A report produced for AnimalhealthEurope

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Animal health:
Towards a more resilient and sustainable future for Europe

About this report

Oxford Analytica is providing a quantitatively informed report that analyses sustainability–related benefits of strong animal health performance in Europe for AnimalhealthEurope. This report presents findings –– examining associations between health, productivity and sustainability –– from three case studies in selected animal species and countries in Europe.

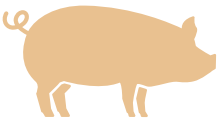
Contents

Executive summary

This report examines the relationship between animal health and the environment, economy and society in Europe, quantifying the benefits of holistic animal health care and associated sustainability–related benefits.

This report features three case studies examining selected livestock species in specific countries (pigs in Germany, cattle in the United Kingdom and poultry in France). Key findings from the case studies **(Figures 1–5)** include calculated estimates on the reduction of food production and supply from an additional case of disease, livestock savings from higher vaccinations rates and the impact of disease on production efficiency and emissions.

Key findings



- Oxford Analytica's modelling indicates that each additional case of disease (in higher income countries) is associated with a decline of 0.985 tonnes in pork production. Given that 22,000 cases of PRRS were recorded in Germany in 2015, this suggests a potential cumulative loss of around 21,700 tonnes of pork production in the following year (Figure 1).

- A modelled vaccination rate scenario for Germany's pork industry finds that doubling the PRRS vaccination rate to 40% from an estimated baseline of 20% would decrease livestock death by 11% (Figure 2). The pork production saved is valued at around EUR8.3 million and translates into 65.6 million servings of pork.

- From a resource perspective, this reduction in mortality is particularly significant. When animals die from disease before reaching slaughter weight, the feed they have consumed and the land required for feed production are effectively wasted. By preventing these premature deaths, approximately 21.9 million kg of feed and 71 thousand square meters of land are conserved, as these resources are instead utilised by pigs that survive to slaughter and thus contribute to actual meat production.

- A modelled disease prevalence scenario for the United Kingdom finds that shifting from a low–infected foot–and–mouth disease (FMD) dairy cattle herd to a completely noninfected herd leads to an increase in milk yield production by an estimated 25 thousand litres (Figure 3). This is equivalent to 36 million kg carbon emission equivalent (kg CO2–e), or approximately the emissions from a single economy passenger taking almost 188 thousand plane rides between London and New York City.

- The global highly pathogenic avian influenza (HPAI) outbreak in 2022 led to an estimated cumulative loss of around 1.4 million tonnes in poultry meat production in France. Oxford Analytica's modelling indicates that each additional case of disease (in higher income countries) is associated with a decline of 0.089 tonnes in meat production for the following year. If applied to the global highly pathogenic avian influenza (HPAI) outbreak in 2022, this suggests a potential cumulative loss of around 1.4 million tonnes of poultry meat production in France in the following year (Figure 4).

- Among French poultry populations, higher vaccination rates are associated with a lower estimated loss of life. By increasing vaccination rates to 30% from the baseline 20%, 16 million meals could be saved (Figure 5). Given that the cost of whole broiler meat was EUR2.2/kg in France in 2021, preventing deaths would result in an estimated savings of EUR5.5 million.

- In terms of resources, this saves an estimated 81 thousand square meters of land and 5 million kg of feed, otherwise wasted on diseased livestock (Figure 5).

Introduction

Prevention, preparedness and control

Addressing a knowledge gap

The European Commission's Vision for Agriculture and Food, a roadmap of farming and agri–food sector priorities to 2040, has declared its commitment to ensuring food security and affordability.

Animal health is intrinsic to promoting resilience and sustainability throughout the livestock production value chain within the agricultural economy, while also supporting broader social goods.

Healthy animals produce animal–sourced foods –– such as milk, eggs and meat –– more sustainably by requiring less resource input to maintain consistent yields. This helps to cut costs for producers, reduce greenhouse gas (GHG) emissions, and increase efficiency and sustainability.

However, there is a need to assess the specific contributions that holistic animal health care, through disease mitigation and prevention, makes to economic, environmental and social aims in Europe. Insufficient data and research have limited the ability to quantify the extent of these benefits.

This report addresses this knowledge gap to develop broader understanding of the relationship between animal health and the economy, environment and society in Europe. The three case studies included in this report calculate estimates that show associations between improved livestock health and production, efficiency and sustainability outcomes.

These findings point to how strong animal health performance benefits Europe's commitment to ensuring food security and affordability, promoting resilience and sustainability within its agricultural economy, in line with shared climate objectives.

Promoting disease prevention for increased sustainability in livestock farming

Promoting sustainability in livestock production through increased disease prevention is critical to de–risking the transition to a low–carbon economy.

Animals that achieve peak production more efficiently reduce the intensity of resource use (feed, water and energy) per unit of output. Animal health interventions, such as medicines and preventative treatments like vaccines, support efficient production, with reduced GHG emissions as an associated environmental benefit.

One Health approach

The World Organisation for Animal Health (WOAH) estimates that animal diseases cause one-fifth of total global livestock production losses each year[1].

The rising trend towards farming practices, where farms with fewer animals are depended upon to produce enough food, necessitates strong oversight in the face of high-impact animal diseases and pathogenic threats.

