the need for an overarching regulatory framework for AW that could provide greater coherence, consistency, and enforceability across Member States.

QUOTE "Without overarching regulation, the situation in animal welfare will be difficult to change." (R3)

4.6 Science-policy interfaces in aquaculture

Fish welfare is a comparatively new policy domain within the EU. Ten years ago, references to fish emotions or stress were often dismissed; today, the scientific consensus acknowledges fish sentience and welfare needs. Nevertheless, EU legislation on AW remains primarily designed for terrestrial species, with aquatic animals insufficiently covered.

Aquaculture policy falls under Member State competence, with the European Commission exercising coordination mainly through the Open Method of Coordination (OMC). The recent establishment of the European Reference Centre on Aquatic Animal Welfare (EURCAW-Fish) in 2024 has initiated an additional route for the translation of science into policy.

Based on the interviews, existing routes of science–policy interface in aquaculture and fish welfare illustrate both progress and persistent gaps. The Aquaculture Advisory Council (AAC) has emerged as a key intermediary linking scientists, NGOs, industry, and the European Commission (https://aac-europe.org/en/). Through AAC consultations and working groups, scientists co-author recommendations that reach the EC. Notable examples include AAC documents on fish welfare and their influence on the European Parliament's ANIT report (2023) concerning the transport of farmed fish (*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*, 2023). According to interviewees, earlier collaboration between SCAR-Fish and SCAR-AHW (2018–2019) demonstrated the value of interdisciplinary fora in shaping agendas, while the Aquaculture Assistance Mechanism (AAM) supports the Open Method of Coordination through good husbandry practices and forthcoming codes on fish welfare (https://aquaculture.ec.europa.eu/).

Interviewees noted that industry and NGOs both occupy important roles in this science-policy interface. Unlike terrestrial farming, aquaculture producers tend to be more receptive to welfare science, recognising the connections between welfare, growth, and profitability. Bottom-up initiatives in Spain (Spanish Aquaculture Business Association) and Greece (Hellenic Aquaculture Producers Organization) illustrate how industry–science partnerships can establish practical welfare standards (González Lecuona, 2022; University of Crete, 2019). NGOs such as Eurogroup for Animals and Compassion in World Farming play a strong role in lobbying and awareness-raising, amplifying scientific findings. However, according to some interviewees, fish welfare campaigns differ markedly in their underlying approaches. Some NGO initiatives are perceived by interviewees to rely primarily on emotive appeals designed to mobilise public concern yet lack grounding in scientific evidence and responsible communication. By contrast, evidence-based and carefully framed campaigns were regarded as essential for safeguarding legitimacy and credibility, not only within policy and societal debates but also in the education of consumers.

According to interviewees, several enhancers and barriers shape the effectiveness of the science-policy interfaces. However, economic constraints remain central, as welfare improvements require investment. European Maritime, Fisheries and Aquaculture Fund (EMFAF) funds could support such measures if Member States include them in their national strategic plans (https://oceans-and-fisheries.ec.europa.eu/funding/emfaf_en). Moreover, social science research is needed to clarify consumer attitudes, societal trade-offs, and acceptable compromises.

Research and evidence needs are considerable. Foundational work in biology and neurobiology remains essential, particularly in understanding pain, stress, and behaviour. The development of operational welfare indicators, especially for early life stages, is a priority. Applied research, such as on stunning technologies, must be integrated with fundamental findings, while premature adoption of unvalidated methods (e.g., electrical stunning) should be avoided. Greater integration of welfare with health and disease management is needed, for instance by recognising vaccines as welfare tools. Species-specific guidance beyond salmon and seabass is urgently required, and emerging areas such as mollusc welfare deserve exploration.

Based on these insights, several recommendations can be made. Science–policy interfaces could be reinforced by creating rapid technical opinions and "living evidence syntheses" that feed into codes of practice and certification schemes. Innovation and applied research require stronger support, with investment spanning both basic neurobiology and applied studies on stunning, slaughter, and welfare indicators. Industry engagement should be leveraged through co-developed guidelines, training, and monitoring systems, building on positive experiences such as Spanish welfare guides (González Lecuona, 2022). Strengthening NGO–science alliances is also crucial, encouraging campaigns grounded in robust evidence rather than emotional appeals. Additionally, developing more welfare-aligned seafood labelling, reforming certification schemes, and improving traceability tools (e.g., the Global Dialogue on Seafood Traceability (GDST)) can foster broad public participation and buy-in, thereby creating additional leverage points. Also, in both aquaculture and fisheries, international alignment is necessary because most fish consumed in the EU are imported. To ensure a level playing field, welfare frameworks should be linked to bilateral trade standards. Moreover, preparations for addressing wild-capture welfare should begin, with non-binding pilots on humane slaughter on vessels and reduced air exposure, laying the groundwork for future regulatory action. Finally, stronger connections should be made between wild-capture fisheries and aquaculture by demonstrating how lessons and technologies from aquaculture—such as transport practices, stunning methods, and welfare indicators—can inform fisheries, and how insights from fisheries can likewise inform aquaculture. Such cross-fertilisation strengthens the case for developing an integrated aquatic animal welfare framework rather than advancing each domain in isolation.

QUOTE "Even after 20-30 years of research in fish welfare, somehow the message is still in a niche and this is an issue that should be tackled." (R16)

4.7 Science-policy interfaces for wild-capture fisheries

Unlike aquaculture, wild-capture fisheries currently lack a dedicated framework for AW, with no institutional demand signal for research, no stable advisory mechanisms, and few incentives for industry uptake. Existing science–policy pathways—primarily linked to EC processes, the farm-oriented EU Reference Centre for Aquatic Animal Welfare, and scattered initiatives such as Carefish or emerging ICES (International Council for the Exploration of the Sea: https://www.ices.dk/Pages/default.aspx) debates, remain essential in addressing welfare in wild catches. There is a platform https://catchwelfareplatform.com/, which is an industry–science initiative and one project, WelTuna, linked to EUPAHW SOA14 (https://prosjektbanken.forskningsradet.no/en/project/FORISS/343115?Kilde=FORISS&distribu

tion=Ar&chart=bar&calcType=funding&Sprak=no&sortBy=date&sortOrder=desc&resultCount=30&offset=0). Nevertheless, wild-capture fish welfare in the EU is at an early yet pivotal stage. Scientific initiatives, NGO advocacy, and political interest in revising the Common Fisheries Policy (CFP) to incorporate welfare considerations are generating momentum, but significant effort is required, including the development of a shared agenda, the establishment of stable advisory channels, and the testing of practical methods under real fishing conditions. The technical building blocks are already available; what is lacking is a policy anchor, a durable advisory loop, and operational R&D adapted to the realities of fishing decks and economic margins. By combining a CFP-level objective with an ICES working group, conflict-resolving guidance on survival studies, and targeted funding linked to market pilots, a coherent pathway would be beneficial, thereby improving welfare outcomes while strengthening the sector's social license.

Priority research areas for wild-capture fish welfare, with an operational orientation, have to centre on developing practical solutions that can be applied under real fishing conditions. Humane slaughter at sea is a key concern, with work underway to adapt electrical stunning techniques for flatfish and other demersal species, assess their feasibility for pelagic species, and integrate them into routine onboard workflows. Routine welfare monitoring on vessels also requires attention, with promising approaches including AI- and camera-based assessments of fish condition at critical points such as hauling, brailing, and sorting. In parallel, simple, and rapid indicators that can be applied under crew and time constraints are needed, favouring practical scoring systems over laboratory assays. Another priority lies in developing non-invasive stress biomarkers, such as scale-mucus sampling, which could replace lethal otolith extraction if validated against established physiological markers like cortisol and lactate, as well as behavioural proxies. Linking welfare-positive practices to product quality indicators—including rigor onset, flesh gaping, shelf life, and survival rates of released species—offers a dual value proposition for both welfare and market outcomes. Finally, study designs must be developed that are both ethically and legally acceptable, relying on standardized and pre-approved protocols for survival trials, such as short-term onboard holding combined with real-time release tagging or, where feasible, at-sea telemetry.

Adoption of welfare improvements in wild-capture fisheries is expected to be uneven. High-value sectors such as tuna fisheries are better positioned to absorb the costs of equipment and training, while low-margin fisheries, such as those targeting flatfish, are likely to require financial support. Certification schemes like the MSC currently lack explicit welfare criteria, which limits their ability to generate strong market incentives for adoption. Voluntary initiatives, such as retailer-led pilots in the United Kingdom that involve partnerships between retailers, scientists, and fishers, demonstrate potential but remain small in scale and require broader implementation. Policy instruments similar to EMFAF, or equivalent national funds, could play a key role by co-financing welfare-oriented retrofits, provided these measures are formally embedded in national and regional strategic plans.

