



2023

STRATEGIC RESEARCH AND INNOVATION AGENDA
**FOR THE EUROPEAN PARTNERSHIP ON
ANIMAL HEALTH AND WELFARE
(EUP AH&W SRIA)**

EUP AH&W LOGO

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This SRIA has been developed thanks to a collaboration between EUP AH&W, WP6 – ERA-Net co-fund ICRAD, STARIDAZ IRC and SFU - CWG AHW.

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Acknowledgments

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The CWG AHW was closely involved in the preparation of this document, and is composed of Funding Organizations, Research Performing Organizations and experts from the following countries: Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Luxembourg, The Netherlands, Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden, Turkey and the United Kingdom.

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The development of this SRIA would not have been possible without the consultation of more than 300 experts, worldwide, who contributed to the prioritization of research needs. We cannot mention everyone by name, but we would like to thank their valuable contribution to this SRIA.



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Preamble

This Strategic Research and Innovation Agenda for the Partnership Animal Health and Welfare (EUP SRIA) presents long-term strategic vision including broad research themes that will guide the partnership's activities over the coming years. This is a live document and will be kept current based on communities needs and requirements.

Accompanying this high-level strategic document is an addendum that describes methodology and research and innovation needs for short-, medium- and long-term and served as an input into the EUP SRIA. This addendum will be valuable when analysing possible specific domains for the research calls and the 'invitations to collaborate' on integrative activities.

This EUP SRIA and its addendum have been developed through joint working of the EUP AH&W, WP6 – ERA-Net co-fund ICRAD, STAR-IDAZ IRC and SFU - CWG AHW through extensive consultation with broad range of players. Through a desk study, an ICRAD working group identified research and innovation priorities, which were further prioritized with the help of animal health and welfare researchers throughout Europe and beyond in an online survey. In addition, industry associations and stakeholders were consulted, as well as the EUP AH&W experts that contributed to the initial proposal for the Partnership that was sent to and evaluated by the EC in 2022. Finally, an interactive workshop with expected Partnership members and stakeholders was organized, as well as a broad consultation.



List of Abbreviations

| | |
|---------|--|
| 3Rs | Replacement, reduction and refinement |
| ABM | Animal-based measures |
| AID | Animal Infectious Disease |
| AH | Animal Health |
| AH&W | Animal Health & Welfare |
| AMR | Antimicrobial Resistance |
| ANSES | Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail |
| AUTH | Authorities |
| AW | Animal Welfare |
| CAP | Common Agricultural Policy |
| CB | Call Board |
| CoI | Conflict of Interest |
| COVID | Coronavirus disease |
| CT | Coordination Team |
| DIVA | Differentiating Infected from Vaccinated Animals |
| DFA | Diagnostics for Animals |
| DG-AGRI | Directorate-general Agriculture and Rural Development |
| EAB | Ethics Advisory Board |
| EB | Executive Board |
| EC | European Commission |
| ECDC | European Centre for Disease Prevention and Control |
| ECI | European Citizen's Initiative (here in relation to 'End the Cage Age') |
| EDQM | European Directorate for the Quality of Medicines and Healthcare |
| EEA | European Environment Agency |
| EFSA | European Food Safety Authority |
| EFTA | European Free Trade Association |
| EIC | European Innovation Council |
| EMA | European Medicines Agency |
| EUP | European Partnership |
| EURL | European Reference Laboratory |
| EB | Executive Board |
| FAIR | Findability, accessibility, interoperability, and reusability |
| FAO | Food and Agriculture Organization of the United Nations |
| FO | Funding Organizations |
| FVE | Federation of Veterinarians of Europe |
| GA | Grant Agreement |
| GenA | General Assembly |
| GMP | Good manufacturing practice |
| GO | General Objectives |
| GovB | Governing Board |
| HE | Horizon Europe |

| | |
|-------|--|
| HERA | European Health Emergency preparedness and Response Authority |
| ICRAD | International Coordination of Research on infectious Animal Diseases |
| IP | Intellectual property |
| KPI | Key performance indicators |
| MoU | Memorandum of Understanding |
| mRNA | Messenger RNA |
| MS | Member States |
| NGO | Non-governmental organization |
| NMG | National AH&W Mirror Groups |
| OIE | World Organisation for Animal Health |
| OO | Operational Objectives |
| PMT | Partnership Management Team |
| R&I | Research & Innovation |
| RPO | Research Performing Organizations |
| SAB | Scientific Advisory Board |
| SCAR | Standing Committee on Agricultural Research |
| SDG | Sustainable Development Goals |
| SHC | Stakeholders Committee |
| SMART | Specific, Measurable, Attainable, Relevant, Time-bound |
| SO | Specific Objectives |
| SRIA | Strategic Research and Innovation Agenda |
| SRL | Societal Readiness Level |
| TRL | Technology Readiness Level |
| UNEP | United Nations Environment Programme |
| VMP | Veterinary Medicine Products |
| WHO | World Health Organization |
| WOAH | World Organisation for Animal Health (formerly 'OIE') |
| WP | Work Package |
| WPR | Work Programme |
| WUR | Wageningen University & Research |

The European Partnership Animal Health & Welfare (EUP AH&W) will generate key knowledge and develop innovative methodologies, tools and products to promote sustainability in livestock production, both for terrestrial and aquatic animals. It will support the development of an animal friendly livestock sector and reduce the risk of animal infections, both from endemic and emerging origin. The Partnership will also enhance public health and wellbeing by enhancing cross-sector collaboration in a One Health – One Welfare perspective.

EUP AH&W will actively engage with chain actors and stakeholders, and support evidence-based intervention and policy making in the fields of animal health and welfare.

The European Partnership Animal Health & Welfare (EUP AH&W) is a Research and Innovation Partnership set up in the context of Horizon Europe. Its general goals are to progress Europe towards healthy and sustainable livestock production systems (for both terrestrial and aquatic animals), including the reduction of anti-microbial usage, and to greatly improve welfare of farmed animals, in line with the European Green Deal and farm-to-fork strategy. Furthermore, the EUP AH&W will enhance public health and well-being by facilitating cross-sector collaboration in a One Health – One Welfare perspective. To accomplish these goals, the EUP AH&W will generate key knowledge, innovative methodologies, tools, and products by launching internal activities and calls for research and innovation proposals. Next to external calls supported by funding organizations, the EUP AH&W will organize a set of internal activities, which aim to strengthen the international collaboration between its partners, leading to increased awareness and preparedness. Furthermore, the EUP AH&W will set up a portfolio of additional activities, such as education and training activities, knowledge hubs with farmers, vets and citizens, etc. to further strengthen international cooperation, networking, and dissemination and exploitation of results.

The activities of the EUP AH&W will be structured around four priority areas:

- I. Surveillance / monitoring systems and risk assessment of animal health and welfare.
- II. Procedures, methodologies and tools to assess animal health and welfare.
- III. Management and husbandry guidelines on farm and including aquaculture, during transport and at slaughter.
- IV. Vaccines and treatments.

In addition, a fifth transversal priority area of socio-economic aspects will be studied along the four previous ones. As such, the outcomes of the Partnership will lead to strengthening

sustainable livestock production and aquaculture and animal welfare, as well as supporting human health and well-being.

The EUP AH&W will consist of partners belonging to research funding organizations (FO), research-performing organizations (RPO), and national authorities. Industry and non-partner RPOs will be allowed to join through external research calls developed for high TRL projects or projects needing specific expertise that is not available within the Partnership. SRL level will also be taken into consideration.

This strategic research and innovation agenda (SRIA) presents the long-term vision of the EUP AH&W and addresses the strategic objectives that will guide the activities of the partnership. Based on a broad input from experts of existing AH&W networks, the SRIA will showcase the vision and ambition of the partnership and its general and specific objectives. It will also elaborate on the organization and governance of the partnership, as well as its intended monitoring framework. The purpose of this framework is to ensure adherence to the partnership's vision and long-term objectives and to provide a comprehensive way to document the progress and impact of the partnership.

Lastly, the EUP AH&W is not intended to be a stand-alone initiative. Through collaboration and exchange with other European initiatives, the EUP AH&W aims to maximize EU added value, societal and economic impact. Complementary European partnerships include the planned partnerships on 'Accelerating farming systems transition: agroecology living labs and research infrastructures'¹, 'Sustainable food systems'², 'Rescuing biodiversity to safeguard life on Earth'³, 'a climate neutral, sustainable and productive Blue Economy'⁴, and One Health-AMR⁵, to name the most relevant ones. The envisioned collaboration and knowledge exchange with these initiatives is elaborated further in this SRIA.

¹ https://research-and-innovation.ec.europa.eu/system/files/202204/european_partnership_for_accelerating_farming_systems_transition_march_2022.pdf

² https://research-and-innovation.ec.europa.eu/system/files/2022-04/ec_rtd_he-partnership-sustainable-food-systems-april_2022.pdf

³ https://research-and-innovation.ec.europa.eu/system/files/202005/european_partnership_for_rescuing_biodiversity_to_safeguard_life_on_earth.pdf

⁴ https://research-and-innovation.ec.europa.eu/system/files/2020-08/ec_rtd_he-partnership-climate-neutral-sustainable-productive-blue-economy.pdf

⁵ https://research-and-innovation.ec.europa.eu/system/files/2022-02/ec_rtd_he-partnerships-onehealth-amr.pdf

Context and Problem Description

Animal health and animal welfare constitute a Global Public Good; its preservation and continuous improvement is the mission of the proposed EUP AH&W. The creation of the partnership is timely, as never before has the need for such an initiative been so pressing: climate change, the COVID-19 crisis and increased consumer concern about how animals are kept and how products are made demand a changed approach. The opportunity of achieving significant and sustainable progress on animal health and welfare is promoted and supported through the EU Commission's Farm to Fork strategy. But the challenges at hand and the mobilisation of resources to achieve them require a systemic, cross-cutting, interdisciplinary and coordinated approach at the transnational level.



The **livestock sector plays a major economic role** in agriculture, accounting for €168 billion annually, 45% of total EU agricultural activities, creating 4 million jobs, many of them in rural areas, while linked sectors (dairy products, eggs and meat processing, feed for livestock) have an annual turnover of approximately €400 billion. The value of EU aquaculture production reached €5.6 billion in 2017.