Food safety and quality are essential to mitigate risks of non-human to human disease transmission. The UN Food and Agriculture Organization (FAO) estimates that 60% of all human infectious diseases originate in animal populations, while an estimated 75% of diseases jump between species[2]. Moreover, 72% of such emerging infectious diseases in animal populations originate from a wildlife source[3].

Appropriate risk management and preventive measures are needed to respond to specific animal health issues. This aligns with the EU's stance towards the One Health approach, which the One Health High-Level Expert Panel (OHHLEP) defines as an integrated approach that balances the health of animals, people and ecosystems[4].

Strong animal health practices protect food safety and security, thus preserving Europe's market integrity and trade policy, and overall economic opportunity for stakeholders in the agri-food sector.

Supporting livelihoods of farmers and producers

The agricultural sector employs 8.7 million Europeans, while an estimated 17 million Europeans contribute to the labour force in some capacity. Livestock production is a major economic force within the sector, as animal-sourced foods and products account for 45% of the total agricultural production value[5].

The EU boasts high rates of self-sufficiency in animal-sourced food products. The agricultural sector has been able to shift its production patterns in response to changes in domestic and global demand through efficiency gains, made possible in part by strong animal health practices. This is seen in visible trends of continuous improvement towards self-sufficiency in the meat sector, as well as a stable output of dairy products[6].

For example, the EU has steadily increased its production levels of poultry products to supply increasing domestic and export demands, while also acting as a reliable net exporter of eggs and dairy products.

1 World Organisation for Animal Health (WOAH), https://www.woah.org/en/what-we-do/animal-health-and-welfare/
2 United Nations Food and Agriculture Organization (UNFAO), https://www.fao.org/one-health/en
3 WOAH, https://www.woah.org/en/what-we-do/animal-health-and-welfare/wildlife-health/
4 One Health High-Level Expert Panel (OHHLEP) (2023), https://cdn.who.int/media/docs/default-source/one-health/ohhlep/one-health-definition-and-principles-translations.pdf?sfvrsn=d85839dd_5&download=true
5 Federal Office for Agriculture and Food (BLE), Germany (2019), https://scar-europe.org/images/CWG-SAP/BLE_CASA_STUDY.pdf
6 European Commission (2023), https://agriculture.ec.europa.eu/system/files/2023-11/efscm-assessment-autumn-2023_en.pdf

Securing food availability and affordability

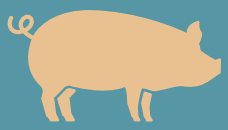
Given that animal–sourced protein provides more than half of the total protein content of European diets, consistent levels of animal–sourced food production are critical to meeting nutritional needs[7]. This helps achieve societal goals, such as eliminating hunger and promoting health and well–being, as outlined in the UN's Sustainable Development Goals (SDGs)[8].

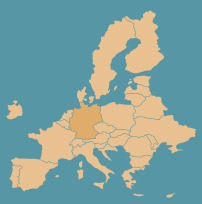
Europe relies on healthy animal populations to maintain the level of productivity its agri–food system is known for. Indeed, Europe is the largest agri–food exporter in the world, with a trade surplus reaching EUR70bn in 2023[9] [10].

Strong animal health performance improves livestock production efficiency, causing a positive chain reaction –– a more resilient and sustainable food supply that benefits the environment, economy and society.

7 European Commission (2020), https://agriculture.ec.europa.eu/media/news/commission–publishes–external–study–future–eu–livestock–2020–10–14_en
8 United Nations Department of Economic and Social Affairs (UNDESA), https://sdgs.un.org/goals
9 European Commission (2024), https://agriculture.ec.europa.eu/document/download/b2e5ee02–4a25–4a6b–9663–92dbee9eb211_en?filename=monitoring–agri–food–trade_dec2023_en.pdf
10 European Commission, https://single–market–economy.ec.europa.eu/sectors/agri–food–industrial–ecosystem/trade–processed–agricultural–products/processed–agricultural–products–eu_en#:~:text=The%20EU%20is%20the%20world's,and%20its%20second%20largest%20importer.

Case study 1: Reducing disease prevalence to promote efficient resource use in Germany's pig farms





Summary

Pig farming is dominant within Europe's livestock–raising landscape. Pork is the most consumed animal protein in Europe, at 32.5 kg per capita, and accounts for 35% of total EU meat production[11].

Germany leads pork production in the EU and provides core economic value to the bloc's agricultural output. The efficacy of modern pork production has allowed for consistent output (exceeding 20 million tonnes at carcass weight each year for the past two decades) and improved food affordability. Strategies to reduce animal disease can improve efficiency, however, when it comes to resource use.

A briefing from the European Parliament identifies animal health and welfare as a current challenge related to pig farming and pork production processes[12]. Responses to these challenges require mitigating the environmental impact of livestock farming and boosting efficiency in animal health and welfare practices to maintain profitability.

Controlling common diseases found in pigs, such as porcine reproductive and respiratory syndrome (PRRS) is key to efficient resource use and sustainability objectives.