Interviewees provided several recommendations. To advance wild-capture fish welfare, welfare objectives should be explicitly embedded in policies and research programmes. A dedicated ICES Working Group on Wild-Capture Fish Welfare (WGCATCH-WELFARE) could be established. Academic research outputs need to be institutionalised for policy use; while technically feasible, the current system remains fragmented, with project-based communication dominating, ad hoc exchanges prevailing, and little structured feedback from policy back to

research. Operational R&D should be funded in areas such as humane slaughter at sea, onboard welfare monitoring, non-invasive stress biomarkers, and quality–welfare co-metrics. While humane slaughter at sea is a key concern, the scope should be broadened to include higher-welfare practices across all stages of capture, retrieval, and handling, rather than focusing solely on stunning and slaughter. Finally, durable two-way interfaces are required beyond project cycles, including regular hearings, standing feedback mechanisms, and joint guidance developed collaboratively by NGOs, industry, and the scientific community.

In wild fisheries, a frequently cited example of regulatory conflict is the clash between the landing obligation and laboratory AW requirements. The policy intent of the landing obligation is to ensure that undersized or unwanted catches are kept onboard unless high post-release survival can be scientifically demonstrated. This creates a strong research need for survival trials, both at sea and on land, to quantify survival probabilities. However, laboratory AW regulations restrict the prolonged captivity of injured fish, and ethics committees have required euthanasia, leading to biased survival estimates or even preventing studies altogether. As a result, practices vary inconsistently across Member States, one interviewee shared the paper of Madsen to illustrate this point (Madsen et al., 2022).

QUOTE "This is not a sprint; it is a marathon. Raising awareness that fish welfare matters, both for the animals themselves and ultimately for consumers, requires sustained engagement. The issue is not only of ethical significance but also directly linked to product quality." (R19)

5. Leverage co-design for policy-driven research: Policy recommendations

5.1 Governance and coordination

Establish clearer liaison structures between existing EU AW science-policy hubs

The interviews revealed that a clear diagram mapping functions, roles, and stakeholders would be beneficial. The diagram developed in Chapter Hubs science-policy interface can serve as a useful starting point for this purpose.

Strengthen member state input and engagement through EU AW science-policy hubs

A strong connection between EU-level structures and national hubs was considered essential by all interviewees. As a provided example, EUROFAWC should be more systematically linked with existing other European hubs. These national forums often enable constructive, multi-stakeholder knowledge exchange and could serve as effective channels to strengthen the science–policy interface from the Member State level upward and downward.

The current use of EFSA mechanisms by Member States is also limited. Although Member States have the option to submit specific requests for risk analyses, this instrument remains underutilized by Member States. EFSA's Network on Animal Welfare, a forum in which Member States are represented and which convenes at least annually, provides a potential platform for cooperation (https://www.efsa.europa.eu/en/science/scientific-committee-and-panels/ahaw). However, its impact is uneven, as representation varies widely across countries. In some cases, participation depends on the expertise or motivation of individual delegates rather than on systematic national commitment. One interviewee highlighted that "the impact of the network strongly depends on

who the Member State delegates." With EFSA's recent steps to strengthen quality assurance in network member selection, there is increasing potential to optimize network performance, provided that Member States continue to appoint engaged and consistently active representatives. Well-functioning networks are essential to ensure effective knowledge exchange, consistency across Member States, and robust support for EFSA's scientific work.

According to interviewees, EUPAHW has the potential to play a pivotal role in strengthening Member States input. Its added value lies in its convening and funding capacity: it can bring together Member States, pool research budgets, and support cross-border projects that no single country could achieve alone. By developing a shared strategic research agenda (SRIA), the Partnership can help ensure that EU and national research efforts are better aligned, coherent, and policy-relevant (Strategic Research and Innovation Agenda for the European Partnership on Animal Health and Welfare, 2023). This collective consultation mechanism across Member States would allow problems to be identified and advanced in a more structured and representative way.

Interviewees note the inconsistent involvement of NCAs in project activities. While some ministries were noted as being actively engaged in EU-funded projects, taking up results and translating them into national policy, this level of commitment was not observed uniformly across Member States. A cited positive example comes from ERA-NET SusAn, where Dutch ministry officials attended a farm visit in Wageningen on ruminant welfare and greenhouse gas mitigation, illustrating effective research–policy interaction (https://era-susan.eu/content/freewalk-develop-economic-sound-free-walk-farming-systems-elevating-animal-welfare-health) (Ferraz et al., 2020).

QUOTE: "At the national level, governments set explicit research questions based on policy needs, and that allows results to be used more quickly and in a more targeted way." (R 8)

QUOTE: "We should not wait for a new legislative framework to improve things, that will take years. Even now, if a few Member States want to collaborate, facilitate joint discussions, for example on pooling national welfare research funding." (R3)

Promote participatory design of policies and research agendas

Interviewees observed a positive emerging shift in EU research projects over the past decade, whereby policymakers and other stakeholders are increasingly involved from the earliest stages to co-design and co-develop solutions. This approach is intended to foster consensus and ensure practical relevance. Several illustrative cases were highlighted: the Animal Transport Guides project, funded by the EC, which produced best-practice guidelines for the transport of farm animals that go beyond existing legislative requirements; Care for Dairy, a pilot initiative that developed best practices for all life stages of dairy cows, with outputs disseminated via the EU Reference Centre website; and Horizon Europe projects such as TechCare, BroilerNet, and Transform-Dairy-Net, which employed national workshops and innovative engagement methods (including the "Innovation Wheel") to involve all relevant actors, from farmers to policymakers, throughout the research process.

This development reflects the move towards the co-design of funding calls, in which policymakers, researchers, industry actors, and non-governmental organisations collaboratively

define research priorities. Such a participatory model contrasts with traditional top-down agenda setting and serves to strengthen the science–policy interface by aligning research agendas with regulatory demands, stakeholder concerns, and societal expectations. In the field of AW, co-design mechanisms are particularly significant, as they enhance both the legitimacy and the applicability of scientific outputs, thereby facilitating their translation into policy and practice. Examples of potential co-designed calls include themes related to vaccines, antimicrobial resistance, and the development of welfare metrics tailored to Recirculating Aquaculture Systems (RAS).

QUOTE "What I have observed is that stakeholders are seldom opposed to animal welfare per se. They are opposed to what it means if the costs won't be compensated." (R 7)

QUOTE "The Care for Dairy project produced best practices across all phases—from calf to end-of-career cows—developed in consensus with stakeholders." (R4)

5.2 Research structures and funding

Maintain a dual funding track supporting both blue skies research and policy-driven research.

An important theme emerging from the interviews was the need to safeguard a dual-track approach to AW research, combining strategically commissioned, policy-driven studies with a protected share of resources dedicated to fundamental, investigator-led inquiry. While policy-relevant research is indispensable for addressing legislative and practical needs—providing legal, economic, and ethical justifications for regulation and offering farmers concrete guidance, blue-skies, future-oriented research remains essential for opening new scientific horizons and seeding the next generation of policy questions. Interviewees broadly supported alignment with policy demands, particularly in light of substantial EU (co-)funding. They cautioned risks of short-termism, fragmentation, and dependency on project calls, whereas safeguarding fundamental research areas such as animal behaviour, pain physiology, and robust welfare indicators ensures a reservoir of knowledge that may later prove decisive. This balance was seen as particularly critical for underexplored species such as equines, which currently fall between EU policy categories, and for fish and invertebrates, where ethological studies must be paired with applied and on-farm research to translate insights into feasible improvements.

QUOTE "Policy questions must be underpinned by research, but science also needs space to pose questions not yet on the policy agenda. For years we focused on what harms animals; we also need research on positive welfare—how to measure when an animal is 'happy.' Those questions rarely come from policy, but they must be addressed." (R14)

Several respondents also highlighted the temporal mismatch between policymaking, driven by policy cycles and immediate pressures, and scientific research, which requires longer horizons to deliver robust innovation. Visionary research, they argued, often anticipates policy relevance in ways not initially apparent, for example longstanding studies showing that non-caged sows yield healthier piglets with reduced mortality and antibiotic use, these findings are now being embraced by industry and policymakers alike. Finally, interviewees stressed that such forward-looking inquiries demand an international framework, as global challenges linking AW, farming systems, environmental sustainability, and planetary health cannot be adequately addressed within a solely European context.