Livestock provides proteins of high nutritional values including meat, fish, crustacean and mollusc, milk and eggs, contributing to food security (see the

United Nations Sustainable Development Goals⁶, SDG2) and nutrition (SDG3). Furthermore, animal production enhances economic growth (food and non-food products) (SDG8), rural development and vitality of many EU marginal territories (SDG9, SDG15) and certain production systems preserve biodiversity on earth (SDG2, SDG15). A healthy and sustainable livestock and aquaculture sector is a prerequisite for providing sufficient and healthy food to citizens and for establishing well-functioning circular sustainable agri/food systems, in the most efficient possible way. The likely increase in animal production, however, will create new challenges, especially with regard to consumer demands regarding climate challenges, environmental concerns, animal welfare and the need for disease prevention and control.

The One Health principle recognises that human, animal including fish, plant and environmental health are closely linked⁷. If one group is affected, this influences the health of the others. In a One Health perspective, certain animal **infectious** diseases (AID) have an impact, directly or indirectly, on public health. Indeed, the majority of emerging AID are

⁶ <https://sdgs.un.org/goals>

⁷ https://www.onehealthcommission.org/en/why_one_health/what_is_one_health/

zoonotic⁸, i.e. transmissible between animals and humans, directly or indirectly (e.g. food-borne and vector-borne zoonoses). In a global study⁹ 56 zoonoses were assessed, which were together responsible for an estimated 2.5 billion cases of human illness and 2.7 million human deaths per year. EFSA has estimated that the overall economic burden of human salmonellosis could be as high as €3 billion a year. The COVID-19 pandemic has underlined the importance of a robust and resilient food system that functions in all circumstances and is capable of ensuring access to a sufficient supply of affordable food for all citizens¹⁰. It has also made us acutely aware of the interrelations between our health, ecosystems, animal reservoirs, supply chains, consumption patterns and planetary boundaries. Spread and emergence of resistant bacteria also arise in the environment, due to pharmaceutical leaks, pollution, organic fertilizers, etc. and are passed onto livestock¹¹. It is clear that we need to do much more to maintain animal, human and our planetary health. The increasing recurrence of droughts, floods, forest fires and new pests are a constant reminder that **our food system is under pressure** and must evolve towards more sustainability and resilience.

One Welfare emphasises the link between animal welfare, human wellbeing and ecosystem health. Pinillos et al. (2016)¹² introduce the One Welfare concept and emphasise the strong link between animal welfare and human wellbeing. They quote Bayvel and Cross (2010)¹³ who state that initiatives to improve animal welfare are “multifaceted, international and domestic, public-policy issues that must take account of not only scientific, ethical and economic issues but also religious, cultural, and international trade policy considerations”. Separating human, social and animal welfare is an artificial compartmentalisation¹⁴, as these scientific areas rely on similar measures and are interdependent from an ecological point of view. Pinillos et al. (2016) describe several areas of interaction. They include evidence indicating that poor states of human welfare commonly co-exist with poor states of animal welfare, e.g. in emerging economies¹⁵. At farm level, the well-being of the animals and their owners is directly correlated:

⁸ http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/Key_Documents/ANIMAL-HEALTH-EN-FINAL.pdf Jones et al, Nature Vol 451|21 February 2008 ; doi:10.1038/nature06536

⁹

https://assets.publishing.service.gov.uk/media/57a08a63ed915d622c0006fd/ZooMapDFIDreport18June2012FINA_Lsm.pdf

¹⁰ OECD Policy Responses to Coronavirus – Food Supply Chains and COVID-19: Impacts and Policy Lessons (2020) <https://www.oecd.org/coronavirus/policy-responses/food-supply-chains-and-covid-19-impacts-and-policy-lessons-71b57aea/>; Niles, M.T., Bertmann, F., Belarmino, E. H., Wentworth, T., Biehl, E. and Neff, R. The Early Food Insecurity Impacts of COVID-19. *Nutrients*, 12(7), 2096 (2020).

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7400862/>

¹¹ <https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2021.6651>

¹² Pinillos RG, Appleby MC, Manteca X, Scott-Park F, Smith C, Velarde A. One Welfare - a platform for improving human and animal welfare. *Vet Rec.* 2016 Oct 22;179(16):412-413. doi: 10.1136/vr.i5470. PMID: 27770094

¹³ BAYVEL, A. C. D & CROSS, N. (2010) Animal welfare: a complex domestic and international public-policy issue—who are the key players? *Journal of Veterinary Medical Education* 37, 3-12

¹⁴ Colonius, T. J. & Earley, R. W. (2013) One welfare: a call to develop a broader framework of thought and action. *Journal of the American Veterinary Medical Association* 242, 309-310

¹⁵ JORDAN, T. & LEM, M. (2014) One Health, One Welfare: Education in practice Veterinary students' experiences with Community Veterinary Outreach *Canadian Veterinary Journal* 55, 1203–1206

well-kept animals on productive farms are generally associated with positive farmer wellbeing. Efforts to develop communities where animals are looked after well, promote long term viability of livestock production and the availability of animal-derived products. Nevertheless, given current areas of societal concern, O’Riordan (2004)¹⁶ suggests that an “inclusive approach should be taken to protect the soil, safeguarding water, widening biodiversity, introducing local food sourcing, establishing local carbon-neutral energy schemes and housing, and creating community initiatives around sustainability partnerships.” As such, One Welfare aims to contribute to sustainable animal production in a very broad sense.

As animal welfare is linked to animal health, the One Welfare concept overlaps and complements the One Health concept. Integrating this concept in future projects will foster interdisciplinary collaboration to improve human and animal welfare and help improve global standards of both human wellbeing and animal welfare.

In recent years, new opportunities become available in the form of new scientific disciplines and advanced technologies such as data science and bioinformatics, OMICS technologies, precision farming technologies and advanced in-line sensory systems at abattoirs and during transport. These will not only detect any new and emerging diseases and welfare hazards, they can also be applied to monitor entrenched diseases or endemic welfare issues. All the above would help transition from a curative approach to the application of more preventive measures with new and improved diagnostics and assessment schemes.

Global change has accelerated in recent decades leading to far-reaching climatic, economic, sociological and environmental consequences. Animal populations, whether domestic or wild, terrestrial or aquatic, lie at the heart of ecosystems, along with plants, air, water and soil. The populations are confronted with new and more complex challenges in relation to climate change, ecological transformation and habitat loss. Furthermore, demands for increasing efficiency of animal farming and husbandry practices and increased trade to meet the growing demands of developing societies pose additional challenges. Rising temperatures affect the physiology of both animals and pathogens, in both aquatic and terrestrial production, and have the potential to lead to significant increases in disease outbreaks, welfare breaches, and antimicrobial resistance^{17 18} within livestock and aquaculture systems, resulting in severe financial impacts¹⁹. Similarly, deforestation transforms the interactions between pathogens, arthropod vectors and hosts in multiple and complex ways leading to spread and emergence of infectious diseases.

¹⁶ O’RIORDAN, T. (2004) Environmental science, sustainability, and politics. *Transactions of the Institute of British Geographers* 29, 234–247

¹⁷ <https://www.sciencedirect.com/science/article/pii/S258900422030208X>

¹⁸ <https://www.nature.com/articles/s41558-018-0161-6>

¹⁹ Mediterranean Aquaculture in a Changing Climate: Temperature Effects on Pathogens and Diseases of Three Farmed Fish Species. <https://doi.org/10.3390/pathogens10091205>

Boundaries

For the purpose of this partnership, **animals** mean living farmed or managed animals, whether **terrestrial or aquatic**²⁰, including minor species such as bees, as well as companion animals and wildlife when there is a potential threat to animal health, public health or the welfare of production animals. Causative agents responsible for animal infectious diseases include bacteria, viruses, parasites, fungi and prions. Non-infectious animal diseases are included as far as they impact the welfare of animals.

Activities related to sustainable farming, breeding and feeding are within the scope of EU Partnership on Animal Health and Welfare as long as they can be directly linked to animal health or animal welfare. All production systems are considered, including for instance organic farming as well as all phases of production: on farm, during transport and in the abattoir and after fishing.



In close cooperation with the consortium that prepares the future EUP One Health AMR, the EUP AH&W will focus on the antimicrobial resistance (AMR) in pathogens for livestock, as well as on the spread of resistance to livestock and the assessment of alternatives for use of antibiotics.

The Partnership Approach to address the Challenges

The objectives of EUP AH&W are presented below. When drafting them, the Partnership took care to align these aims with the provisions of Horizon Europe, Cluster 6, Intervention Area 3 (i.e. Agriculture, Forestry and Rural Areas), which broad advice is to address the following:

- Control of contagious and zoonotic animal diseases and assess and improvement of animal welfare.
- Prevention strategies, control measures, diagnostic and alternatives to the use of antibiotics and other substances/techniques to tackle AMR and threats from biological hazards.
- Tackling the links between plant, animal, ecosystems and public health from One Health-One Welfare and Sustainable Development Goals/Global-Health perspectives.

²⁰ Aquatic animals include marine and freshwater fish.

- Fostering international partnerships for sustainable agriculture for food and nutrition security.

The Partnership's objectives fit well with important initiatives and policies of the European Commission/Union:

- The Green Deal of the European Commission, notably the Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, was adopted in 2020²¹. As part of it, the Commission planned to take action to reduce overall EU sales of antimicrobials for farmed animals and in aquaculture by 50% by 2030. The Commission also committed to revise the animal welfare legislation, including on animal transport and the slaughter of animals, to align it with the latest scientific evidence, broaden its scope, make it easier to enforce and ultimately ensure a higher level of animal welfare.
- As part of the Farm to Fork strategy, an Action Plan on the development of organic production was published early in 2021²². It will help to reach the objective of at least 25% of the EU's agricultural land under organic farming by 2030. Animal welfare will also play an important role in livestock and fish organic production.
- The Communication on the Future of Food and Farming²³ referred to "responding to societal expectations regarding food, in particular concerning food safety" ... "The Common Agricultural Policy (CAP) should become more apt at addressing critical health issues such as those related to AMR ... in line with an ambitious and encompassing approach with regard to human and animal health - as embodied by the One Health concept". "Identically the CAP can help farmers to improve the application of EU rules on animal welfare and to further increase standards through voluntary initiatives aimed at promoting the market value of animal welfare both within and outside the EU." The Farm to Fork Strategy recognises the role of the CAP in supporting the transition to sustainable food systems. In the context of and subject to the ongoing legislative procedure regarding the CAP, a new system is envisaged from 2023 whereby Member States will be able to use 'eco-schemes' to support a transition to better animal welfare²⁴.
- In its communication on the European Citizens' Initiative (ECI) 'End the Cage Age'²⁵, the Commission set out plans for a legislative proposal to prohibit cages/crates/stalls/individual pens for a number of farm animals (laying hens, rabbits, pullets, broiler breeders, laying breeders, quail, ducks, geese, sows, calves). The proposal will come as part of the ongoing revision of the animal welfare legislation. The Communication stated that Horizon Europe would help provide decision-makers and actors with additional scientific evidence, not least with the creation of a European Partnership on Animal Health and Welfare to be proposed for the 2023-2024 work programme.