11 European Parliament (2020), https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652044/EPRS_BRI(2020)652044_EN.pdf

12 European Parliament (2020), https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652044/EPRS_BRI(2020)652044_EN.pdf

Prevalence of porcine reproductive and respiratory syndrome (PRRS)

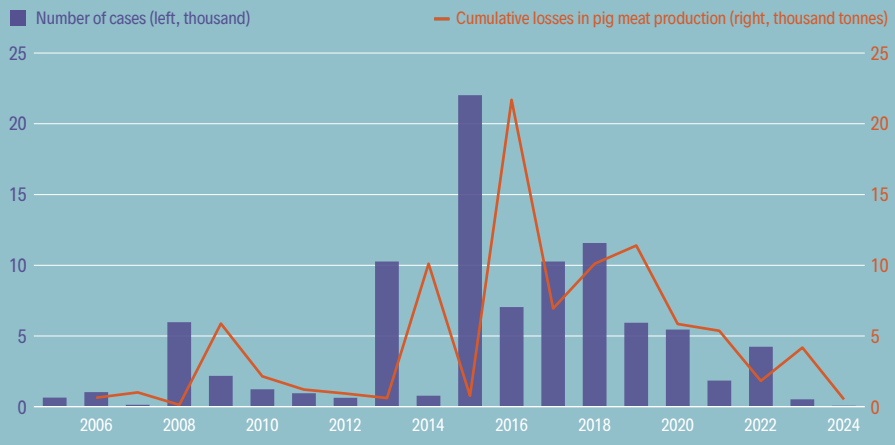
PRRS causes reproductive failure of sows and respiratory problems in piglets and growing pigs[13]. The associated virus (PRRSV) is highly pathogenic and widespread in pig populations. It is known to weaken population–level immunity due to its ability to cause co–infections.

Increased rates of morbidity and mortality can lead to economic losses from decreased productivity. This can be economically and environmentally damaging due to wasted resources in the production value chain.

Animal feed, for example, is the single most significant cost factor in livestock production, as the European Feed Manufacturers' Federation (FEFAC) reports. Further, the pig feed sector takes up the largest segment of industrial compound feed production in Europe –– thus, higher mortality for pigs leads to greater cumulative losses of resources across the board[14].

Germany's western states of Lower Saxony and North Rhine–Westphalia feature high concentrations of large–scale pig farms, which experience the highest virus prevalence. In herds, the estimated prevalence ranges from 50–75%[15].

Figure 1. Number of cases and cumulative losses in pigmeat production due to PRRS outbreaks, 2005–24



Source: WAHIS, Oxford Analytica

Figure 1 shows cumulative losses in pigmeat production due to PRRS outbreaks in Europe, according to Oxford Analytica's regression model[16]. This model finds that an additional case of any disease in pig herds is associated with a decline of 0.985 tonnes in domestic pigmeat production in the following year. In the past decade, the estimated cumulative losses in pigmeat production due to an outbreak of PRRS in Europe amount to 91,000 tonnes.

13 WOAH (2021), https://www.woah.org/fileadmin/Home/fr/Health_standards/tahm/3.09.06_PRRS.pdf
14 European Feed Manufacturers' Federation (FEFAC) (2024), https://fefac.eu/wp–content/uploads/2024/03/FF_2023.pdf
15 Renken, C., Nathues, C., Swam, H., et al. (2021), https://porcinehealthmanagement.biomedcentral.com/articles/10.1186/s40813–020–00183–x
16 Oxford Analytica (2023), https://www.oxan.com/insights/global–data–healthforanimals/

This is equivalent to more than 2% of Germany's entire pigmeat production in 2024 (4.3 million tonnes)[17], revealing the significant opportunity that disease management offers to mitigate production losses and improve the overall efficiency of Europe's pig farms –– especially in top–producing countries.

Cost benefits and resource use efficiencies of vaccination programmes

Estimates of the impact of farm–level PRRS suggest an annual median loss for individual pig farms ranging from EUR75,724 to EUR650,000 based on the infection's severity[18].

Germany's Federal Statistical Office (Destatis) estimates that there were 15,600 pig farms in the country as of 2024. If PRRS were to sweep through each farm, unmitigated, the incurred costs to Germany could amount to an estimated range of EUR1.18bn to EUR10.1bn in annual losses.

17 Eurostat, https://ec.europa.eu/eurostat/databrowser/view/tag00042/default/table?lang=en&category=t_agr.t_apro.t_apro_mt

18 Nathues, H., Alarcon, P., Rushton, J., et al. (2017), https://www.sciencedirect.com/science/article/pii/S0167587716305517?via%3Dihub

Figure 2. Scenarios for the estimated impact of vaccination against PRRS on pigmeat production in Germany

Figure 2 shows the estimated association between vaccination rates and productivity amongst fattening pigs, and feed use, considering that the largest loss from PRSS is in the fattening phase. This figure models an increasing vaccination rate scenario for Germany and estimates a reduction in loss of life. The model finds that higher vaccination rates are associated with a lower estimated loss of life and reduced feed wasted for no food output; when quadrupling the vaccination rate for pigs from a baseline vaccination rate of 20% to 80%, the estimated loss of livestock is reduced by nearly one-third.

Quadrupling the vaccination rate prevents food loss to the extent that it can feed every resident in Germany a serving of pork at least twice.

This prevented food loss translates to approximately 197 million servings of pork, or the ability to provide every resident in Germany (84 million people) a serving of pork at least twice[19].

In the scenario of increasing the vaccination rate, there are also considerable savings in both feed and land resources, typically wasted when consumed by pigs who died prematurely from PRRS before reaching slaughter. Assuming that each pig consumes approximately 255 kg of feed in their life cycle, increasing the vaccination rate to 40% would save an estimated over 21 million kg of feed. Similarly, assuming that each pig requires about 0.83 square meters of land in Germany, in the higher vaccination rate scenario, more than 70 million square meters of land would be saved.