Introduce structured follow-up mechanisms to ensure continuity and evaluation of AW research and policies

Interviewees proposed more structured follow-up mechanisms focussing on all phases of the classic PDCA (Plan–Do–Check–Act) cycle (Taylor et al., 2014). Omissions of the 'check' and 'act' phases can undermine accountability, limit progress and weaken the long-term effectiveness of policy initiatives. This is further compounded by the fact that there is a lack of systematic monitoring of AW across the EU, with inspections often leading to fines but not to structural changes.

QUOTE "There is a need to evaluate existing indicators, monitoring tools, and policy mechanisms: "What truly works, and what is redundant?"" (R 3)

Policy implementation should include an explicit "from legislation to action" step, with clear timelines and responsibilities, and the designation of a specific owner to ensure follow-through.

Another concern raised by interviewees was that time limited funding for research projects exacerbates the lack of follow-up. Once funding ends, project and research outputs may not be sustained, providing no assurance that results will be further developed or implemented. once projects finish websites and repositories can lapse or become inaccessible, while databases can be difficult to navigate, which limits the visibility and uptake of results.

To address these shortcomings, interviewees proposed extended dissemination strategies to be planned beyond project closure, with results hosted on stable, platforms such as EU Farmbook. A rebalanced funding model could also ensure continuity of promising research and reduce the fragmentation caused by short-term projects. Finally, continuity instruments such as follow-on pathways, bridging grants, implementation pilots, or living labs should be developed to carry forward and scale successful results. To strengthen the research–policy interface, the establishment of a dedicated "Results-to-Policy" incentive mechanism could help to synthesise, validate, and pilot the uptake of research outputs. Projects could also be encouraged to deliver standardised indicator sets and protocols to facilitate policy implementation. Moreover, five-year impact assessments post-project implementation; tracking uptake, changes in practice, and enforcement outcomes, could help measure long-term effects. One interviewee suggested the creation of a "Results-to-Policy" micro-fund within EUPAHW to support the systematic synthesis, validation, and piloting of completed project outputs.

Require "usable outputs" in EU-funded research

Interviewees proposed to mandate usable outputs in research funding. To maximise policy relevance and practical uptake, research grants should explicitly command the production of usable outputs that extend beyond academic publications. Without clear linkages to policy and practice, many research findings risk remaining unused. Deliverables such as factsheets, checklists, implementation guides, and structured dissemination plans are essential to ensure broader accessibility. Research design should also incorporate co-creation with farmers, inspectors, and practitioners from the outset, ensuring that outputs are both practical and economically viable (Schukat et al., 2020). On-farm studies should be emphasized to generate enforceable outputs, along with the development of operational indicators, husbandry checklists, and animal-based monitoring and reporting templates. Scaling up monitoring efforts should include the validation of indicators as regulatory outputs, thereby facilitating the use of

outcome-based rules. A stronger emphasis on animal-based indicators, rather than prescriptive input measures such as stocking density, was deemed necessary by interviewees to support a shift toward performance-driven standards that better capture AW realities.

5.3 Knowledge gaps and data

Systematically follow up on research and data gaps identified by EFSA and the EURCAWS

EFSA and EURCAWS systematically identify data gaps in each of its scientific opinions and work programs, thereby highlighting areas where further research is required. These gaps are usually included in the recommendation's sections and are important for feeding into EUPAHW and Horizon Europe calls.

The SCAR AHW CWG has an important role for ensuring enhanced coordination among Member States, which could help align funding streams with identified data gaps and direct resources towards policy-relevant research. At present, interviewees believe the connections with key funding bodies, such as EUPAHW or national agencies could be strengthened in certain cases, underscoring the importance of coordination and integration of national research agendas at the EU level.

Moreover, interviewees propose to invest in research that covers under-addressed species and underexplored species such as equines, fish, and invertebrates. Another important gap that was raised is emergency preparedness. According to some interviewees one of the most pressing AW challenges today stem from epizootic diseases (e.g. peste des petits ruminants (PPR)) and from natural disasters such as wildfires and floods, which are linked to climate change. A recent request from France to the EU Reference Centre confirmed the existence of a critical gap: the absence of comprehensive emergency plans addressing AW during such crises. While veterinary protocols are in place for disease control, they generally do not extend to welfare-related procedures such as humane handling, euthanasia, or carcass disposal under emergency conditions. This highlights the need to develop coordinated emergency plans at both the European and national levels, ensuring that AW considerations are systematically integrated into crisis response frameworks. EUPAHW includes efforts to address these concerns.

QUOTE "I would have expected that they use more the EURCAWs. Maybe we could have advised: OK, this will be feasible or not, this is very important for the animal, this is less important." (R6)

QUOTE "Climate change will affect animals' environments and welfare; we need joint work to understand these impacts." (R14)

Enhance data sharing, harmonisation, and access to MS and industry data

According to the interviewees, data related to AW research remains highly fragmented, making it difficult to obtain a comprehensive overview that could guide policy and strategic interventions. Strengthening data interoperability and infrastructure would enable a more holistic understanding of welfare conditions, thereby supporting more effective policy development. Interviewees emphasised the need for greater data aggregation, interoperability, and harmonisation to overcome the chronic fragmentation that currently undermines evidence-based decision-making.

An observed key barrier is the absence of a legal obligation for Member States to report aggregated data. Without such requirements, many countries neither collect nor share information in a structured manner, leading to a lack of objective monitoring and accountability across the EU. Trust deficits further complicate the situation: some countries are reluctant to share data for fear of being perceived as underperforming or facing negative repercussions. Several interviewees stressed that the first step should simply involve plotting and observing the available data, without immediate benchmarking or judgment, in order to build trust and encourage participation. The monitoring of footpad dermatitis in broilers was cited as an illustrative example: while countries such as Denmark, Sweden, Finland, and the Netherlands maintain robust systems for this, comparable practices are not consistently implemented across all Member States.

Interviewees indicated that, at present, no centralised and user-friendly database exists that integrates animal welfare data across both EU and national levels. As a result, policymakers lack a single accessible entry point. Systematic collection is further hindered by language barriers, inconsistent data formats and metadata, and the significant resources required to maintain repositories. Even when repositories exist, uploading material is often cumbersome, with limited incentives for participation.

Interviewees observed that industry actors hold extensive datasets, but rarely share them due to concerns about misuse, competitive disadvantage, or political repercussions. Although EFSA has legal provisions for handling confidential information, industry stakeholders remain hesitant, citing gaps in confidentiality guarantees and commercial constraints faced by multinational companies. The absence of legal requirements to provide aggregated data further limits transparency. Interviewees therefore recommended stronger legislative frameworks and the development of secure, anonymised data-sharing mechanisms to safeguard confidentiality while ensuring access. AVEC, for example, engaged with EFSA's proposed data platform under the EUPAHW, stressing the need for strict safeguards and robust anonymisation protocols.

QUOTE: "Farmers are often reluctant to share data when there is a risk that studies could portray them in a negative light." (R 14)

QUOTE: "Scientists must be independent, but not to an extent where they're completely disconnected from the sector. If you do not accept data from the sector, where are you going to get them from?" (R15)

Increase the use of output-based standards

Interviewees stated that a stronger focus on animal-based indicators, rather than prescriptive input measures such as stocking density, would facilitate a shift toward performance-driven standards that more accurately reflect AW outcomes. At the EU level, the adoption of outcome-based welfare indicators would align monitoring with tangible welfare improvements. One key challenge arises from the fact that new scientific evidence often emerges after legislative texts have been negotiated. Once stakeholder positions have been defined, integrating such evidence becomes difficult, if not impossible, without reopening the legislative process. To address this problem, several interviewees advocated a move away from rigid input-based requirements (e.g. specific floor space or bedding standards) toward output-based approaches that assess measurable welfare outcomes. These may include behavioural indicators, the

prevalence of injuries or lesions, and relevant health parameters. Some interviewees indicated this approach could provide regulatory flexibility, allowing scientific and husbandry innovations to be integrated more rapidly without requiring comprehensive legislative revisions. For instance, Denmark's monitoring of footpad dermatitis in broilers has significantly lowered prevalence rates, illustrating the effectiveness of outcome-based measures. Framing legislation around desired outcomes, grounded in animal-based indicators, was therefore seen to foster innovation, enable adaptive implementation, and ensure timely translation of new scientific insights into practice.