²¹ COM(2020) 381 final

²² COM(2021) 141 final

²³ COM(2017) 713 final

²⁴ The list of potential agricultural practices that eco-schemes could support is available at

https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/factsheet-agripractices-under-ecoscheme_en.pdf

²⁵ https://europa.eu/citizens-initiative/initiatives/details/2018/000004_en

- Replacement, reduction and refinement (3Rs) of animal testing is a long-standing objective of the European Directorate for the Quality of Medicines and Healthcare (EDQM)²⁶. Needs for transition to reduced animal use in medicine development are increasing. On 16 September 2021, the European Parliament has adopted a resolution on plans and actions to accelerate the transition to innovation without the use of animals in research, regulatory testing and education²⁷. In addition, there is the ongoing European Citizens Initiative on a Europe without animal testing, which will likely require new initiatives in this field²⁸.
- AMR is subject to an EU AMR action plan²⁹, with one pillar on research highlighting needs, notably in the animal production sector. A number of the EUP AH&W operational objectives are addressing these needs.
- Regarding the contribution of animal health to the preparedness of countries against cross-border and cross-sector infectious threats to humans, EUP AH&W will seek to cooperate as appropriate with relevant initiatives, in particular in the EU4Health programme, the future 'pandemic preparedness' and the 'One Health AMR' partnerships and the European Health Emergency preparedness and Response Authority (HERA)³⁰.

Animal infectious diseases do not respect frontiers and threaten the lives of animals, compromising their welfare, engender significant production loss, threaten the integrity and diversity of ecosystems, jeopardise the livelihood of farmers and the socio-economy of regions and nations, costing billions of Euros for control and mitigation and place human lives at risk. Therefore, improving animal health and welfare as planned by EUP AH&W will have both direct and indirect impacts on the main cornerstones of Sustainable Development, as well as on most, if not all, of its 17 SDGs but notably on the following ones:

Since the challenges described above are not restricted to the European continent, networking with international projects and initiatives will be sought and international cooperation developed as much as possible. Interaction with international stakeholders such as WOAHA, FAO, WHO and UNEP, as well as international research alliances such as STAR-IDAZ International Research Consortium will enable such cooperation.

²⁶ <https://www.edqm.eu/en/alternatives-animal-testing>

²⁷ <https://www.europarl.europa.eu/news/en/press-room/20210910IPR11926/meps-demand-eu-action-plan-to-end-the-use-of-animals-in-research-and-testing>

²⁸ <https://eci.ec.europa.eu/019/public/#/screen/home>

²⁹ https://ec.europa.eu/health/sites/health/files/antimicrobial_resistance/docs/amr_2017_action-plan.pdf

³⁰ COM (2021) 576 Final

Vision and Ambition of the Partnership

The Vision

The vision of the EU Partnership on Animal Health and Welfare is to provide society with a sustainable livestock production sector. Infectious animal diseases are controlled with appropriate means, antimicrobials are used prudently, and animal welfare is respected in every phase of the production process, until death. This will be achieved through strengthened cooperation between public research and innovation entities, and collaboration with relevant partners, including relevant authorities, the animal health industry and other stakeholders such as NGOs.



The Ambition

The ambition of EUP AH&W is to build a strong research and innovation framework strengthening Europe's capacity to act on a preventive approach and raise healthy animals in sustainable systems that support a high level of animal welfare. It will bring together authorities responsible for and scientists active in the sectors of animal health, animal welfare, public health, food safety, economic sustainability and the environment. It will cover a large area of activities, such as farm management; animal based (welfare) measures; livestock resilience; zoonoses; vector-borne, food-borne pathogens and emerging diseases at primary

production; and other issues such as antimicrobial resistance. The mobilisation of resources from both RPOs and FOs together with EC co-funding will allow to achieve ambitious, cross-cutting, interdisciplinary and coordinated objectives at the transnational level.

The Intervention Logic of the Partnership

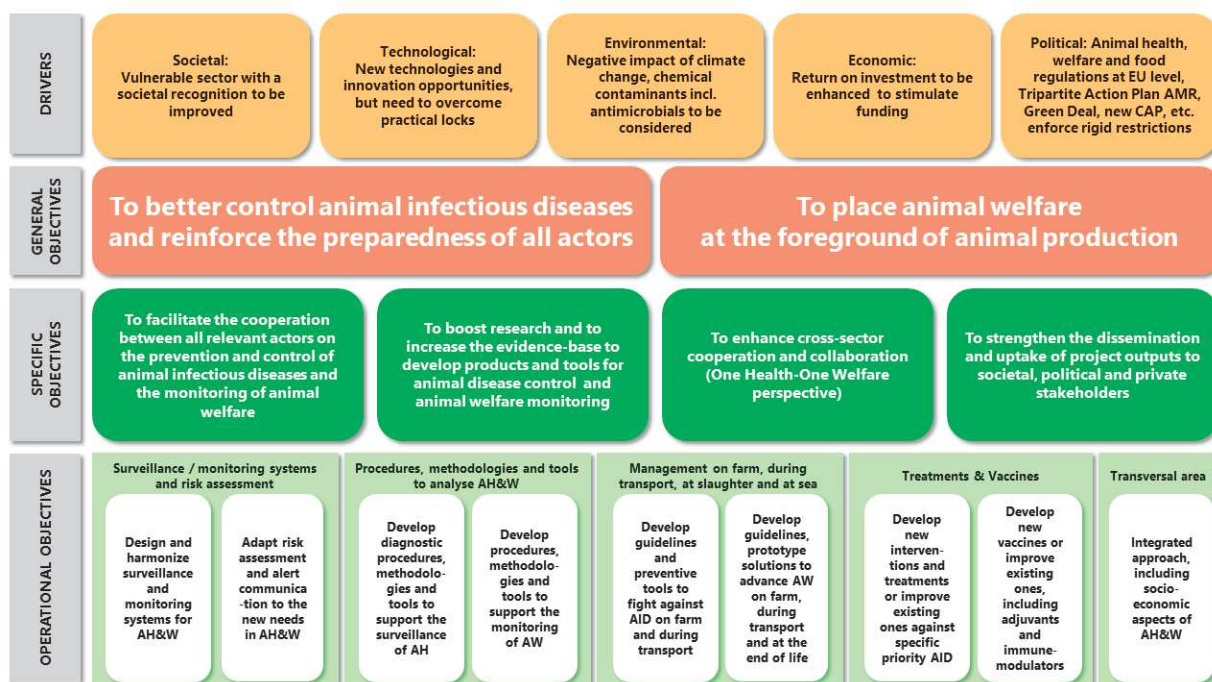
The EU Partnership on Animal Health and Welfare focuses on the following areas:

1. Regulated and emerging diseases for which prevention, monitoring and control have an important policy dimension because of their impact on animal health, food production/safety, regional or global trade and public health.
2. Priority endemic and production diseases, that cause detrimental economic losses to farmers and the animal production sector, may lead to reduced animal welfare, antimicrobial use and, consequently, risk to public health and health of ecosystems. Some of those diseases are often complex to control and some infectious diseases may be notifiable in a number of countries.
3. Animal welfare issues, such as those related to the European citizens' initiative 'End the cage age', in combination with the proposed revision of the European Union legislation on farm animal welfare (due Q4 2023). The aim will be to strengthen the well-being of animals and accommodate animals' needs, as well as meeting societal and political demands for better animal welfare, recognising that animals are sentient beings.

There is a growing interest from the market in animal welfare, including labelling and traceability of products as prioritised in the Farm to Fork strategy of the European Commission. Welfare monitoring and assessment, trade-offs between welfare, farm economy and environmental issues are included in the Partnership's efforts to make livestock production more sustainable, with higher standards of animal welfare. Main strengths of the Partnership Animal Health & Welfare are:

- Bring the main European actors together in a unique AH&W consortium that will support the European livestock sectors.
- Advance AH&W knowledge and perform a responsive, policy driven research.
- Contribute to implement the One Health and One Welfare concept.
- Reinforce the communication, dissemination and exploitation on AH&W to promote the uptake of expected outcomes and thus gain impact.
- Build on and collaborate with existing scientific and professional networks and stakeholders, including other relevant Horizon Europe Partnerships (through links with EU policies and other initiatives) and reach out to private partners.
- Perform both research (internal and external) as well as integrative activities to strengthen the collaboration among the European AH&W actors, to reinforce their preparedness, and to install aligned welfare initiatives.

The diagram below summarises the problems and drivers, as well as the general, specific and operational objectives of EUP AH&W.



The Intervention Logic. Please note that both General Objectives (GO) are related to all the drivers illustrated on top of the figure. Similarly, all Specific Objectives (SO) relate to both GO, and most of the Operational Objectives can be linked to all four SO. As for the expected impact, see paragraph 'The monitoring framework for assessing progress towards the objectives'

The general objectives of the Partnership

GO1. To contribute to better control animal infectious diseases and to reinforce the preparedness of all actors

Improved animal health surveillance, more accurate diagnostics, risk assessment tools adapted to new types of data, modern farming practices including efficient biosecurity management, and new or better vaccines/treatments, will lead to less production loss, decreased use of antimicrobials and reduced AIDs with possibly less spill-over of zoonotic infections and resistant germs to humans.

Suggested indicators:

- Reduced occurrence of some selected AID.
- Reduced use (sales as an estimate) of antimicrobials (especially critically important ones) in livestock/poultry production and aquaculture.
- Reduced burden (e.g. economic, societal) of some selected AID.
- An increase in available integrated data (epidemiological, clinical and genomic) on AID, both endemic and emerging and new ones.

GO2. To place animal welfare at the foreground of animal production

Mitigating or preventing risks to animal welfare addresses societal and political concerns, increases animal resilience to production stressors (including mild pathogenic challenges), and deepens the understanding of the links between animal health and welfare. Research on animal welfare will accompany the implementation and further development of the new European animal welfare legislation. It will also respond to the increased interest of food chain actors and consumers regarding market opportunities for improved animal welfare. Finally, a One Welfare approach will strengthen both human wellbeing and animal welfare and facilitate sustainable livestock production and aquaculture in general. In line with consumer and citizen expectations, measures to support positive welfare will be considered.