Resource use and sustainable production

Feed costs represent the most substantial factors in total production costs, and are therefore key determinants of profitability. It is critical for Europe to maintain its competitive advantage in the global marketplace for agricultural commodities through resource waste minimisation[20].

Sustainable resource use –– by ensuring that feed and water inputs efficiently lead to food output –– boosts efficiency and reduces environmental impact. For example, feed crop production is a major contributor to water scarcity because freshwater sources are directed towards fattening pig feed production. Thus, reducing the prevalence of common diseases such as PRRS, which is associated with higher morbidity and mortality rates, reduces resource waste.

Outlook

Animal health is indispensable in pig farming as characterised by increased efficiency in the use of resources among healthy pig populations. Common diseases such as PRRS present endemic prevalence challenges and co–infection risks that increase morbidity and mortality rates.

Health interventions aimed at bolstering broad, population–level immunity is essential to current PRRS control efforts, as farm–scale eradication is costly and difficult without regional, national or supra–national efforts. Continued vaccine development research and development alongside other animal health solutions is recommended to mitigate associated economic and environmental burdens.

19 European Commission, https://agridata.ec.europa.eu/extensions/DashboardPigmeat/PigmeatPricesCarcases.html
20 European Commission (2025), https://agriculture.ec.europa.eu/data–and–analysis/markets/overviews/market–observatories/meat_en

Case study 2: Improving health performance to reduce GHG emissions in the United Kingdom's cattle farms

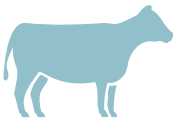
Summary

Europe's agricultural sector is key to the transition to a low-carbon economy. The European Commission's Vision for Agriculture and Food, a roadmap of farming and agri-food sector priorities to 2040, encourages the adoption of innovative practices to support climate objectives[21].

These practices seek to improve farm-level sustainability performance, such as livestock management measures to reduce GHG emissions. Animal health is critical to achieving related climate objectives, as observed by the positive association between increased disease prevalence and its impact on yields and emissions[22].

Compromised milk or meat yields among dairy and beef cattle create a compound effect of more emissions expended. For example, the World Animal Health Information System (WOAH-WAHIS) data on the global prevalence of foot-and-mouth disease (FMD) in dairy cows suggests that greater disease prevalence correlates to increased GHG emissions intensity (kg CO_2-e/kg product) of milk production. Although FMD is not endemic in the United Kingdom, for the purpose of measuring the impacts of disease on emissions, Figure 3 models the impact of FMD prevalence on dairy livestock [23].

21 European Commission (2025), https://agriculture.ec.europa.eu/overview-vision-agriculture-food/vision-agriculture-and-food_en
22 Oxford Analytica (2023), https://www.oxan.com/insights/global-data-healthforanimals/
23 Capper, J. L. (2023), https://onehealthoutlook.biomedcentral.com/articles/10.1186/s42522-023-00089-y



The United Kingdom is home to 9.4 million cattle and calves. It is estimated that improving the health status of animals could reduce GHG emissions release in the livestock sector by 10%[24]. This points to the need to commit adequate resources to management and surveillance to reduce disease prevalence. Overall strategies to improve animal health can positively contribute to climate adaptation plans.

Improving health outcomes to complement climate adaptation plans

Improved health outcomes for the United Kingdom's cattle sector, where beef and dairy products contribute the most value to the agriculture economy, is also key to minimising environmental impact, through reduced GHG emissions and efficient land use.

Animal health contributes to sustainable livestock raising and management, as improved performance and productivity associated with healthy animals helps reduce GHG emissions.

The United Kingdom was the first major economy to implement a legally binding commitment to achieve net zero emissions by 2050.

The United Kingdom's Committee on Climate Change (CCC) recommends a 64% reduction in GHG emissions from agriculture and land use sectors to meet this target. It finds that improving livestock health contributes to low-carbon farming practices that could save 10 metric tonnes CO_2-e by 2050[25]. This corresponds to 5,000 single high-speed train ride journeys between London and Paris.

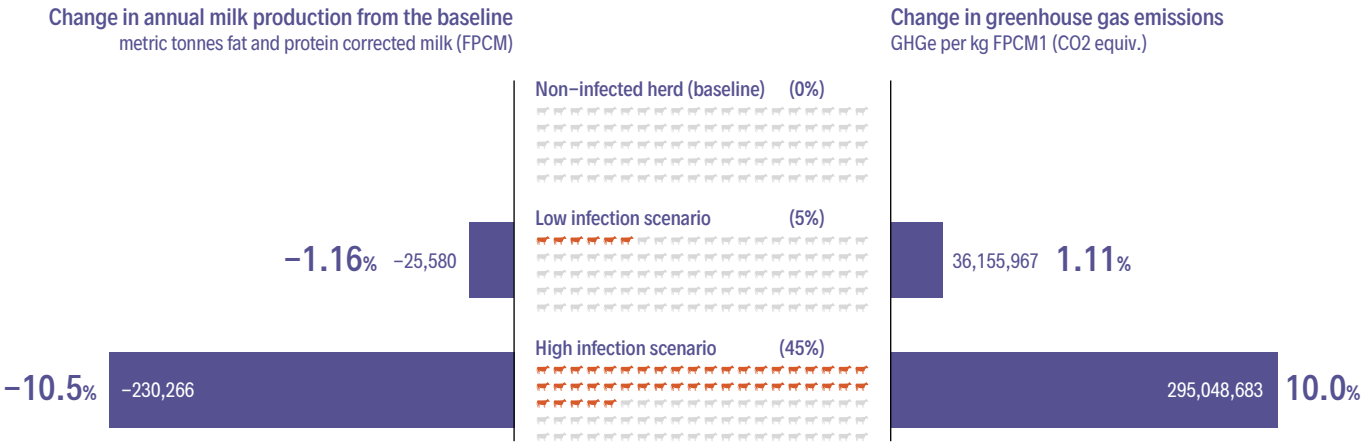
The CCC further posits that it is possible to reduce land-based GHG emissions while contributing to additional strategic priorities for land, such as food production, climate change adaptation and biodiversity.