QUOTE: "Because lawmaking is slow, newer findings sometimes cannot be integrated once texts are far advanced. One solution is more flexible, outcome-based regulation: define the outputs we want to achieve for the animal, rather than only inputs like square meters or group size." (R14)

5.4 Societal and economic awareness

Invest in social sciences and humanities (SSH) and consumer-oriented studies

Interdisciplinarity is considered indispensable by all interviewees, particularly for translating technical findings into practices that can be understood, accepted, and adopted by society. Some interviewees recommended embedding interdisciplinarity into research calls, encompassing social sciences, economics, climate studies, and ethics, and if apt providing funding for whole-system assessments. Integrating sociology, consumer research, and behavioural science is necessary to identify barriers, understand persuasion and adoption mechanisms, and secure societal legitimacy. The interviewees strongly recommended increased investment in the social sciences and humanities (SSH), as well as in consumer-oriented studies. Social sciences are essential in defining the boundaries and compromises, and in guiding acceptable trade-offs. Requiring socio-economic analyses would help ensure that future legislative proposals are grounded in both scientific evidence and societal realities.

Consumers emerged during the interviews as critical, yet often overlooked, determinants of AW progress. Ultimately, choices about AW reflect societal value judgments rather than scientific determinations: scientists provide evidence, but decisions rest with many stakeholders. A persistent "citizen–consumer gap" complicates matters: while many citizens express strong support for AW in principle, they often purchase the cheapest products available in supermarkets; their stated preferences frequently diverge from actual purchasing behaviour. Policy makers must therefore take into account the "cheap food paradox" and ensure that measures to improve sustainability do not inadvertently create affordability issues or incentivise imports from regions with lower environmental and animal welfare standards. Furthermore, many citizens hold strong views about AW despite limited direct experience with farming. According to the interviewees, addressing this gap requires investment in consumer research and communication strategies that align policy ambitions with market realities, including the "cheap food paradox." Research should adopt a comprehensive and contextualised approach that combines studies on consumer behaviour and willingness to pay.

Some interviewees noted that consumers have historically been pivotal drivers of AW reform, with movements such as vegetarianism, veganism, and public protest contributing to early policy changes. Their influence remains decisive: when consumer demand supports higher

welfare and accepts corresponding price signals, the industry adjusts accordingly. However, although science communication has improved through dissemination plans and social media, significant knowledge–action gaps persist. To bridge these, transparent and accessible communication must be sustained, alongside trustworthy labelling and long-term education (SWI swissinfo.ch, 2025). Therefore transparent, accessible communication and credible labelling/metrics to bridge stated vs. revealed preferences is important. Previous projects have employed methods such as citizen juries and deliberative processes—for example, in relation to cloning and genetically modified animals within the animal health domain—to capture societal values and assess trade-offs. These approaches could be more extensively applied in AW technology projects, particularly in the context of precision livestock farming. Schools and public media can also help citizens understand trade-offs between welfare, cost, and other risks, enabling more consistent and informed purchasing decisions.

According to some interviewees the integration of social sciences and humanities (SSH) into AW research is steadily advancing. Many research topics now require explicit socio-economic components, and all work programmes are reviewed for SSH relevance by the EC. EUPAHW has also introduced a dedicated socio-economics objective. Formalising SSH deliverables within research projects could provide important entry points for informing legislation.

QUOTE: "It's a choice of society where you put the threshold. Scientists cannot decide that." (R4)

QUOTE: "People don't know how animals are reared. If you explain the pros and cons of cages vs outdoor, then they can choose rightly what they want to buy." (R8)

Support transition economics to guide policy implementation

Based on the interviews we can conclude that AW reforms demand careful negotiation between science, policy, industry, and society. Perfect welfare standards, such as abstaining entirely from animal consumption, are rarely attainable, and compromise is unavoidable. Policy should also consider unintended consequences such as production relocation outside the EU, which could undermine global welfare standards. Supporting transition economics is therefore critical. This entails embedding cost–benefit and compensation models in research, testing them with farmers, and designing durable incentives, such as price premiums, labelling systems, and market recognition, that align regulatory upgrades with viable business models.

All interviewees emphasised the need for more scientific work, ranging from fundamental research to applied on-farm studies, to support resilience and long-term welfare progress. Criteria for success should include farmer involvement, practical applicability, measurable improvements, and above all, economic viability. In short, while AW science can guide welfare reform, economics determines its feasibility and acceptance.

QUOTE: "One of the issues is reputational value. If society sees you as harming animals, even if you are trying to do better, there is no reward." (R3)

6. Tackle expertise for policy-driven research: Research recommendations

1. Research project design and collaboration

Embed European and international relevance in research projects

A recurring theme in the interviews was the importance of ensuring wider European applicability in AW research. They observed that many research efforts remain localised, targeting highly specific national or regional needs that are not easily transferable or scalable at the EU level. Closer engagement with the European Commission was considered essential to orient research more effectively toward issues of broader European relevance, thereby enhancing its contribution to EU-wide policies and objectives. An illustrative case is turkey welfare: while certain Member States, such as Austria and Germany, have adopted species-specific legislation, a consolidated European overview of scientific research is still lacking.

Several interviewees emphasised the need for a stronger international orientation of research programmes. Two points were emphasised in particular. First, research should be designed to extend beyond national or even European boundaries, recognising that animal welfare challenges often have global dimensions and that solutions can be developed and applied more broadly. An international orientation facilitates the exchange of knowledge, methodologies, and best practices, thereby enriching research and amplifying its potential impact. Second, research projects should adopt a less Eurocentric outlook. While Europe often positions itself as a global leader in animal welfare standards, this role must be continuously substantiated through robust scientific evidence. Interviewees noted that many projects remain confined to the EU context, which limits their wider relevance. Broadening the scope beyond Europe would not only enhance understanding of global animal welfare challenges but also strengthen Europe's credibility as a leader in this domain.

QUOTE "Europe is only a small part of the world. Welfare is perceived differently elsewhere, but trade and imports will increasingly shape what we can do in Europe." (R1)

QUOTE "Europe is small. Trade with the rest of the world, and outreach in places like China, will increasingly influence what research and policy we can do here" (R 8)

Design interdisciplinary projects with shared KPIs to foster cross-disciplinary integration

Interdisciplinarity is widely recognized as essential by the interviewees yet remains difficult to achieve in practice as experienced. Both academic institutions and public administrations are organized along disciplinary lines, with incentives and funding mechanisms reinforcing this structure. This creates concrete frictions, for example in attempts to align AW objectives with environmental concerns such as nitrogen reduction and for animal health, outdoor access may improve AW but simultaneously increase disease risks. Only a limited number of research teams or studies address People, Planet, Profit simultaneously using robust and credible methodologies. Moreover, while climate, biodiversity, and environmental measures can in some cases reinforce AW objectives, in other cases they may come into conflict. Most interviewees therefore recommend that AW, environmental, and economic dimensions be integrated into the same research frameworks, with joint deliverables such as scenario analyses and trade-off

curves. Interdisciplinary teams should work collaboratively to model welfare–environment–economy interactions, for example by linking emission factors to different space allowances, thereby providing policymakers with scenario-based regulatory options. Consortia combining universities, applied institutes, and practice partners are seen as especially valuable for ensuring replication across diverse farm conditions, enhancing practical validity, and generating implementable recommendations rather than purely theoretical insights. Interviewees emphasized that policy-driven research projects should be firmly grounded in real-world conditions and oriented toward the development of enforceable criteria and practical protocols. They observed that promising progress in this direction is already found in initiatives of the EUPAHW, which explicitly integrates "One Welfare" principles and socio-economic perspectives into its objectives. Similarly, earlier projects such as ERA-NET SusAn supported projects that combined veterinary science with socioeconomics or engineering, illustrating the value of such interdisciplinary approaches.

Respondents emphasized that future research on farmed animals should be interdisciplinary, guided by shared KPIs that address AW, farm management, sustainability, economic viability, and policy goals. Genuine integration requires embedding these dimensions within the same work package, with joint outputs such as scenario analyses and trade-off curves. Interviewees further stressed the importance of early co-creation with farmers, veterinarians, researchers, and administrators, as well as the explicit inclusion of economic aspects and social science insights into behavioural dynamics and risk perceptions. While resistance and long timelines are expected, projects that deliver measurable and enforceable outcomes are more likely to influence policy. Accordingly, interviewees recommended embedding interdisciplinarity from the start and, where possible, adopting whole-system assessments.