Suggested indicators:

- An increase in percentage of available data on trends of animal welfare at farm, transport, at slaughter in the EU for policy, commercial and scientific purposes (EFSA, WOAAH, EU Reference Centres for Animal Welfare).
- Progress in the development of the revision of the animal welfare legislation, and subsequent implementation as measured through a reduction of inadequate husbandry systems and management practices.
- An increase in the number and size of animal welfare labelling systems in Europe, with emphasis on the voluntary industry lead initiatives.

The specific objectives of the Partnership

Based on the general objectives outlined above, the following four specific objectives are proposed.

SO1. To facilitate the cooperation between all relevant actors on the prevention and control of animal infectious diseases and the monitoring of animal welfare

Offering public and private players in the field of animal health and welfare the possibility to set up research and other kinds of integrative activities, training, capacity building and education actions, and to share experience, will lead to a reinforced cooperation that will support the realisation of the general objectives of EUP AH&W.

Potential indicators:

- Evolution of the number of stakeholders that are engaged in the EUP AH&W call organisation and experimental designs (e.g. industry, regulation).
- Evolution of the number of partners and/or countries that express interest in joining the Partnership.
- Expansion of the professional AH&W networks that will be created.

- Number of organizations taking part in joint integrative activities (as confirmed through e.g. MoU's and shared resources/infrastructures/tools such as biobanks), including those involved in e.g. risk assessment, agricultural economy, social sciences, ethology and veterinary issues.
- Number and value of joint integrative activities, other activities, i.e. harmonization of methodologies, ring trials, simulation exercises, labelling systems, short term missions, etc. between organizations and stakeholders, common webinar or meetings to exchange information and results.

SO2. To boost research and to increase the evidence-base to develop products and tools for animal disease control and animal welfare monitoring

Joint transnational research and other research and innovation activities will create new knowledge, methodologies, techniques, procedures, data and databases, models, system designs, insights, networks and products, etc. that will be available for further uptake.

Suggested indicators:

- Number and value of joint transnational calls organised, and number of projects selected for funding on this specific objective.
- Number of scientific papers/communications produced by EUP AH&W.
- Number of novel deliverables (i.e. methodologies, techniques, procedures, data, databases and data share, models, preventive/curative/diagnostic tools, etc.) produced.

SO3. To enhance cross-sector cooperation and collaboration (One Health-One Welfare perspective)

The contribution of EUP AH&W to a multidisciplinary approach across sectors will enable targeted actions contributing to sustain the health and welfare of animals, people and ecosystems. Approaches include e.g. the design and implementation of surveillance and monitoring systems, the harmonization of tools and procedures, the design of husbandry systems and management practices, the alignment of the risk assessment, etc. They will target sectors dealing with animal health and welfare, public health, food safety, farm economics and the environment regarding zoonoses, antimicrobial use and animal welfare.

Suggested indicators:

- Number of initiatives that are set up across sectors, i.e. regarding design and implementation of welfare monitoring and disease surveillance systems, laboratory methods, risk assessment, with EUP AH&W involvement and that support public health.
- Number of cross-sector EUP AH&W outputs, e.g. common publications, workshops, capacity building, etc.
- Number of contributions (e.g. reviews, studies, trials, etc.) from EUP AH&W to wider One Health-One Welfare initiatives like Tripartite + or other.

- Number of common actions with other relevant Partnerships and networks.

SO4. To strengthen the dissemination and uptake of project outputs to societal, political and private stakeholders

Upstream and continuous interaction with stakeholders to identify their needs and demands, general and targeted communication on the outputs of EUP AH&W, both dealing with animal health and animal welfare, dissemination of its deliverables to partners, national and international stakeholders, and to all other possible users, will stimulate their uptake and implementation all over Europe.

Suggested indicators:

- Number of EU reference laboratories for animal health and EU reference centres for animal welfare that implement and use outputs developed by EUP AH&W.
- Use of EUP AH&W outputs in reports/opinions of EFSA, ECDC and EEA, in global reference bodies (e.g. WOAHA, FAO, WHO), in EU regulatory initiatives, EU and MS welfare labelling schemes, regarding treatments/vaccines by the European Medicines Agency (EMA).
- Number of EUP AH&W outputs taken up by livestock industry and other end users: Intellectual Property Rights/ patents/ marketing authorisations secured, filed or granted or in progress.
- Number of guidelines or methodologies taken up by farmer associations or sectors, etc.
- Increase in the number or proportion of research projects from open calls in which an industrial partner is involved, compared to ERA-NETs (target 30%).
- Number of innovations that have been brought to a high(er) TRL (Technology Readiness Level).
- Number of leaflets, newsletters, website visits, meetings and webinars with the contribution or participation of external participants.

The Partnership's Priority Areas

The above mentioned general and specific objectives have been transposed in nine Operational Objectives (see diagram above). In this section, these Operational objectives are grouped in the four high-level Priority Areas defined in the introduction section, i.e. surveillance / monitoring systems and risk assessment; procedures, methodologies and tools to assess AH&W; management on farm, during transport, at slaughter and after fishing; and finally, treatment and vaccines. The priority areas can be seen as successive, multi-disciplinary steps from detection and characterization of health and welfare issues to actions in the field for prevention and recovery.

Please note. For each of the actions a recommendation regarding the corresponding activity is proposed, 1) to indicate if the activity should be of research or integrative nature, and 2) to indicate whether it is a priority, meaning that the activity should be initiated in the first two years of the partnership. The EUP AH&W will consult with the Authorities, Funding and Research Performing organizations (i.e. its Governing Board) to define the specific domains on which the research and integrative work will be based.

Priority Area: Surveillance / monitoring systems and risk assessment for animal health and welfare

For this area there are two Operational Objectives, i.e. dealing with the monitoring and surveillance systems for animal health and welfare, and the methodologies needed for risk assessment, alert systems and communication.

OO1. Contribute to design and harmonize surveillance and monitoring systems for animal health and welfare

Surveillance systems for animal infectious diseases or monitoring systems for animal welfare are the basis of the prevent-detect-respond approach. As defined by the WOAHA Terrestrial and Aquatic Animal Health Code, animal health surveillance aims at demonstrating the absence of infection or infestation, determining the presence or distribution of infection or infestation, or detecting as early as possible exotic or emerging diseases. A surveillance system represents a tool to monitor disease trends, to facilitate the control of infection or infestation, to provide data for use in risk analysis, for animal or public health purposes, to substantiate the rationale for sanitary measures and for providing assurances to trading partners. The type of surveillance to be applied depends on the objectives of the surveillance, the available data sources, and the outputs needed to support decision-making.

For animal welfare, as a starting point for a surveillance system, it is highly relevant to collect data on the overall welfare status of livestock and aquatic animals, as is real time information on the occurrence and prevalence of specific welfare issues. Whilst overall strategic decisions can be taken on the general status of welfare in a region or MS, temporary measures (e.g. regarding transport conditions) or risk-based inspections by competent authorities will benefit from reliable real time information on husbandry circumstances and / or associated welfare

consequences. However, in particular because most data will ultimately be used for benchmarking purposes, it is important that the collection procedures and the type of indicator are standardised. For animal welfare, data collection in a standardised and harmonised way is a key development to do before monitoring and



surveillance systems can be put in place (see OO4). Still, monitoring and surveillance should be addressed and resolved within the lifetime of the Partnership.

Action 1. Optimize and extend to other countries current surveillance systems for animal health and zoonotic infections (***Integrative activity, beyond first 2 years***) and to develop new ones where needed. (***Research, beyond first 2 years***)

Action 2. Set up a European wildlife network (for both terrestrial and aquatic animals), based on existing wildlife disease surveillance and reporting systems, to coordinate and expand their activities, to analyse wildlife populations in Europe, and to analyse what specific data with reference to potential threat to livestock, aquaculture and humans are needed. (***Integrative activity, first two years priority***)

Action 3. Create networks that bring together epidemiology, sequencing data including metagenomics and bio-informatics to integrate in a harmonized and aligned way epidemiological, clinical and genomic data, applicable to both livestock/aquaculture and wildlife. (***Integrative activity, beyond first 2 years***)

Action 4. Surveillance of pathogens of veterinary importance (that are not covered in One Health calls) and their antimicrobial resistance profiles. (***Integrative activity, first two years priority***)

Action 5. Build networks and develop databases for surveillance of livestock and aquaculture, and implement the FAIR principles for the monitoring of (re)emerging animal health and welfare issues, and to develop a hazard monitoring and early warning service. (***Integrative activity, beyond first 2 years***)

Action 6. Create a knowledge platform in the EU with the objective to collect, analyse, share and use integrated scientific and technical data on animal welfare, to support all stakeholders. (***Integrative activity, beyond first 2 years***)

Action 7. Monitor in real time the incidence of specific welfare issues or husbandry conditions that affect animal welfare, to support impact assessment in relation to policy objectives. (***Integrative activity, beyond first 2 years***)

Suggested indicators:

- Number and extent (and evolution) of networks and reports related to surveillance of health and monitoring of welfare in livestock, aquaculture and wildlife.
- Number of guidelines concerning (that include?) genomic surveillance of AIDs or AMR in animal pathogens.
- Number of pilot studies on novel or improved methods and tools for monitoring and surveillance, and number of participants in those studies.
- Number of new databases on AH or AW established.
- Number of dashboards (inventories) with integrated data and functionalities for real-time management implemented.

OO2. Contribute to adapt risk assessment and alert communication to the new needs in animal health and welfare

In addition to surveillance and monitoring, attention should be given to alert signalling, communication and risk assessment. The extensive movement of both livestock and wild animals, their products, other goods and people around the world facilitates the spread of infectious agents, which underlines the need for efficient exchange of health-related information between relevant stakeholders, from local health units to governments and international agencies. Similarly, the changing political, legislative and economic climate related to husbandry conditions and animal welfare will require a constant monitoring of hazard – consequence relations for risk assessment purposes. To share AH&W data in an efficient and sufficiently transparent way and to set up sensitive alert systems, modern platforms, tools and models are necessary, especially when it comes to the inclusion of new kind of data related to genomics and / or sequencing, climate, movements, post slaughter assessments, etc. Coordinated research and other activities will help aligning of existing methodologies and improving them. It will strengthen the preparedness of the partners to prevent and respond to new and emerging animal infections and changing circumstances for animal husbandry, that will support national and EU policy development on AH&W.