Impact of disease prevalence on emissions output

When assessing the impact of disease in animal populations on GHG emissions release, the prevalence of the disease is a primary factor. Severity is also key. For example, among dairy cattle, FMD corresponds to a 1.11% increase in CO_2-e emissions per litre of milk yielded when measured at a 5% prevalence rate among herds, compared to a 10.5% increase in CO_2-e emissions when measured at a 45% prevalence rate[26].

24 Moredun Research Institute (2022), https://ruminanthw.org.uk/wp-content/uploads/2022/04/SO-634-Ruminant-Report-Methane-April-2022-web.pdf
25 Capper, J. L. (2023), https://onehealthoutlook.biomedcentral.com/articles/10.1186/s42522-023-00089-y
26 Capper, J. L. (2023), https://onehealthoutlook.biomedcentral.com/articles/10.1186/s42522-023-00089-y

Figure 3. Estimated production impact of increased FMD prevalence amongst cattle in the United Kingdom



Source: Oxford Analytica

Figure 3 models a disease prevalence scenario on milk production. The figure visually presents the estimated impact on milk yield and the corresponding emissions that would have been generated by a change from no disease presence to a low or high rate of FMD infection in the 2024 dairy cattle population in the United Kingdom. Considering the change from a non-infected to a low-infected population, there is a decrease in milk yield production by 1.16% which is equal to the loss of an estimated 25 thousand litres of Fat-and-Protein-Corrected-Milk (FPCM). As diseases become more prevalent, their impact on production efficiency and emissions increases. This means that higher disease levels lead to less efficient production, resulting in higher emissions per unit of product. For the low infection scenario, there is around a 1.11% increase in GHG emissions per kilogram of milk, equivalent to an estimated 36 thousand kilograms of CO_2-e.

The difference in emissions from a non-infected to a low-infected dairy cattle population is equivalent to a single passenger taking almost 188 thousand single economy flights from LHR to JFK.

Precision livestock farming and advances in animal health care

In the case of a disease like FMD, proper outbreak management with support from veterinarians, and potentially vaccination help to protect animal health. But when it comes to more everyday concerns (e.g. mastitis, reproduction), farmers are increasingly relying on a range of advances in animal health care to both protect health and reduce emissions. Precision livestock farming (PLF) technologies are increasingly being adopted to improve animal health and productivity while reducing GHG emissions. These technologies include accelerometer-based health sensors for early disease detection, precision systems for vaccine delivery, rapid diagnostic testing devices, and automated fertility monitoring systems.

For the same emissions as the global average in kg CO_2–e emissions per litre of milk, each 1.32 litres plus of milk from UK dairy cattle could help produce two pints of ice cream.

For example, PLF tools have been shown to reduce GHG emissions by 2.5% in grazing systems and 2.1% in housed systems in Scotland's beef sector. When comparing the product emissions of each scenario, health sensors had the largest reduction in both the grazing (10.5%) and housed systems (12%)[27].

Genomic prediction and testing also support better disease detection and management. By accelerating genetic improvement in traits such as fertility, feed efficiency, animal welfare, and disease resistance in livestock, farmers can make the best–informed decisions for more sustainable farming practices.

As a key part of holistic animal health care, nutrition also supports reducing methane emissions. High–quality forage, precision feeding and the inclusion of methane–reducing additives can lower enteric methane emissions. Combined strategies have already contributed to measurable emissions reductions in the United Kingdom. For example, the carbon footprint of milk production in the United Kingdom decreased by more than 20% over the past two decades, reaching an average of 1.25 kg CO_2–e emissions per litre of milk.

This average is less than half of the estimated global average to produce a litre of milk, creating a 2.32:1 ratio in efficiency of litres of milk produced, when comparing the two emissions averages[28].

Outlook

A key sustainability improvement to the cattle sector is improved overall health.
This recognition raises the importance of addressing research gaps into critical areas related to animal health, namely, the impact that prevention, preparedness and control of livestock diseases can have on climate objectives related to environmental sustainability of production systems.

Support for animal health research efforts advances environmental responsibility and sustainability goals. It also encourages innovative medicines and solutions that are essential to ensuring Europe's shared vision of the One Health approach.