QUOTE "Few research groups integrate both welfare and nitrogen emission questions" (R8)

QUOTE "Interdisciplinarity here means social and economic sciences… to tell natural and veterinary sciences how far we can go." (R19)

Co-design research projects and pilots with farmers and other end users to increase uptake and real-world relevance

Interviewees underscored the importance of co-designing policy-driven research with farmers and practitioners. They noted that the feedback loop between farmers, science, society, and policy remains weak, limiting the practical orientation of research. Strengthening this loop is considered essential to ensure that animal welfare research produces outcomes that are both usable and implementable. Respondents emphasized that producers should be systematically involved from the earliest stages of research projects, enabling sectoral expertise to inform research questions and ensuring that outputs are both practical and economically viable. Farmers and cooperatives were identified as crucial knowledge providers and indispensable partners in translating science into policy. Their on-farm data remain underutilized, and once research is published it is rarely open to feedback, leaving farmers with limited opportunity to contest findings that diverge from practical experience.

Interviewees pointed out that co-design should be an open process, responsive to feedback, and accompanied by farm-level trials supported by clear incentives for data sharing. They argued that research projects should incorporate replication across diverse farm contexts,

develop implementation tools such as factsheets, checklists, and decision aids, and provide farmers with practical guidance both before and after regulatory changes. According to interviewees, success in this area can be assessed through active farmer involvement, the practical applicability of findings, demonstrable improvements in animal welfare outcomes, and economic viability for producers. They further highlighted the importance of "pilot-to-practice" projects, in which research protocols are first tested in trials and subsequently validated in practice, with the involvement of inspection services.

QUOTE: "We really would like to do a good job on raising animal welfare, raising the bar. But we sometimes feel that we're quite misunderstood and not listened to." (R 15)

QUOTE: "When drafting legislation, it might be no luxury to include an evaluation phase before it is formally enacted, in order to identify and resolve practical issues or problems before they are embedded in law." (R12)

Use scenario-based modelling to explore possible futures and policy outcomes

Most interviewees emphasized that much of the existing research in AW tends to concentrate on ideal end-state scenarios, while neglecting the identification of feasible intermediate steps. This gap poses a significant challenge for effective policymaking. Academic studies often present an aspirational picture of optimal AW, but fail to explore practical, incremental improvements that may be more economically viable and politically acceptable. As a result, policymakers are confronted with a "black-and-white" narrative in which scientific guidance for gradual progress is limited. This observation also highlights a broader issue on the academic side: research is often highly fundamental and insufficiently solution-oriented, which makes it difficult for policymakers to translate findings into concrete action. To enhance impact, scientific advice should therefore provide multiple scenarios, such as cost–benefit analyses of incremental improvements in AW. In other fields, including avian influenza and antimicrobial resistance, scenario-based approaches using modelling are already well established. In contrast, AW research continues to lack the data necessary to substantiate such analyses, leaving policymakers to piece together partial evidence and make trade-offs without integrated scientific scenarios.

QUOTE "If you present a black-and-white narrative, they will dismiss it; scenarios provide a point of reference." (R9)

Apply the "Dilemma Approach"

A complementary perspective to scenario-building was raised by an interviewee, namely the so-called "dilemma approach," which is being used at Wageningen University (van Riemsdijk et al., 2020; Wolf et al., 2023). This method acknowledges the interdisciplinary nature of welfare issues and identifies value trade-offs and policy tensions early on. Different academic disciplines possess distinct languages and methodologies, which complicates integration; nonetheless, AW challenges are inherently intertwined with economic, environmental, and social dimensions. This requires approaches that can mediate between scientific evidence and societal values. Rather than providing a single normative answer, the dilemma approach presents policymakers with the consequences of alternative options.

Quote "If you give a pig 1 m², this is what happens. If you give 3 m², this is what happens. We cannot tell you which is right, that is a societal choice. But we can show you the trade-offs." (R11)

Integrate cost-benefit analyses to support evidence-informed decision-making

Interviewees emphasised that while complex animal welfare challenges require an interdisciplinary approach, interdisciplinarity remains insufficiently developed. In particular, economic, and environmental analyses are considered essential for assessing the viability, feasibility, and costs of welfare improvements. Without integrating these dimensions, scientific recommendations risk remaining abstract or impractical. Despite their central importance for policy uptake, economic impact assessments are still frequently absent from current research. Since no welfare improvement can be achieved without economic viability, research should provide insights into the full cost–benefit balance of welfare interventions, including non-traditional forms of reward for farmers as well as broader One Welfare benefits. Interviewees also stressed that study designs should account for cross-impacts, such as economic implications and environmental effects. To illustrate this point, one interviewee referred to and shared a relevant article by Schuck-Paim et al. (2025) A recurring demand was for more comprehensive evaluations of the costs and benefits of different welfare interventions, supported by robust technical and scientific analyses capable of quantifying the economic consequences of implementation. Such evidence is considered indispensable for policymakers, who must balance welfare objectives with economic and environmental realities.

A key challenge identified is the translation of research findings into practical applications that can be readily adopted in commercial settings. This gap between theoretical knowledge and implementation highlights the need for feasibility studies. Economic considerations play a decisive role in shaping both policy and practice in animal welfare, particularly under pressures to increase production with limited resources. While many welfare measures entail additional costs, such as reduced stocking densities, others can deliver net benefits, including heat-stress mitigation, preventive health protocols, and more selective antimicrobial use, all of which can enhance both productivity and welfare outcomes. Certain improvements, such as better handling practices, may even be implemented at little or no cost. Research should therefore prioritise interventions with the potential for economic neutrality or for generating co-benefits.

Some interviewees noted a deeper structural constraint, the prevailing "cheap food" paradigm, whereby modern food systems have been structured around the goal of making food as inexpensive as possible, often at the expense of other values such as health, environmental sustainability, and AW. The expectation that food remains inexpensive has its roots in the post-war drive for abundance, supported by industrialisation, subsidies, and the externalisation of costs such as environmental damage, biosecurity risks, and public health burdens (Rushton et al., 2021; Tansey, 2013). These externalities are borne by society at large, for instance through public funding of epidemic culling or compensation schemes, as illustrated by a provided article (Rusman et al., 2023). The result is that meat is often kept artificially cheap relative to fruit and vegetables. To correct this systemic imbalance, it is necessary to internalize externalities, design mechanisms for sharing costs, and acknowledge that while welfare-friendly systems generate higher production expenses, these are counterbalanced by a reduction in negative externalities.

The retail sector constitutes another major bottleneck. While welfare improvements at farm level may be relatively inexpensive, estimated at a few cents per kilogram, retailers often inflate final

prices disproportionately. This practice makes welfare-labelled products unaffordable for consumers while simultaneously preventing farmers from receiving a fair share of the added value. Farmers often capture less than one-third of the retail price, and costs are not adequately transferred along the value chain. According to some interviewees, this retail dynamic represents a more decisive barrier to welfare progress than farm-level production costs. Initiatives such as targeted labelling schemes, national or EU funding for transition investments, and compensation for biodiversity, climate, and welfare services could mitigate these challenges. Nonetheless, the divergent positions of stakeholders complicate consensus: NGOs typically push for high or even maximal welfare standards, citizens express support but display inconsistent purchasing behaviour, farmers are generally willing to invest if fairly compensated, and retailers remain responsive to consumer demand while maintaining exploitative pricing practices. Effective alignment therefore requires mechanisms of fair and transparent redistribution, consumer willingness to pay, and direct retailer engagement.

Ultimately, AW reforms demand careful negotiation between science, policy, industry, and society. Perfect welfare standards, such as abstaining entirely from animal consumption, are rarely attainable, and compromise is unavoidable. Policy must also guard against unintended consequences such as production relocation outside the EU, which could undermine global welfare standards. Supporting transition economics is therefore critical. This entails embedding cost–benefit and compensation models in research, testing them with farmers, and designing durable incentives, such as price premiums, labelling systems, and market recognition, that align regulatory upgrades with viable business models.

All interviewees emphasised the need for more scientific work, ranging from fundamental research to applied on-farm studies, to support resilience and long-term welfare progress. Criteria for success should include farmer involvement, practical applicability, measurable improvements, and above all, economic viability. In short, while AW science can guide welfare reform, economics determines its feasibility and acceptance.