Action 1. Improve rapid risk assessment methodologies regarding the economic, social, environmental and cross sectoral consequences of animal health and welfare issues. **(Research, first two years priority)**

Action 2. Study and assess epidemiological associations between human interventions such as hunting, trade, transport, rewilding and translocations of wildlife and disease spread, in order to propose harmonized tools to prevent spread of infections and support alert systems. **(Research, beyond first 2 years)**

Action 3. Adapt existing, or develop new methodologies to integrate genomic surveillance data in risk assessment **(Research, first two years priority)** and to draft risk assessment guidelines **(Integrative activity, beyond first 2 years)** for the integrated use of epidemiological and genomic data.

Action 4. Assess the risk of spread of AMR in veterinary pathogens and genes encoding resistance. **(Research, beyond first 2 years)**

Action 5. Build or further map and coordinate emergency networks for scientists and communities, to increase risk knowledge by systematically collecting data and undertaking risk assessments (availability of risk maps and data, knowledge on hazards and vulnerabilities). **(Integrative activity, beyond first 2 years)**

Action 6. Based on animal welfare surveillance systems (and their evaluation), develop indicators and alarm levels, produce factsheets and any relevant digital infrastructure and methodologies that enable risk assessment of any breach in animal welfare. **(Integrative activity, beyond first 2 years)**

Suggested indicators:

- Number of existing assessment networks, methods, tools, data and protocols mapped, described and analysed.
- Number of new assessment guidelines and models.
- Number of risk assessment dashboards with integrated data and functionalities for real time management implemented.

Priority Area: Procedures, methodologies and tools to analyse animal health and welfare

Many of the currently used detection, monitoring and characterization methods for several health or welfare issues are not optimal and need improvement, and more accurate diagnostic platforms should be developed. Furthermore, standardisation and harmonisation of diagnostic methodologies, capable of detecting, identifying and characterising pathogens (including emerging ones) with high and proven diagnostic reliability (diagnostic specificity and sensitivity in particular) is very important. Similarly, to obtain real-time, quantitative data that correctly and reliably indicate welfare problems requires appropriate and agreed animal based or management-based measures. In addition, for benchmarking purposes across farms or regions, the methodology of assessment needs to be standardised (e.g. in relation to season, time of day, sample sizes, category of animal).

At the same time, new opportunities become available in the form of emerging scientific disciplines and advanced technologies such as data science and bioinformatics, artificial intelligence, OMICS technologies, precision farming technologies and advanced in-line sensory systems at abattoirs and during transport. Such advanced precision farming technologies cannot only detect any new and emerging diseases and welfare hazards, they can also be applied to monitor entrenched diseases or endemic widespread welfare issues. All the above would help transition from a curative approach to the application of more preventive measures with new and improved diagnostics and assessment schemes.

Two Operational Objectives cover the priority area of procedures, methodologies and tools to support the surveillance and monitoring for both animal health and welfare.

OO3. To develop diagnostic procedures, methodologies and tools to support the surveillance of animal health

Action 1. Gain knowledge on priority pathogens (i.e. bacteria, parasites, viruses, fungi, prions, including resistance patterns) and infectious diseases responsible for important economic losses or high risk of transmission to humans, and their detection methods (including metagenomics approaches, molecular markers of interest, etc.) with the aim to identify possible diagnostic markers. **(Research, first two years priority)**

Action 2. Development, optimisation and standardisation of reliable, faster, potentially automatable and/or scalable direct (antigen/genome amplification/detection) and indirect

(detection/immune response) assessment tools/technologies; tools for the rapid detection of drug-resistant bacteria, viruses, fungi or parasites; on-farm, pen-site diagnostics for pathogens and antimicrobial resistance; focus on priority pathogens and those that do not have EURL. **(Research, first two years priority)**

Action 3. Development, optimisation and standardisation of tools to distinguish between (i) infected and vaccinated individuals (DIVA) as well as (ii) presence of unviable or infectious pathogens to study the pathogens' survival in the environment or in effluents and (iii) to study inter-species (including wild animals) circulation of pathogens or resistant variants. **(Research, first two years priority)**

Action 4. Development of quantitative and multi-target diagnostics to identify infection levels and microorganisms that can interfere with decisions regarding the treatment or prevention of enzootic production diseases in livestock and aquaculture. **(Research, beyond first 2 years)**

Action 5. Development of non or less invasive and more convenient sample collection methods, including new matrices as well as sample transport and storage, and corresponding diagnostic tools, also suitable for the detection of diseases in free-ranging or wild animals. **(Research, beyond first 2 years)**

Action 6. Study host-pathogen- environment interactions, i.e. focusing on drivers and markers, on characterisation of microbial ecosystems, on drivers of pathogenicity or resistance. **(Research, beyond first 2 years)**

Suggested indicators:

- Number of scientific publications (general, across pathogen-types, across animal species, considering AH & AW integration, considering One Health).
- Number of new markers for e.g. host response/vaccine efficacy, drug resistance/efficacy, variants, zoonotic potential, infectivity/virulence, etc.
- Number of new diagnostic procedures validated and/or harmonized.
- Number of new reagents / diagnostic kits developed, optimised, automatized and/or harmonised.
- Number of new biobanks, stocks of reference materials, models etc. to be shared with other partners.

OO4. To develop procedures, methodologies and tools to support the monitoring of animal welfare

Action 1. Further develop the research area of 'positive welfare' (including positive emotions), through the identification and validation of animal-based measures (e.g. behavioural, endocrine and neurological indicators). Research will focus on cognition, preference testing and strength of motivation to obtain rewards. **(Research, beyond first 2 years)**

Action 2. Development of technologies on the slaughter line to assess animal welfare on farm and/or during transport. Identification of suitable ABM with appropriate level of validity,

sensitivity and specificity; development of in-line sensors, large scale data collection. **(Research, first two years priority)**

Action 3. Livestock and fish welfare at slaughter and when killing for e.g. disease control and emergency killing; development of technologies, procedures and/or protocols to increase the reliability of methods which assess consciousness and death. **(Research, first two years priority)**

Action 4. Development of ABM to measure negative animal welfare consequences (e.g. pain, fear or discomfort at individual and group level). These could include behavioural measures, but also measures of physiological stress, impact on immune response and omics (e.g. transcriptomics and metabolomics) **(Research, beyond first 2 years)**. Standardisation and integration of these indicators should allow inclusion in welfare assessment tools **(Integrative activity, beyond first 2 years)**, which can be followed up by Activity 7 of OO1 and Activity 6 of OO2.

Action 5. Development of digitally assisted monitoring technologies on farms for increasingly enabling precision management of animal health and welfare. Technology includes visual and auditory surveillance of animal-based measures for welfare, analysing records with deep learning technology, data processing techniques and decision support systems. **(Research, beyond first 2 years)**

Action 6. Development of technologies to assess animal welfare during transport. Affordable and reliable solutions to prevent serious welfare problems through early detection of signals before and whilst in transit, e.g. lameness, lesions, heat stress, aggression, thirst or hunger, exhaustion, etc. Development of sensor technology, data analysis tools, data collection and integration platforms, decision support for the driver; related staff training. **(Research, first two years priority)**

Suggested indicators:

- Number of scientific publications on the assessment of welfare on farm, during transport and at slaughter or stunning and killing after fishing.
- Number of new welfare indicators and markers endorsed by the animal welfare community.
- New guidelines and tools, e.g. for welfare diagnosis, for monitoring positive animal emotions, etc.

Priority Area: Management and husbandry guidelines on farm including aquaculture, during transport and at slaughter

Increased productivity, intensification and stocking density, with the aim to satisfy the global protein demand and act on the climate challenges, brings along an augmented risk of production-related disease and welfare problems, frequently multifactorial in nature, and associated with biogenic factors as well as farming methods and management factors.

Mitigating or removing animal welfare challenges on farm, during transport and at the end of life increases resilience to diseases that impair productivity. In addition, it addresses a growing societal concern about the level of welfare in livestock and aquatic production *per se*. The European Citizen's Initiative 'End the Cage Age' and the EC's intention to revise the animal welfare legislation are strong drivers for change regarding livestock husbandry practices and will have to be dealt with by policy makers as well as the industry in the coming decade and beyond. Research and practical results are needed to facilitate the further development and implementation of these developments and will contribute to reinforce the interest of all food chain actors and of the consumers in a sustainable livestock sector. Research should involve all aspects of the animal's life: on farm, during transport and during slaughter, and it should address the trade-offs that exist between animal welfare, environmental impact and the economy of the production chains.

Two Operational Objectives cover this priority area, i.e. OO5 and OO6.

OO5. To develop guidelines and preventive tools to fight against animal infectious diseases on farm and during transport

Action 1. Establish a multidisciplinary network of experts with focus on biosecurity measures to prevent and control AID on farm and during transport. Draft foresight and priority studies on animal health, public health, pandemics and the role of biodiversity, the changing climate, emerging vectors and vector-borne diseases, bird and fish migrations, epidemiology / modelling, bioinformatics, etc. for all animal species, including minority species and aquaculture. **(Integrative activity, first two years priority)**

Action 2. Reduce the entrance and spread of AID by reinforcing external and internal biosecurity in both terrestrial and aquatic animals, while limiting antimicrobial use, set up innovative systems and models with focus on biosecurity and integrated management. **(Integrative activity, beyond first 2 years)**

Action 3. Perform research on prudent use of antimicrobials: research on treatment concepts for antimicrobial and antiparasitic usage, on alternatives to antimicrobials including feed additives/nutrition, studying improved vaccination strategies, etc.; development of best practices for administration/application of Veterinary Medicine Products (VMP) in livestock and aquaculture production systems. **(Research, first two years priority)**

Action 4. Reinforce animal resilience (the natural ability of animals to withstand pathogens), through fundamental and applied research addressing e.g. animal feeding and breeding. **(Research, first two years priority)**

Action 5. Establish a pan-European network of experts in genetics (breeding), feed additives including pre- and probiotics, applied ethologists, stress physiologists and leading experts in immunology to produce foresight and priority reports on improving animal resilience. **(Integrative activity, beyond first 2 years)**

Suggested indicators:

- Number and evolution of foresight reports
- Number and evolution of collectively endorsed guidelines on biosecurity measures
- Contribution to AM stewardship initiatives
- Number of research projects on animal resilience launched in EUP AH&W
- Number of new concepts / knowledge produced by EUP AH&W and endorsed by breeding companies.