27 McNicol, L.C., Bowen, J.M., Ferguson, H.J. et al. (2024), https://www.frontiersin.org/journals/sustainable–foodsystems/articles/10.3389/fsufs.2024.1414858/full
28 Parliament of the United Kingdom (2019), emissionshttps://committees.parliament.uk/writtenevidence/105598/pdf/

Case study 3: Reducing food losses by responding to highly pathogenic threats in France's poultry farms

Summary

Europe has witnessed several epidemics (epizootics) of highly pathogenic avian influenza (HPAI) in recent years, with France's poultry sector hit particularly hard during a seasonal wave of nearly 1,400 outbreaks between October 2021 and September 2022. The devastating consequences of this outbreak prompted new strategies to prevent and contain animal disease transmission.

In October 2023, France initiated a national preventative vaccination campaign –– the world's first large poultry exporter to do so. Viewed as a success for the poultry sector, the campaign capped cases and prevented major health crises, allowing French farmers to recover their pre–crisis production level.

Vaccination is a complementary tool to other animal health interventions to reduce illness, severity and mortality, as well as a cost–effective investment strategy to avoid economic losses from unmitigated animal disease prevalence. Implementation of animal health controls like vaccination campaigns can stabilise animal–sourced food and protein supplies that bolster food availability and secure the supply chain in domestic and international markets.

The threat of highly pathogenic avian influenza (HPAI)

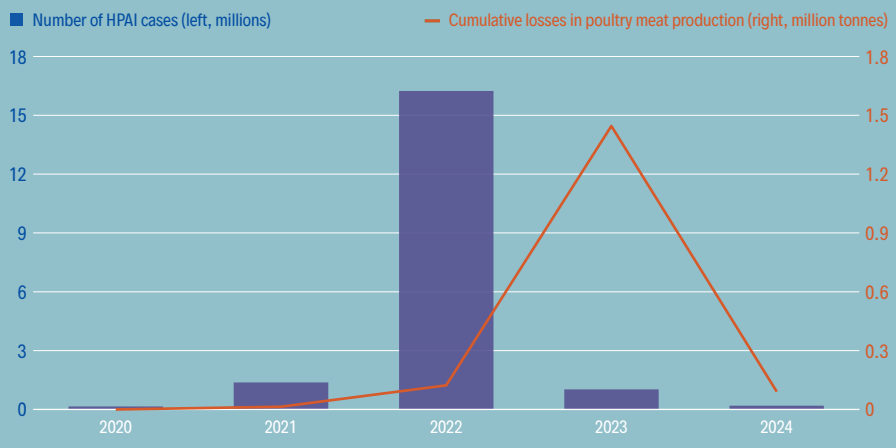
Highly pathogenic avian influenza (HPAI), commonly referred to as avian influenza or bird flu, is the most prominent disease affecting European poultry farms. HPAI is characterised by its high prevalence. Between 2000 and 2016, HPAI was found to have caused a quarter of all major global animal disease outbreaks, with case–fatality rates reaching 100%[29].

WOAH reports that HPAI has led to losses of over 547 million poultry worldwide between 2005 and 2023[30]. In 2022 alone, 146 million birds were lost during an unprecedented peak.

France's response to HPAI

France recorded nearly 1,400 outbreaks in its commercial farms during this global peak in the 2021–22 season. The poultry industry incurred an estimated EUR1.4bn in economic losses, as 21 million birds were reportedly culled during the crisis –– about 7% of the estimated 300 million total domestic poultry population at the time[31].

Figure 4. Number of cases and cumulative losses in poultry meat production due to HPAI outbreaks, 2020–24



Source: WAHIS, Oxford Analytica

Figure 4 shows cumulative losses in poultry meat production due to HPAI outbreaks in France. The visible decline in poultry meat production is quantified at 0.089 tonnes for each additional HPAI case, according to Oxford Analytica's regression model[32]. In 2022, more than 16 million cases of HPAI amongst broiler livestock was recorded in France. This represents an estimated cumulative loss of around 1.4 million tonnes of consumable poultry meat.

29 Planchand, S., Vergne, T., Guérin, J.–L. et al. (2025), https://pmc.ncbi.nlm.nih.gov/articles/PMC11682810/
30 WOAH (2024), https://www.woah.org/app/uploads/2024/10/hpai–report–63.pdf
31 United States Department of Agriculture (USDA) (2022), https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Ongoing%20HPAI%20Outbreaks%20Threaten%20the%20Future%20of%20France%20Egg%20and%20Poultry%20Industry_Paris_France_FR2022–0003.pdf
32 Oxford Analytica (2023), https://www.oxan.com/insights/global–data–healthforanimals/

Further, the estimated cumulative loss of almost 1.69 million tonnes of poultry meat in the first half of this decade is equivalent to more than the total annual French poultry production in 2024[33].

The model's statistically significant negative association between HPAI cases and production highlights the economic vulnerability of high-income countries, such as France, to disease amongst livestock.

Given the significant potential for viral transmission, France launched a national vaccination campaign targeting infected ducks in October 2023. This is because ducks are a highly susceptible and sensitive species, able to spread the virus in outdoor grazing systems.

This strategy complemented traditional control measures such as early detection, culling, quarantine, and movement restrictions. As a result, France reported only 10 poultry outbreaks in 2023–2024. This is a substantial reduction from 1,374 in 2021–2022 and 396 in 2022–2023[34].

This led to a considerable recovery; the vaccination campaign contributed to an increase in production of 12.1% in 2023–24[35]. France benefited significantly from this improvement, as evidenced by a 7% increase in export value in fiscal year 2024 -- at nearly half a million (EUR499,924) for poultry products -- compared to fiscal year 2021[36].