QUOTE "We need more science that tells farmers: if you invest in animal welfare, here's what you get in return—not just in profit, but in satisfaction and recognition." (R4)

2. Translation and uptake

Include knowledge digest information and brokerage activities to make findings accessible for policymakers

A recurring theme throughout the interviews was the communication gap between scientists and policymakers. Although both groups share the goal of advancing AW, they often operate with different priorities, use distinct professional "languages," and lack a full understanding of each other's contexts. This disconnect can result in the loss of crucial research insights that might otherwise inform policymaking more effective, thereby hindering the efficient transfer of knowledge from science to policy.

Several mechanisms already exist to bridge this divide. Platforms such as COMPASS provide Commission services with access to reports and deliverables from EU-funded research programmes such as Horizon Europe, while CORDIS functions as the public-facing repository for project information and reports (https://cordis.europa.eu/about). To support effective communication researchers should systematically digest and consolidate project outputs into

policy and practice-ready syntheses. By producing targeted, accessible summaries that highlight actionable findings, the integration of research into decision-making processes and practical implementation can be significantly strengthened.

Some interviewees proposed that researchers present their findings through the EU Platform on AW. It offers a practical way of bridging the science–policy divide by allowing researchers to engage with other stakeholders. At the same time, such initiatives may contribute to broadening the Platform's participation.

QUOTE "Dissemination, dissemination, dissemination… Do not leave things abandoned because then nobody picks them up anymore." (R8)

7. Develop a toolkit for a science-policy knowledge transfer model in policy-driven research

Throughout the study and interviews, several recommendations emerged regarding the design of a toolkit and a research checklist. Key elements for developing a toolkit to support policy and research are outlined below as sources of inspiration. Their further elaboration, however, would require a separate study.

The One Welfare concept as a valuable framework for guiding policy-driven research

Several interviewees highlighted the One Welfare concept as a valuable framework for orienting policy-driven research, as it promotes the integration of AW, human well-being (including citizens, farmers, and workers), and environmental sustainability, thereby embedding systems thinking across domains. From this perspective, meaningful welfare improvements require cross-disciplinary collaboration that draws on expertise in AW science, environmental sciences, and economics, supported by tools such as life cycle and footprint analyses to evaluate proposed measures. Central to the concept is the recognition that AW is inseparable from farmer well-being, environmental sustainability, economic viability, and food security. This holistic approach underscores that advances in AW can yield societal benefits, strengthen farmer satisfaction, and contribute to sustainable agricultural systems. However, the economic dimension remains underdeveloped, and current evidence on the financial returns of AW improvements for farmers is limited. Accordingly, cost–benefit analysis should be integrated into AW research and expanded to capture non-traditional forms of value, including reputational benefits, societal trust, and contributions to sustainable farming. Respondents emphasized the importance of scientific work that demonstrates the broader value of investing in AW. Moreover, AW should be considered in the sustainability assessment of systems and practices as one of its dimensions.

QUOTE "In animal welfare, interdisciplinarity is even more important than in animal health. A holistic approach is essential. (R1)

From planning to dissemination: An overview of the UK Animal Welfare Research Programme

The UK system model was presented at a meeting of the CWG AHW Strategic Foresight Unit in May 2025. An overview was provided of the Great Britain Animal Welfare Research Programme, which covers all kept animal species. The funding landscape combines three main areas—blue-sky research, science for policy, and applied research, with DEFRA funding the science-for-policy strand, co-funding blue-sky research, and coordinating an AW research network. Research drivers include government priorities, emerging scientific insights, evolving industry and societal norms, legislative reviews and implementation needs, expert committee recommendations, and horizon scanning. The programming process spans from planning to dissemination: policy workshops identify research questions, followed by joint analysis with the Welsh and Scottish Governments and a prioritization exercise. In the R&D pipeline, project proposals are co-developed with policy teams and stakeholders, scored according to policy relevance, and reviewed by DEFRA's chief scientists for alignment with policy needs before commissioning. Procurement is conducted via different tender types, assessed through a pre-agreed matrix. Dissemination occurs through internal reports, peer review, and publication in open-access journals, with results deposited in a public repository. During the discussion, it was emphasized that a clear distinction is maintained between funders and policymakers, and that DEFRA funding does not extend to laboratory or wild animals. The approach broadly mirrors that used in animal health, and funding coordination is supported through an informal National Funding Consortium.

The RIU model: a science-policy knowledge transfer model

One interviewee indicated that the RIU (Research, Integration, and Utilization, annex 2) model from Böcher & Krott could substantiate the Science-Policy Knowledge Transfer (Böcher & Krott, 2016). This model views knowledge transfer not as a one-way street but as a continuous, bidirectional process. A checklist accompanies the model and outlines key quality criteria for effective knowledge transfer into political practice. By addressing these criteria across research, integration, and utilization, scientific projects are more likely to achieve practical impact. The model states that research forms the foundation for informed decision-making. This knowledge then moves into the phase of integration, a two-way process in which research is aligned with policy goals and practical needs. Integration requires a clear orientation toward public objectives, ensuring relevance to political processes, and active engagement with various target groups, including experts, administrators, and political actors. Finally, utilization marks the stage where scientific advice is actively applied by political actors, administrators, and citizens in the implementation of policy.

Based on the findings of Do et al. (2020) (Do et al., 2020), improvements in scientific knowledge transfer should be directed toward one or several specific factors rather than the entire process. The authors recommend that targeted improvements in individual elements—such as research, integration, or utilization—can enhance the overall transfer of scientific knowledge. Accordingly, the propositions outlined in this report may be addressed independently while still generating impact. The interviewee believed that the primary obstacles to better information flow in the

science-policy interface for the welfare of farmed animals lies in the integration and utilization phases, suggesting that the "obstacles exist in policies, not in science."

Good practices in advancing animal welfare science-policy interface

Interviewees described a range of good practices that combine rigorous science, applied on-farm research, structured monitoring tools, and strong science–policy interfaces, while keeping farmer-led innovation networks at the core of sustainable transitions. Welfare Quality® was frequently cited as a pioneering EU project for welfare assessment, developed through iterative validation from experimental farms to practical application, and instrumental in normalising the use of animal-based and management/resource indicators in both scientific and policy discourse. Robust science–policy interfaces, such as the EU Partnership, ISCG, and EURCAWS, were seen as essential for strengthening dialogue and alignment, with tools like the EUPAHW dashboards enabling transparent monitoring and EFSA providing structured opinions grounded in clear, policy-driven questions. Applied research under Horizon Europe has further advanced practical solutions for challenges such as cage-free egg production, feather-pecking, and dairy cattle welfare, with research projects like the Best Practice Hens (https://bestpracticehens.eu/) consortium accelerating the cage-free transition across Europe. Indicator-based field applications, including aWISH (https://www.awish-project.eu/) and Legmoni (https://www.legmoni.be/), as well as national tools like Danish benchmarking for foot-pad dermatitis, were recognised as effective approaches to welfare monitoring. Sectoral gap analyses, such as the CWG-AHW (CASA) report on fish welfare, have also been critical in identifying research priorities. Finally, farmer-led networks such as Welfarmers, which foster exchange between farmers and universities, were highlighted as key to complementing academic projects and ensuring grounded, practice-oriented innovation (https://www.welfarmers.com/).

QUOTE “The Welfare Quality project changed the way in which we measure, and we quantify welfare.” (R11)

QUOTE “EU framework programmes have been essential. When findings are produced within a European project, they are backed by colleagues across countries and therefore carry much more impact than if stated by a single national team. The programmes link research lines between countries and strengthen results. We should definitely preserve this.” (R14)

Develop a "Research checklist" for policy relevance

Based on the interviews, a key step in strengthening the AW science–policy interface lies in developing a practical toolkit that enhances two-way communication and ensures effective translation of both research results into policy and regulatory needs into research agendas. A proposal is to establish a “Research Checklist for Policy Relevance” that can guide project design and implementation. An example of a checklist was given during the interviews, the RIU model checklist, see Annex 2. Such a checklist would encourage researchers to adopt approaches that increase policy applicability, including the use of dilemma-based framing, scenario modelling, and cost-benefit analyses, while embedding European and international relevance, interdisciplinary collaboration with shared key performance indicators, and co-design with farmers. It would also support a shift towards output-based standards and the production of practice briefs that are accessible to policymakers. To further improve communicability,

researchers should prepare policy-ready summaries written in clear, non-technical language that emphasize implications and actionable insights. Engagement with the EU Platform on Animal Welfare, direct communication with DG SANTE, and cooperation with advocacy organisations could provide channels for dissemination, professional convening, and translation of findings to wider audiences. Moreover, research should prioritise on-farm studies with enforceable outcomes and systematically include their contribution to the broader One Welfare framework. In this way, AW research can be made more relevant, accessible, and impactful for policy processes at both national and international levels.