OO6. To develop guidelines and prototype solutions that advance animal welfare on farm, during transport and at the end of life

Action 1. Establish a multidisciplinary network of experts to draft foresight and priority studies with focus on sustainability aspects related to non-cage systems, indoor and outdoor systems for livestock, animal transportation and slaughter, killing on farm, in slaughterhouses or stunning and killing after fishing, and focussing on ending mutilations, including aquaculture production systems. **(Integrative activity, first two years priority)**

Action 2. Perform research on how to improve animal welfare while maintaining or increasing farm economic and environmental sustainability. Aims to develop innovative housing systems and addresses the opportunities and consequences of reducing the use of cages in a sustainable way, in terms of economic and environmental impacts. **(Research, beyond first 2 years)**

Action 3. Perform research on how to improve animal welfare through better understanding of animal cognitive capacities and emotions adapted to each species' needs, opportunities for pain relief, and environmental enrichments technologies. **(Research, first two years priority)**

Action 4. Develop appropriate livestock and fish stunning and killing techniques to limit pain and reduce stress during slaughter after fishing or in the abattoir, as well as during on farm killing for e.g. disease eradication purposes or euthanasia. **(Research, first two years priority)**

Action 5. Develop innovative systems for the transport of livestock and fish. **(Research, beyond first 2 years)**

Action 6. Improve animal welfare through novel husbandry systems including innovative feeding and breeding strategies. Develop nutritional solutions to mitigate prolonged hunger and undesirable behaviours (e.g. broiler breeders, breeding sows) or metabolic and physiological problems (e.g. veal calves, high producing dairy cows). Address the relevance of genetics to reduce wide spread behaviour problems (e.g. tail biting, feather pecking), optimise breeding programmes for welfare (e.g. addressing piglet mortality, leg health issues in broiler). **(Research, first two years priority)**

Action 7. Set up a pan-European network of experimental farms, which will serve as 'beacons' or demonstration facilities for practical solutions to animal husbandry issues. The network

should cover different species including fish, as well as a range of husbandry conditions present in various regions of Europe. ***(Integrative activity, beyond first 2 years)***

Suggested indicators:

- Foresight reports
- Number of management- and resources-based indicators for animal welfare.
- Number of new welfare technologies on farm, during transport and at slaughter.
- Number of welfare technologies brought to higher TRL levels.
- Number of experimental farms being active part of the network

Priority Area: Treatments & vaccines



Vaccination of animals is often the most cost-efficient measure to prevent and control the spread of AID and can be an important tool to reduce the burden of certain diseases and reduce the use of antimicrobials. With modern technologies and vaccine platforms (e.g., mRNA vaccine technology or multimeric scaffold particles) the efficacy of existing vaccines may be further improved. Production of new vaccines and improvement of existing ones will require significant scientific advances, such as new approaches to antigen selection and

production, antigen delivery, improved adjuvants, vaccine administration, and new insights in the immune system function before products can be commercialised.

Research into vaccines and treatments addresses a great number of global challenges. They include e.g. the controlled risk of emerging and enzootic diseases, the limited spreading of resistance against antimicrobials including antiparasitic drugs and the challenge to combine an increasing supply of animal protein with high standards for animal welfare. These broad priorities need to be translated in concrete roadmaps and activities enabling research groups across Europe to turn research results (TRL 2-4) into innovations (TRL 4-7, including proof of concept in target species in controlled challenge and field trials). The innovations should respond to clear market and societal needs and should be the basis for new health applications that reach the market via industrial programs or via the EIC within Horizon Europe.

The following three Operational Objectives (OO7, OO8 and OO9) cover the priority area of interventions, and are described below.

OO7. To develop new interventions and treatments, or improve existing ones, against specific priority animal infectious disease

Action 1. Perform basic research (TRL 1-2) to study interactions between pathogens and host microbiome, focussing on the immune system and trained immunity, and direct or indirect interactions between pathogens (e.g. co-infections), antimicrobial and antiparasitic drugs and

host microbiome, mechanisms of anti-microbial (antibiotic and antiparasitic) resistance, where not covered by EUP AO-AMR **(Research, first two years priority)**

Action 2. Develop tools such as (i) experimental farm approaches; (ii) in vivo, in vitro and in silico infection models for testing efficacy and safety of new drugs with reduced need for animal testing, new drug-delivery devices, therapeutics including leads for new antimicrobials; and (iii) bioinformatic pipelines for analysis of microbiome and pathogen data; this will be done in collaboration with industry, where appropriate. **(Research, first two years priority)**

Action 3. Build on the results of Action 1&2 to develop or improve interventions and treatments and deliver first proof of concept, where appropriate, in collaboration with industry: demonstration of immunogenicity and efficacy (minimum immunizing dose) in target species; representative (small scale) animal (challenge) model (TRL 3-4). **(Research, beyond first 2 years)**

Action 4. In collaboration with industry: bring outputs to higher TRL in early/pre-clinical development (GMP-material; TRL 5-6); (i) for non-food animals: demonstration of efficacy and field safety at large scale in representative animal models or approved alternative methods; (ii) for food animals: lab-scale assessment of animal safety and initiation of environmental safety, user safety, and (if needed) microbiological safety assessments; absence of toxicity/side effects; carcinogenicity studies initiated if needed, and demonstration of efficacy and field safety at large scale in a representative animal model and toxicology studies. Work on TRL 7 to 9 (late/clinical development, marketing authorisation and lifecycle management) will be performed by industry itself. **(Research, beyond first 2 years)**

Suggested indicators:

- Number of evidence-based treatment schedules.
- Number of publications addressing the physiopathology of co-infections.
- Number of novel drugs, immune-modulators, alternatives to antimicrobials.
- Number of devices for individual and group treatment of animals.
- New tools such as improved (and standardized) assays for assessing efficacy and safety of drugs.

OO8. To develop new vaccines or improve existing vaccines, including adjuvants and immune-modulators

Action 1. Study the role of the immune system of farm animals, including the innate immune capacity of new-born animals and using high-end technologies (e.g. transcriptomics/single-cell sequencing); the mechanisms that elicit protective immunity at the entry site, factors affecting immune response to vaccines, mode of action of adjuvants (basic research; TRL 1- 2). **(Research, first two years priority)**

Action 2. Develop tools such as vaccine platforms and expression systems, immunological toolboxes (cell lines, reagents, etc.) and delivery systems, etc.; this will be done in collaboration with industry, where appropriate. **(Research, first two years priority)**

Action 3. Build on the results of Action 1&2 to develop or improve vaccines and immune-modulators and deliver proof of concept: demonstration of immunogenicity and efficacy (minimum immunizing dose) in target species; representative (small scale) animal (challenge) model (TRL 3-4) or approved alternative methods; this will be done in collaboration with industry, where appropriate. **(Research, beyond first 2 years)**

Action 4. In collaboration with industry: bring outputs to higher TRL in early/pre-clinical development (GMP-material; TRL 5-6); (i) demonstration of animal safety in target and non-target species; and (ii) demonstration of efficacy in a representative and validated target animal challenge model. Work on TRL 7 to 9 (late/clinical development, marketing authorisation and lifecycle management) will be performed by industry itself. **(Research, beyond first 2 years)**

Action 5. Develop methods and procedures for comparative evaluation of clinical efficacy of veterinary antimicrobials to feed into antimicrobial guidelines and policies. **(Integrative activity, first two years Priority)**

Suggested indicators:

- Number of models, immunological and computational tools.
- Number of publications regarding a better understanding of the immune response of targeted animals.
- Number of potency tests to evaluate efficacy of vaccines (3Rs).
- Number of new pilot vaccines and adjuvants developed.
- Number of vaccine platforms, platforms for antigen discovery, production and delivery.
- Number of new or improved delivery systems.
- Number of new immune-modulators developed.
- Number of procedures for comparative evaluation of clinical efficacy of veterinary antimicrobials.

Transversal Priority Area: Integrated approach, including socio-economic aspects of animal health & welfare

This priority area consists of one Operational Objective OO10 on socio-economic aspects, which cannot be seen independently from the other Operational Objectives. The socio-economic research and integrative activities that will be developed will be embedded in the other priority areas. They will cover the surveillance and monitoring systems, the diagnostics for health and assessments for welfare, risk assessment and management, etc. In particular, this transversal priority area will look at any potential trade-offs that may exist between the improvement of animal health and animal welfare through new production methods on one hand, and the environmental and societal impact on the other hand. Therefore, these activities will support AH&W policy making and the sustainability of the European livestock industry.

In some of the Operational Objectives and Actions above reference is made to socio-economic aspects. Here, the emphasis is put on the general dimension and added value of a socio-economic approach in all priority areas of the EUP SRIA.

OO9. To develop an integrated approach on animal health and welfare including socio-economic aspects

Action 1. Assess the economic and societal burden of selected priority diseases (including resistant pathogens), including their control (e.g. cost-benefit of different surveillance components and risk mitigation options). **(Research, first two years priority)**

Action 2. Assess the socio-economic consequences of the possible changes in livestock and fish farming that may result from e.g. changes in citizen demand regarding animal welfare or that may be an effect of new legislative requirements. **(Research, first two years priority)**

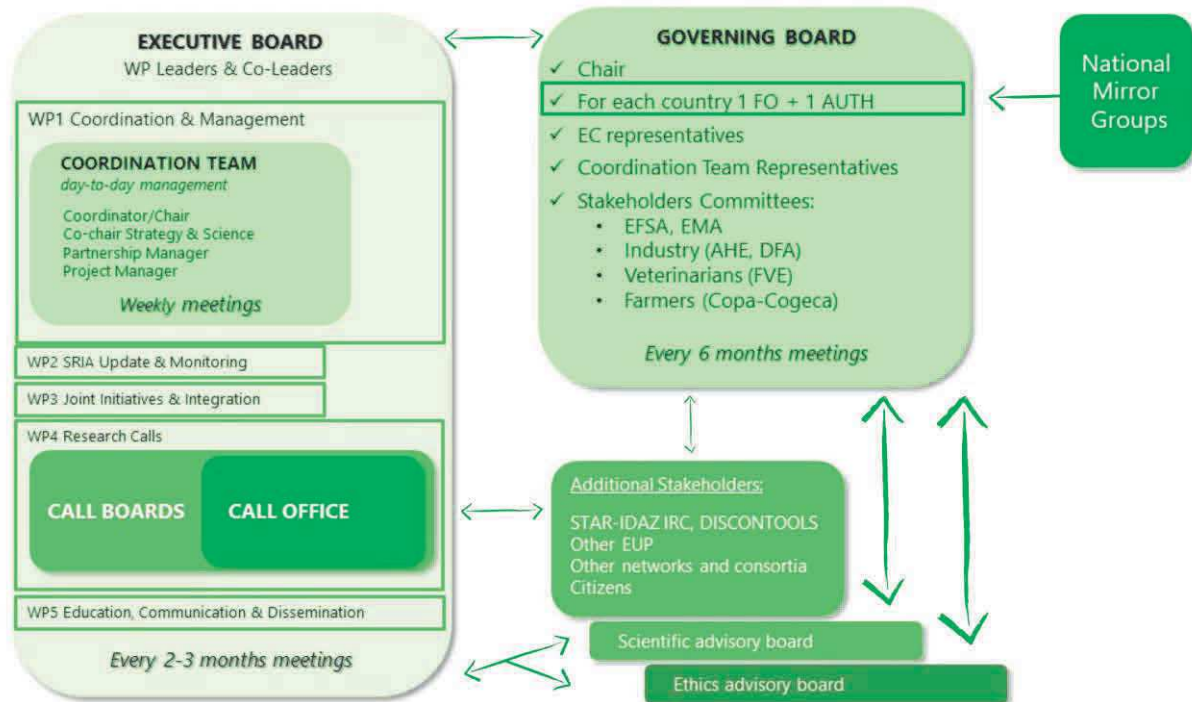
Action 3. Set up social science studies among farmers, consumers and other actors along the production chain on their behaviour (also in relation to AM use) to maintain and improve animal health and welfare, including consumers' willingness to pay for improvements; incentives and barriers to adopt innovations and practices including health- and welfare labelling schemes. **(Research, first two years priority)**