Similarly, the producer price index (PPI) for industrially produced chicken meat sold in France increased by 21 percentage points, comparing the four-month average from October 2021 to January 2022 with that from October 2023 to January 2024[37].

Implementing a DIVA (Differentiating Infected from Vaccinated Animals) strategy

France's campaign efforts adopted a DIVA (Differentiating Infected from Vaccinated Animals) control strategy, which helps differentiate between vaccinated and naturally infected poultry as a way to eradicate infections.

In recent years, WOAH has reviewed this strategy among several disease prevention and control options to manage the heightened risk that HPAI poses to Europe.

The intergovernmental organisation found that several next-generation vaccines offer improved outcomes in line with a DIVA control strategy, and moreover, that vaccination campaigns should be part of an overarching plan to strengthen biosecurity as a means of control[38].

Each case of HPAI is associated with a loss of 0.089 tonnes in consumable poultry meat in the following year.

The negative association between HPAI outbreaks and productivity highlights an area of economic vulnerability in Europe. However, animal health interventions, such as preventative vaccination campaigns, can lead to economic recovery.

33 Eurostat, https://ec.europa.eu/eurostat/databrowser/view/tag00043/default/table?lang=en&category=t_agr.t_apro.t_apro_mt
34 Guinat et al. (2025), https://doi.org/10.3201/eid3107.24144
35 Reuters (2025), https://www.reuters.com/business/healthcare-pharmaceuticals/french-bird-flu-vaccine-campaign-helps-poultry-output-recover-producers-say-2025-02-18
36 European Commission (2025), https://agridata.ec.europa.eu/extensions/DashboardPoultry/PoultryTrade.html
37 National Institute of Statistics and Economic Studies (INSEE), https://www.insee.fr/en/statistiques/serie/010763652#Tableau
38 WOAH (2022), https://www.woah.org/app/uploads/2023/03/2022-eur2-brown-3335-a.pdf

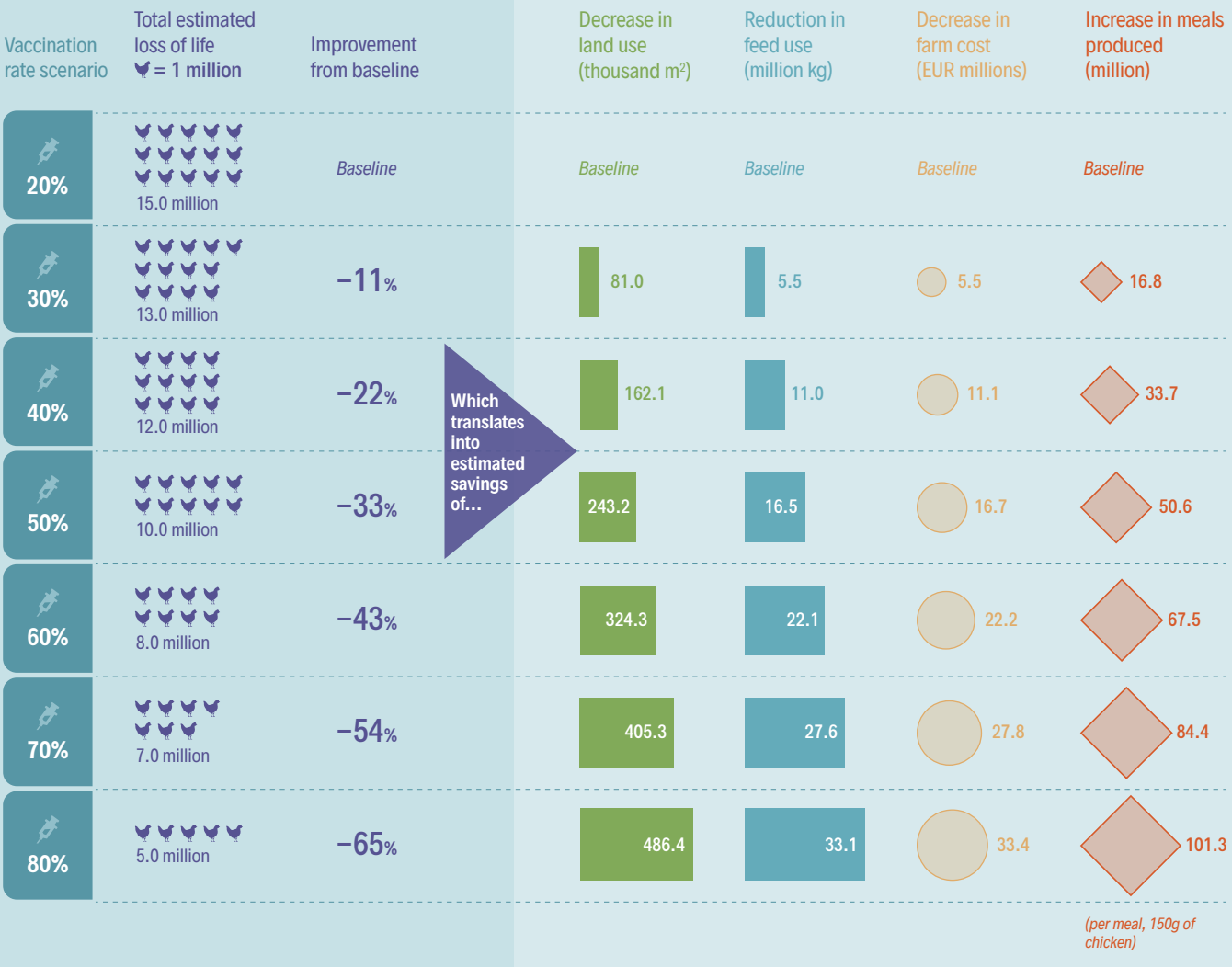
Cost–effectiveness of the vaccination campaign

As a virus, HPAI can still be detected in asymptomatic, vaccinated birds. It is therefore necessary to enforce strict surveillance protocols post–vaccination.