QUOTE "We need a model of scientific knowledge transfer that neither overestimates the direct application of science in politics nor underestimates its usefulness." (R7)

BIBLIOGRAPHY

Bagni, M., Williams, C., & Messori, S. (2016). *Gap analysis on Animal Welfare research*.

Blokhuis, H. (2021, June 22). *European Union Reference Centre for the welfare of ruminants and equines*.

Böcher, M., & Krott, M. (2016). *Science Makes the World Go Round Successful Scientific Knowledge Transfer for the Environment*. Springer.

Cozzi, G., & Gottardo, F. (2005). Feeding behaviour and diet selection of finishing Limousin bulls under intensive rearing system. *Applied Animal Behaviour Science*, *91*(3–4), 181–192. https://doi.org/10.1016/j.applanim.2004.10.004

Do, T. H., Krott, M., & Böcher, M. (2020). Multiple traps of scientific knowledge transfer: Comparative case studies based on the RIU model from Vietnam, Germany, Indonesia, Japan, and Sweden. *Forest Policy and Economics*, *114*(102134), 1–9. https://doi.org/10.1016/j.forpol.2020.102134

Ducrot, C., Barrio, M. B., Boissy, A., Charrier, F., Even, S., Mormède, P., Petit, S., Pinard-van der laan, M. H., Schelcher, F., Casabianca, F., Ducos, A., Foucras, G., Guatteo, R., Peyraud, J. L., Vayssier-Taussat, M., Veysset, P., Friggens, N. C., & Fernandez, X. (2024). Animal board invited review: Improving animal health and welfare in the transition of livestock farming systems: Towards social acceptability and sustainability. *Animal*, *18*(101100), 1–14. https://doi.org/10.1016/j.animal.2024.101100

European Commission. (2024, June 14). *EU Reference Centers for Animal Welfare*.

Ferraz, P. F. P., Ferraz, G. A. e. S., Leso, L., Klopčič, M., Barbari, M., & Rossi, G. (2020). Properties of conventional and alternative bedding materials for dairy cattle. *Journal of Dairy Science*, *103*(9), 8661–8674. https://doi.org/10.3168/JDS.2020-18318

Fletcher, K. A., Padalino, B., Felici, M., Bigi, D., Limon-Vega, G., Grist, A., & Gibson, T. J. (2024). Assessment of ante mortem welfare indicators and the pathophysiology of captive-bolt trauma in equids at slaughter. *Animal Welfare*, *33*(e65), 1–17. https://doi.org/10.1017/awf.2024.70

Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities. (2015). OECD. https://doi.org/10.1787/9789264239012-en

González Lecuona, A. C. M. C. D. S. L. D. M. M. G. R. V. J. O. G.-P. J. V. N. J. M. F. A. L. M. S. F. and P. A. López. (2022). *A guide on fish welfare in Spanish aquaculture-Volume 1: Concepts and generalities*.

Guyomard, H., Bouamra-Mechemache, Z., Chatellier, V., Delaby, L., Détang-Dessendre, C., Peyraud, J. L., & Réquillart, V. (2021). Review: Why and how to regulate animal production and consumption: The case of the European Union. *Animal*, *15*(100283), 1–12. https://doi.org/10.1016/j.animal.2021.100283

Madsen, N., Ern, R., & Olsen Alstrup, A. K. (2022). Estimating Discard Mortality in Commercial Fisheries without Fish Dying: A 3R Challenge. *Animals*, *12*(782), 1–15. https://doi.org/10.3390/ani12060782

Manfrin, A., Messori, S., & Arcangeli, G. (2018). *Strengthening fish welfare research through a gap analysis study*.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis*. Sage.

Molitorisová, A., & Burke, C. (2023). Farm to fork strategy: Animal welfare, EU trade policy, and public participation. *Applied Economic Perspectives and Policy*, *45*(2), 881–910. https://doi.org/10.1002/aepp.13326

Murphy, E., & Legrand, A. (2023). Introduction to the concept of "welfare potential" of production systems and its practical relevance to welfare labelling. *Frontiers in Animal Science*, *4*(1225839), 1–7. https://doi.org/10.3389/fanim.2023.1225839

Paulović, T., Chartier, O., Zingaretti, M. C., Bertolozzi, D., Martino, G., Krüger, T., Pelsy, F., Sioland, L., Oulès, L., Baker, A. C., Hoek, E., Nesslany, F., Frewer, L., Rakers, P., Schrijver, R., Hansen, S. F., & Libbrecht, S. (2022). Horizon scanning exercise on preparedness for future risk assessment requirements and possible challenges in regulatory science. *EFSA Supporting Publications*, *EN-7297*, 1–106. https://doi.org/10.2903/sp.efsa.2022.en-7297

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 (December 7, 2023).

Rushton, J., K Mazet, J. A., & Shankar, B. (2021). A Food System Paradigm Shift: From Cheap Food at Any Cost to Food within a One Health Framework. *NAM Perspect*, *22*, 1–5.

Rusman, A., Heuberger, L., Huzen, M., Lucas, V., Reimers, S., Barette, C., & Danai, A. (2023). *EXTERNAL COSTS OF ANIMAL SOURCED FOOD IN THE EU Study on the externalities attributed to current value chains of EU production and consumption of animal sourced food-and opportunities for change*.

Schuck-Paim, C., Alonso, W. J., Verkuijl, C., Hegwood, M., & Hartcher, K. (2025). The Welfare Footprint Framework can help balance animal welfare with other food system priorities. In *Nature Food*. Springer Nature. https://doi.org/10.1038/s43016-025-01213-z

Schukat, S., Plettenberg, L. von, & Heise, H. (2020). Animal welfare programs in germany—an empirical study on the attitudes of pig farmers. *Agriculture*, *10*(609), 1–17. https://doi.org/10.3390/agriculture10120609

Strategic Research and Innovation Agenda for the European Partnership on Animal Health and Welfare. (2023).

Sundrum, A. (2024). Why has animal science not led to improved farm animal health and welfare? *Frontiers in Animal Science*, *4*(1214889), 1–17. https://doi.org/10.3389/fanim.2023.1214889

SWI swissinfo.ch. (2025, June 4). *Swiss food labels must declare animal suffering from July - SWI swissinfo.ch*. https://www.swissinfo.ch/eng/food-supply-chains/animal-suffering-to-be-declared-on-food-labels-from-july/89451200?

Tansey, G. (2013). Food and thriving people: Paradigm shifts for fair and sustainable food systems. *Food and Energy Security*, *2*(1), 1–11. https://doi.org/10.1002/fes3.22

Taylor, M. J., Mcnicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2014). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety*, *23*, 290–299. https://doi.org/10.1136/bmjqs

University of Crete. (2019). *Mediterranean Fish Welfare: Guide to good practices and assessment indicators*.

van Riemsdijk, L., Ingenbleek, P. T. M., van der Veen, G., & van Trijp, H. C. M. (2020). Positioning Strategies for Animal-Friendly Products: A Social Dilemma Approach. *Journal of Consumer Affairs*, *54*(1), 100–129. https://doi.org/10.1111/joca.12240

Wolf, D., Meijl, V., Jonge, D., Ree, V., Wassenaer, V., & Wigboldus, en. (2023). *WUR-perspectieven op landbouw, voedsel en natuur*.

ANNEX 1

Interview questions

Interview for RefreSCAR study on regulatory science for animal welfare

Thank you for accepting to be interviewed.

The interview will take approximately 60 minutes and will follow a semi-structured format, with around ten core questions and room for elaboration and discussion (approx. 5 minutes per question). Your responses will be anonymized and used exclusively for research purposes.

Purpose: To gather insights from both policymakers and scientific experts on the effective integration of Animal welfare research into policy development and implementation within the EU. The focus is on Animal welfare science and Agricultural policy. We will map existing science-policy pathways, identify barriers/enablers, determine key actors/hubs, reflect on lessons learned, and generate ideas for improving the interface.

Questions

Question 1: Can you outline the existing routes, mechanisms, and processes through which Animal welfare research outcomes are currently incorporated into EU policy-making processes? Do you think that, in the future, the alignment between Animal welfare research and policy is evolving towards greater or lesser coordination? In which direction do you think this evolution is heading, and what is your opinion about this development?