Action 4. Develop appropriate solutions to facilitate the integration of AID mitigation measures and improved animal welfare and resolve potential trade-offs in the overall context of sustainable livestock production and aquaculture in the EU. **(Research, beyond first 2 years)**

Action 5. Develop integrated strategies for policy development regarding the control of diseases, including emergency situations regarding animal diseases and zoonoses. This should take into account relevant criteria, such as the epidemiological situation, the cost vs benefits, etc., and will support decision making by national and international risk managers and other relevant stakeholders. **(Integrative activity, beyond first 2 years)**

Suggested indicators:

- Number of scientific publications on socio-economic studies related to health and welfare.
- Number of data available about the costs of AID to leverage funding.
- Number of new animal welfare labelling schemes initiated by MS and / or industry.
- Number of policy briefs on intervention strategies.



The proposed Organization and Governance of the Partnership

The **Governing Board (GovB)** is the decision-making body of the EUP AH&W that meets every 6 months. It is composed of

- representatives of each beneficiary country who signed the Grant Agreement. For each participating country, two representatives (one FO and one Authority) designated by their national mirror group (if existing).
- representative of the responsible EC-Directorate General.
- European Food Safety Authority (EFSA).
- European Medicines Agency (EMA).
- the industry (Animal Health Europe (AHE) and Diagnostics for Animals (DFA)).
- veterinarians (Federation of Veterinarians of Europe FVE).
- farmers (Copa-Cogeca).
- representatives of the Coordination Team.

The GovB decides on the activities (see below 'strategic document') that should be implemented, the annual Work Programme (WPR, deliverables of the partnership) and the related budget to achieve the partnership's objectives. Other responsibilities of the GovB include partnership membership and a role in arbitrage in case of complaints about the call procedure. The GovB appoints a chair and a vice-chair representing the partnership as necessary.

The **Executive Board (EB)** implements the actions approved by the GovB and will meet every 2-3 months (or when needed). In accordance with the EUP AH&W SRIA and the WP description, it proposes activities bundled into a 'strategic document' to the GovB. This strategic document will include (1) suggested domains of activities (overall scope, not specific topics or activities) and their assignment to the internal programme (integrative or joint activities) or research (internal or external calls), (2) a proposed budget, and (3) a proposed timing of implementation. The EB will execute the decision of the GovB on the proposal of the strategic document, the activities that should be included in the WPR and the related budget. The Executive Board discusses the results/impact of the EUP and prepares a document to present to the GovB. This document contains an overview of the results/outputs and impact and suggests actions to be prepared and executed by the **WP Education, Communication and Dissemination** (both internal to the beneficiaries as external (e.g. to stakeholders and the general public).

Each WP is represented in the EB:

- The **WP Coordination & Management** is responsible for the overall coordination and day-to-day management. It also takes care of legal tasks, like the Consortium Agreement's updates and amendments to the Grant Agreement. It comprises the Coordinator, a co-chair Strategy & Science, a partnership manager and several project

managers in its Coordination Team who meets frequently (weekly). Other members of this WP include financial officers, administrative assistant, UGent EU-Team members, legal and innovation officers. This team has expertise in administrative, legal and financial EU project management.

- The **WP SRIA Update and Monitoring** provides proposal of activities to be scheduled in the WPR based on the SRIA and the WP description of the partnership. When necessary, it proposes updates to the SRIA. It does this based on input received during interactions with the members of the EUP (FO and RPO), the stakeholders and the Scientific Advisory Board. To facilitate these interactions, they are supported by WP Education, Communication and Dissemination. The WP SRIA Update and Monitoring monitors at the level of the whole partnerships which indicators, impacts and results in relation to the objectives of the EUP have been reached and if the SRIA/WPR needs an update and reports to the EB.
- The **WP Joint Initiatives and Integration** is responsible for the activities in the internal program. This WP is responsible for drafting an "invitation to collaborate" to the RPO in the EUP and may seek advice from the stakeholders and Scientific Advisory Board. It consults the RPO of the partnership on their interest to contribute to the proposed activities and on the proposed budget. It provides a proposal of internal RPO who will perform the activities to the Executive Board who will approve or adapt. The final consortium of RPO needs to be approved by the GovB.
- The **WP Research Calls** is responsible for the internal and external research calls. For *internal calls*, the **Call Board** is composed of the WP Research Calls Lead and authorities. It defines specific topics and call text and monitors progress and outputs (milestones and deliverables) of Partnership projects until the final report. For *external calls*, the **Call board** is composed of the WP Research Calls Lead and FO who wish to fund the activities/topics in the call. It defines specific topics and call text and monitors progress and outputs from projects until final report. For both internal and external calls, the **Call Office** organises the calls (announcement, submission, reporting). The WP Research Calls monitors the results of individual projects and provides an overview of the milestones & deliverables and results/outputs generated in individual projects and presents this to the WP SRIA Update and Monitoring and to the EB.
- The **WP Communication, Dissemination, Exploitation and Capacity Building** will contribute to strengthening European collaboration and achieving scientific excellence in the related domains. Developing and applying a dynamic and flexible approach, it will support to maximise the utilisation of the achievements not only by direct potential beneficiaries but also by further stakeholders, policy and decision makers, and other researchers to generate new cycles for innovation. It will raise societal awareness on the impact of the research carried out in the framework of this partnership.

The **Ethics Advisory Board** are independent, external observers consulted for all potential issues of conflict of interest.

The Monitoring Framework for Assessing Progress towards the Objectives

The monitoring of the progress of the activities within the research and non-research projects will be done through the production of reports, databases, procedures, etc., which are deliverables that the corresponding work packages will monitor. Being a strategic document, this EUP SRIA does not contain specific deliverables but describes the planned actions that are linked to the Partnership's operational objectives. The EB will monitor the progress of the research and non-research (i.e. reference, integrative and joint) achievements of the Partnership for each of the priority areas (i.e. surveillance / monitoring and risk assessment of animal health and welfare; procedures, methodologies and tools to analyse AH&W; management and husbandry guidelines on farm, during transport, at slaughter and at sea; and treatments and vaccines), which are linked to the operational objectives. To measure the effect of the actions and activities, their outcomes must be disseminated and exploited first. The possible uptake, diffusion, deployment, and/or use of the project's results by direct target groups will be encouraged, facilitated where possible, and followed up through a convenient monitoring tool in close collaboration with the appropriate work packages.

Under the chapter 'The Intervention Logic of the Partnership' indicators for the general, specific and operational objectives are proposed. The most appropriate and feasible KPI will be selected (amongst suggested indicators for each OO) and new ones may be proposed. The data source will be identified and the KPI will be calculated. In addition, the EC Services made certain general KPI mandatory for all EUP.

The Partnership should make progress everywhere in Europe and in all priority areas. To this end, criteria must be established in addition to the even distribution across the operational lines, for instance the even geographic spread of the activities across Europe, the involvement and engagement of all partners in the activities, the balanced involvement of not only RPO, but also FO and authorities, work on terrestrial animals and aquaculture, incl. minority species, etc.

The procedures that identify all actors and that describe their interaction in order to monitor the progress of the Partnership activities are planned.

Expected outcomes of priority activities (first 2 years of the Partnership)

The main expected outcome of the EUP AH&W is an integrative approach to animal health and animal welfare in Europe, during its lifetime and even beyond. “Integrative” means to bring together actors from different backgrounds (citizens, farmers, scientists, economists, etc...) to share their views, data and developed benefits. For instance, by the end of the Partnership it is expected that within the animal welfare area a common terminology, standardised and agreed indicators are defined for data collection and that methodologies & network are established for further monitoring and surveillance in the EU has learned a lot from the methodologies, networks, etc. of health, and that a common terminology will be used. The construction of this AH&W continuum is a strong expectation from the Partnership. Another likely outcome is the balanced integration of socio-economics aspects in all the priority areas, from surveillance and monitoring, diagnostics and assessment, risk assessment and intervention methodologies. This means that future uptake of the Partnership results will be driven by this reinforced, interdisciplinary culture.

In the table below are listed main expected outputs and outcomes from the activities that have been listed as a priority for the first 2 years.

Surveillance /monitoring and risk assessment

| EXPECTED DELIVERABLES | EXPECTED OUTCOMES |
|---|--|
| Coordinated European network(s) established for mapping selected terrestrial and aquatic wildlife species, including their main infectious diseases and resistance profiles of animal pathogens. | Based on the surveillance of priority wildlife populations, their infectious diseases and resistance profiles of animal pathogens, the risk of infecting production animals can be assessed. |
| Coordinated European network(s) established in livestock for mapping selected animal pathogens and their resistance profiles. | Based on the surveillance of priority animal pathogens and their resistance profiles, the risk of emergence in production animals and humans can be assessed. |
| Improved rapid risk assessment methodologies regarding the economic, social, environmental and cross sectoral consequences of animal health and welfare issues. | The improved rapid risk assessment methodologies allow to determine the economic, social, environmental and cross sectoral consequences of animal health and welfare issues. |
| Adapted and newly developed tools that allow the integration of genomic surveillance data in risk assessment methodologies. | New risk assessment methodologies that integrate genomic surveillance data allow to improve the risk assessment of current surveillance systems. |

Procedures, methodologies and tools

| EXPECTED DELIVERABLES | EXPECTED OUTCOMES |
|---|---|
| Scientific peer reviewed publications on priority pathogens responsible for important economic losses or high risk of transmission to humans, and their detection methods. | Based on the better understanding of the pathogenesis of animal pathogens, new diagnostics for their detection and characterization are developed. |
| New tools are available for the direct and indirect assessment of pathogens, for the rapid detection of drug-resistant bacteria, viruses, fungi or parasites, and for their on-farm detection and characterization. | The newly developed tools and procedures allow the faster and more reliable detection of animal infectious diseases. |
| New tools are available to distinguish between (i) infected and vaccinated individuals (DIVA) as well as (ii) unviable and infectious pathogens and (iii) to study inter-species circulation of pathogens or resistant variants. | The newly developed tools and procedures allow a better estimation of the risk related to diagnostic results, and therefore the most appropriate action to take. |
| New technologies on the slaughter line to assess animal welfare on farm and/or during transport, including the identification of suitable animal-based measures and in-line sensors. | The slaughterhouse tools lead to a straightforward methodology that allows the realistic assessment of the welfare of animals on farm and during transport, which makes corrective measures feasible. |
| New technologies and methodologies for application at slaughter and after fishing to better assess consciousness and death of animals at the end of life. | New tools to optimally assess the consciousness at stunning and killing phase allow to take appropriate measures and protect animal welfare at slaughter and stunning and killing after fishing. |
| New technologies and tools to assess animal welfare during transport through early detection of signals before and whilst in transit. | New developed tool applied during transport to and transit in the slaughterhouse lead to specific measures that improve the welfare of the animals. |

Management and husbandry guidelines on farm, during transport, at slaughter and at sea

| EXPECTED DELIVERABLES | EXPECTED OUTCOMES |
|--|--|
| A multidisciplinary pan-European network of experts with focus on biosecurity measures to prevent and control AID on farm and during transport. | The biosecurity experts collect available functional tools, procedures and methodologies, and perform foresight studies on animal and public health, and taking into account drivers like loss of biodiversity and climate change. |
| Scientific peer reviewed publications on the prudent use of antimicrobials, on alternatives to antimicrobials and on best practices for administration of Veterinary Medicine | Based on a better knowledge, antimicrobials and other veterinary products are more prudently used, and alternatives for antimicrobials are widely evaluated for use in production animals. |

| | |
|---|---|
| Products (VMP) in livestock and aquaculture production systems. | |
| Methods to reinforce animal resilience, e.g. through animal feeding and breeding technologies, are developed. | New breeding and feeding techniques are evaluated for use in livestock. |
| A multidisciplinary network of experts to draft foresight and priority studies with focus on sustainability aspects and focussing on ending mutilations. | Outcomes will benefit the entire livestock sector in general and animal welfare particularly, by strongly reducing mutilation. |
| Scientific peer reviewed publications on animal cognitive capacities and emotions, opportunities for pain relief, and environmental enrichments technologies. | Improved understanding of positive welfare will lead to more effective measures to improve animal welfare. |
| Newly developed livestock and fish stunning and killing techniques to limit pain and reduce stress during stunning and killing after fishing or in the abattoir. | Improved methodologies and techniques to end the life of animals not only leads to less suffering, but increases the acceptability of the citizens. |
| Novel husbandry systems including innovative feeding and breeding strategies. | Advanced husbandry systems that mitigate undesirable behaviours etc. are profitable to the welfare and acceptance by the citizens. |

Treatment and vaccines

| EXPECTED DELIVERABLES | EXPECTED OUTCOMES |
|---|--|
| Increased knowledge in host pathogen interactions (e.g. microbiome, immune response and co-infection) and their modulations by antimicrobial and antiparasitic drugs. | Updated training of young scientist. |
| New tools to mimic infections at the farm, in vivo, in vitro and in silico and to evaluate new drugs efficacy. | Better insight in evaluating new drugs with a reduced use of animal experiments. |
| Better understanding of protective immunity in order to improve response to vaccines and choice of better adjuvants | Good basis to facilitate uptake by the industry in the course of vaccine development. |
| In collaboration with industry, developed tools such as vaccine platforms and expression systems, immunological toolboxes (cell lines, reagents, etc.) and delivery systems. Similarly developed methods and procedures for comparative evaluation of clinical efficacy of veterinary antimicrobials to feed into antimicrobial guidelines and policies. | Through private/public collaboration fasten the process of vaccines development or new drug efficacy evaluation. |

Integrated approach

| EXPECTED DELIVERABLES | EXPECTED OUTCOMES |
|--|--|
| Data about the economic and societal burden of selected priority diseases and their control. | Boost in interdisciplinary publications with data about the economic and societal burden. |
| Data on the socio-economic consequences of changes in livestock and fish farming practices resulting from citizen demand or new legislative requirements. | Uptake by the authorities of the socio-economic aspects of any changes imposed on farming practices. |
| Data about consumers' willingness to pay for AW and AH improvements, incentives and barriers to adopting innovations and practices such as welfare labelling schemes. | Integrated view of the social acceptability of any changes in farming practices. |

Expected impact

By pursuing the objectives and related activities, the partnership will leverage efforts across countries, sectors and disciplines that will allow achievement of the following key expected impacts.

Scientific impact

- Improved coordination of all actors in animal health and welfare, public health and the environment.
- Increased and aligned investments in research and innovation, infrastructures, education and training, and services in animal health and welfare.
- State-of-the-art science to improve animal health and welfare, and protect public health

Societal impact

- Increased food safety and security, and reinforced capacity of the livestock sector to meet the objectives of related political priorities.
- Improved protection of public health by the improved capacity to reduce zoonoses and reduce inappropriate use of traditional antimicrobials.
- Improved preparedness of all actors and stakeholders and provision of means for farmers and other actors to manage their activities in a way to prevent and control AIDs.
- Improved societal perception of animal production by better addressing animal welfare across the entire chain.

Economical / Technological impact

- Contribute to a more healthy and resilient livestock and aquaculture sectors.
- Create a more dynamic animal health care system/ chain involving a continuum of actors from farmers to veterinarians, scientists, the industry and the consumer.

- Protect economic viability and sustainability of livestock and aquaculture farming systems.
- Uptake by all actors of tools and methods to prevent and control animal infectious diseases and strengthen animal welfare.

Link with other Horizon Europe Partnerships

The Management of EUP AH&W is in contact with the following European Partnerships that are planned under cluster 1 (Health) and cluster 6 (Food, Bioeconomy, Natural Resources, Agriculture and Environment) and that may develop activities related to livestock and aquaculture, animal health and welfare, and the prudent use of antimicrobials. The purpose of such inter-partnership cooperation is, in a common approach, to define the Partnership's boundaries and maximally align their activities, to avoid duplication of work and explore possible synergies.

The following types of collaboration and interactions with these partnerships are considered: a coordinated engagement with the livestock and aquaculture sector and with the general public (citizens science), parallel, aligned and complementary research calls. Mutual participation in stakeholders committees, 'shared' experts in advisory boards, exchange and dissemination of research results, the organization of common events, the organization of common knowledge hubs including various sectors: farmers, vets, feed and other industry, etc. The precise mechanisms of cooperation will be established once the partnerships are operational.

On-going and upcoming partnerships under cluster 6:

- The partnership 'Accelerating farming systems transition: agroecology living labs and research infrastructures' will develop and promote innovative agroecology methods that should lead to a reduced use of antimicrobials, enhanced animal welfare and improved safety of animal effluents used as fertilizers. Because the concept of agroecology is tightly linked to animal health and welfare, synergies between the two EUP will ensure their common success.
- The partnership 'Sustainable food systems', among other areas of work, pays attention to the primary production, both for livestock and aquaculture, as providers of safe food.
- The partnership 'Rescuing biodiversity to safeguard life on Earth' (Biodiversa Plus) is developing activities in the areas of loss of biodiversity, changing wildlife habitats and possible consequence for spread of infectious animal diseases in livestock and the human population.
- To a lesser extent, the partnerships for 'Agriculture of Data', for 'A climate neutral, sustainable and productive Blue Economy', and 'Water security for the planet' (Water4All) plan activities that are potentially related to animal health and welfare.

Upcoming partnerships under cluster 1:

- Discussions to align strategies and activities with the management of the future partnership on One Health-AMR are ongoing. In general, in EUP AH&W antimicrobial resistance in non-zoonotic, veterinary pathogens for livestock will be studied, as well as the spread of resistance to livestock and the assessment of alternatives for the use of antibiotics.
- To a lesser extent, the partnership on Pandemic preparedness and the Innovative Health Initiative Joint Undertaking, a public-private collaboration that enhance the uptake of research outcomes and innovations, are of particular interest to EUP AH&W.

Update of the SRIA

This SRIA will be updated during the lifetime of the Partnership as appropriate, in particular to take into account any new scientific (such a new emerging virus) or regulatory event (such as new constraints on export in relation to some infectious agents) that might impact the priority domains of the EUP AH&W. Depending on the available cash and in-kind budget and the progress the Partnership will make, the actions will be covered by different types of activities and outputs delivered, meaning that the EUP SRIA will need to be revised at the end of the Partnership. The decision to modify the SRIA should be taken by the Governing Board, probably with advice and recommendations of the Stakeholders Committee (SHC) and the experts of the Scientific Advisory Board (SAB). The Work Package 'SRIA Monitoring & Update' will have the lead in this process.

Although the actual EUP SRIA (spring 2023) encompasses all currently identified gaps in the AH&W domains, there will be the need to update the document to e.g. the evolving epidemiological situation, upcoming crisis, changes in political structures and policies, etc. At mid-term and at the end of the Partnership, the Executive Board plan to consult the Governing Board and the Stakeholders Committee during their regular contacts. In addition, as epidemiological, policy or other conditions may change, the above-mentioned boards may suggest the EB to amend the SRIA. Similarly, the scientific community of the EUP AH&W might alert the EB about new pressing needs to be covered to meet the ambition of the EUP AH&W.

For each of the updates, a gap analysis will be set up to compare the planned EUP AH&W objectives and the expected results and outcomes of the on-going and finalized projects. This analysis will identify objectives that have to be included in the subsequent, amended SRIA. In addition, an online survey will be set up among a broad AH&W audience, including regional, national and international contacts (for instance experts that were consulted in a previous SRIA version, the country AH&W mirror groups, etc.) to obtain recommendations for improvement. Based on the outcome of the Governing Board, Stakeholders Committee and Scientific Advisory Committee consultation, the gap analysis and the survey, the EUP

SRIA will be amended. Any updated SRIA will be an EUP deliverable and will feed into future post-EUP AH&W research agenda.

Annex – Initial proposal

[The initial proposal for the Partnership \(April, 2022\)](#)