Question 2: In your experience, is the information flow between the Animal welfare scientific community and policymakers adequate or sufficient? If yes, what do you perceive as the main factors enhancing the flow of information between the Animal welfare scientific community and policymakers at the EU level? If not, conversely, what are the primary barriers or hindrances that impede effective information exchange at this science-policy interface?

Question 3: Are there specific institutions, initiatives or fora that you see as hubs or intermediaries in the AW science-policy landscape at EU (or national level)? Which do you see as key hubs for facilitating the flow of information between Animal welfare researchers and policymakers? How are these hubs connected or coordinated at the EU level?

Question 4: To what extent is there a structured two-way exchange between scientists and policymakers in the field of AW? What works well, and what could be improved? What approaches, tools, mechanisms, or support structures do you think are essential for improving two-way communication between Animal welfare researchers and policymakers—both for translating research into policy and for ensuring that policy needs guide research priorities? What opportunities do you see for improving direct collaboration between policymakers and Animal welfare scientists?

Question 5: Considering the RefreSCAR Animal Health & Welfare CWG interest in the interface between science and policy, and referring to the EU's recent public consultation on "*On-farm Animal welfare for certain animals: modernisation of EU legislation*". This is an example of stakeholder engagement and evidence-informed policymaking, where both broad public input and scientific evidence are intended to shape a legislative proposal. From your perspective, what institutionalized mechanisms currently exist within the EU framework to ensure that scientific research findings, distinct from general stakeholder input, are systematically channeled into the policy development process for Animal welfare? As a follow-up: Can you describe any established procedures for disseminating summaries of public consultation results to science-related bodies such as the SCAR Working Groups, EFSA, or other relevant scientific entities?

Question 6: Can you describe any specific research needs your organization (or you) has identified that would support the development or improvement of Animal welfare regulations? Do you communicate these needs to the research community or policy makers? If so, how?

Question 7: Can you share any good or best practices you have encountered for incorporating policy-making needs into Animal welfare research programs? What made these practices successful or impactful? Do you know examples of other policy and science fields that could serve as inspiration (sociology, biodiversity, public health, …)?

Question 8: Do you think that current Animal welfare science should closely align with policy needs? To what extent do you believe such alignment is necessary or desirable? If yes, how could research agendas be better aligned with policy needs in Animal welfare? Are there strategies you recommend for improving coherence? If no, how to avoid guarantee ensure that the research agenda can be less independent of policy.

Question 9: What role do you believe interdisciplinary approaches play in addressing complex Animal welfare issues from a policy perspective? What mechanisms exist to bridge conflicts between scientific insights from different disciplines and societal values (stakeholders) in the context of Animal welfare and agricultural policy?

Question 10: Do economic factors influence the development and implementation of Animal welfare policies, and what strategies could help balance economic pressures with welfare goals? Do budgetary or political constraints affect the uptake of AW research? Are there other factors that influence the development and implementation of Animal welfare policy, for example, considerations related to biodiversity, ecological footprint, climate, or broader environmental concerns?

Question 11: According to you, how can differing perspectives of stakeholders on AW be aligned effectively? How could multi-stakeholder engagement be effectively organized to ensure meaningful involvement of different interest groups in Animal welfare policy and research. Do you have examples?

Question 12: Are there any topics we have not discussed, but that you believe are important to address? Can you also suggest individuals, organizations, or networks we should interview to gain further insights?

Question 13: To conclude the interview, I would like to ask for your evaluation of the following statements. Please indicate your level of agreement or assessment for each statement below

using the following scale:

1 – Strongly disagree / Not at all / Never / Not useful
2 – Disagree / Slightly / Rarely / Slightly useful
3 – Neutral / Somewhat / Occasionally / Moderately useful
4 – Agree / Mostly / Often / Useful
5 – Strongly agree / Very much / Always / Extremely useful

	Strongly disagree / Not at all / Never / Not useful	**Disagree / Slightly / Rarely / Slightly useful**	**Neutral / Somewhat / Occasionally / Moderately useful**	**Agree / Mostly / Often / Useful**	**Strongly agree / Very much / Always / Extremely useful**
There is a structured two-way exchange between scientists and policymakers in the AW field.					
Scientific research is consistently considered during the development of AW regulations.					
Interdisciplinary approaches are essential to addressing complex AW issues from a policy perspective.					
Political and budgetary constraints significantly affect the uptake of AW research.					
AW scientists conduct research that aligns with regulatory or legislative needs.					
New AW scientific findings influence decision-making regarding AW regulations.					

ANNEX 2

RIU Checklist

Checklist for Successful Scientific Knowledge Transfer
As a result of our RIU model and based on the results of our empirical research (see the following chapters), we can derive the following checklist (Fig. 2.2). The checklist presents individual quality criteria related to the subtasks of scientific knowledge transfer that support the transfer of scientific knowledge into political practice. By applying these quality criteria there is a greater probability for scientific projects to have an impact on practice. The checklist helps considering the specific factors that are relevant for research, integration, and utilization (RIU). Practical utilization is more likely to succeed if the number of questions on the checklist that can be answered in the positive is greater.

		Success Factors
1	R	Is there high quality scientific research?
2	I	Is there pluralistic foresighted integration?
3	U	Is there assurance of a democratic utilization?

1 High quality scientific research

Assessing current scientific information

- ☐ Has the national and international scientific literature been collected and reviewed?
- ☐ Have the national and international data sources been collected and reviewed?

Compliance with the procedures of good scientific practice

- ☐ Does the scientific work adhere to professional standards?
- ☐ Are the research process and its results clearly documented?
- ☐ Will new findings be scientifically published?
- ☐ Has the expertise of external researchers been called in when facing difficult questions?

Cooperation with other scientific institutions and projects

- ☐ Are other relevant and current scientific projects known and has the potential for cooperation been evaluated?
- ☐ Is there scientific exchange with relevant research institutions at local, national, and international levels?

Independent meaningfulness of scientific findings

- ☐ Are scientific findings independently informative and empirically substantiated?

2 Pluralistic foresighted integration

Orientation toward public goals (like sustainability, ...)

- ☐ Are the research process and its results orientated towards ecological, economic, and social aspects of sustainability?
- ☐ Are deficits regarding sustainability requirements clearly expressed?
- ☐ Are the values of sustainability clearly formulated, or have they been developed further according to norms, where needed?
- ☐ Is there a legitimate public contracting authority, like a Ministry, that defines public interest goals?

Fig. 2.2 Checklist for successful scientific knowledge transfer

- ☐ Are scientific findings coordinated in respect of the competing public interests of different public institutions at national and international levels?
- ☐ Are the researchers independent enough to hold their ground against criticism of their research results?

Relevance in regard to political processes

- ☐ Do the research results deliver explanations for practical problems?
- ☐ Are there science-based alternative solutions for practical problems?
- ☐ Are there science-based prognoses about the future development of problems?
- ☐ Are scientific results being delivered to political actors in time for them to take action?
- ☐ Is there a stock of scientific knowledge about practical problems that could arise in the future?
- ☐ Do the researchers and institutions maintain their seriousness and credibility independently of current disputes?
- ☐ Do the researchers have practical experience with administration and politics?

Relevance in regard to allies

- ☐ Are there (internal) allies who participate in the research process and who push through the results in their own interest, even against political resistance?
- ☐ Are there (external) allies who can exert political pressure for the practitioners to cooperate with researchers constructively?
- ☐ Are there (learning) allies who are prepared to rethink old convictions in order to learn from scientific findings?
- ☐ Are there (wise) allies who judge scientific findings fairly from their everyday reality, and who make use of them?

Target-group oriented intermediation

- ☐ Are the research results presented in a language that is understandable for the target groups?
- ☐ Are those media used that reach the target group?
- ☐ Is the scientific information given at a time at which the practical discourse is open?

3 Democratic Utilization

Contribution to democracy

- ☐ Are the research processes transparent?
- ☐ Do citizens have access to research findings?
- ☐ Do the media have access to research findings?

Fig. 2.2 (continued)

1. Is there **high quality scientific research**?
2. Is there **pluralistic and foresighted integration**?
3. Is there an **assurance of a democratic utilization**?

The answers can be found by using the criteria for research, integration, and utilization, described above, to identify the potential for improvement of the process and its subtasks. However, not all criteria have to be fulfilled in every process at the same time. Rather, these criteria deliver a framework of possibly important aspects of scientific knowledge transfer. In a concrete research project aiming at practical utilization, its topic, its target groups, and its production lines determine the specific criteria that have to be used in that particular case.

Research projects that become strong in all three aspects, research, integration and utilization, have a high probability of producing science-based knowledge that is used in practice.