France's vaccination campaign cost an estimated EUR105 million for the 60 million ducks inoculated, compared to the EUR1.4bn in losses incurred pre–campaign. In this case, for every EUR1 spent on vaccination, more than EUR13 was delivered to France's economy through loss of value averted.

Vaccination is therefore a cost–effective investment strategy that can be used alongside other animal health interventions to reduce illness, severity, and mortality.

Figure 5. Estimated impact of vaccination rate scenario against HPAI on poultry meat production in France



Source: Oxford Analytica, WAHIS | Findings represent the estimated impact of HPAI (See 'Animal health: overview of findings and methodology' for more detail)

Figure 5 models an increasing vaccination rate scenario for broilers (young chickens) in France in 2021. This model finds that higher vaccination rates are associated with a lower estimated loss of life. When increasing the vaccination rate for broilers from a baseline vaccination rate (20%) to 50%, the estimated loss of life is reduced by one third.

This prevented food loss translates to the ability to serve three-quarters of the French population (67.8 million people) a serving of chicken. Given that the cost of whole broiler meat was EUR2.2/kg in France in 2021, reducing this food loss would result in an estimated savings of EUR16.7 million[39].

In terms of resources, the scenario modelling shows that even in the event of increasing the vaccination rate only by 10% from the baseline (20%), there are significant savings in feed and land resources. If each broiler consumes about 3.41 kg of feed to reach a live weight of 2.2 kg during its lifetime, increasing the vaccination rate from the baseline to 30% can save 5.5 million kg of feed, which would otherwise be wasted on diseased broilers from HPAI. Similarly, if each broiler requires around 0.05 square meters of land throughout its lifetime, in the higher vaccination rate scenario, 81 thousand square meters of land would be saved.

Impacting the circular economy: On top of the food chain, various other value chains are impacted by the losses of birds such as textiles, pharmaceuticals, fertilisers, and household goods sectors which upcycle by-products of poultry production.

Focus on food availability

Consistent production levels of foods are required to ensure food affordability and quality nutrition, especially in response to the rising demand for poultry meat within Europe[40].

This is especially relevant in the context of recent food inflation pressures seen in Europe, which reached a historical high in March 2023, hovering around 15%[41]. Indeed, a 2023 European Commission report named food inflation as a primary concern to consumer food security[42].

In addition to meeting internal demand, Europe is a net exporter of both poultry meat and eggs. Threats to production levels may thus also harm the export supply, with attendant economic and social implications.

39 European Commission, https://agridata.ec.europa.eu/extensions/DashboardPoultry/PoultryPrices.html
40 United States Department of Agriculture (USDA), https://www.fas.usda.gov/data/european-union-poultry-and-products-annual-3
41 European Central Bank (2024), https://www.ecb.europa.eu/press/economic-bulletin/focus/2024/html/ecb.ebbox202402_04~9b36bced23.en.html
42 European Commission (2023), https://agriculture.ec.europa.eu/system/files/2023-11/efscm-assessment-autumn-2023_en.pdf

Outlook

Following France's campaign, the European Food Safety Authority (EFSA) issued a scientific opinion on vaccination of poultry against highly pathogenic avian influenza which concluded that vaccination can complement critical animal health practices already in existence in poultry farming, such as biosecurity, surveillance and early detection monitors[43].

As an important animal health tool, vaccination can signify overall improvement in animal care, as observed through its correlation to increases in productivity for farmers. It is considered an important investment in veterinary care and the adoption of advanced preventative practices.

Vaccination also contributes to ongoing sustainability efforts within poultry production to support resilience against the threat of disease, as advocated in WOAH's global strategy to address HPAI[44].

WOAH encourages the One Health approach as well as the need to engage both public and private sector stakeholders to coordinate on disease mitigation and prevention efforts.

43 European Food Safety Authority (EFSA) (2023), https://www.efsa.europa.eu/en/news/vaccination-poultry-against-highly-pathogenic-avian-influenza-available-vaccines-and

44 WOAH (2024), https://www.woah.org/en/document/global-strategy-for-the-prevention-and-control-of-high-pathogenicity-avian-influenza-2024-2033/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Conclusion

This report contributes to ongoing efforts to quantify the impact of disease on livestock populations, in the context of promoting resilience and sustainability in Europe's agri–food system.
A better understanding of the extent to which strong animal health performance benefits the economy, environment and society enables innovation and research into improved medicines and technologies to strengthen Europe's livestock production value chain –– an essential pillar of the agri–food system.

Innovations related to animal health cited in this report that could benefit from further research and analysis include advanced biosecurity and surveillance strategies, such as the DIVA control strategy; biotechnology–based and next–generation vaccine development; early detection monitors; and precision livestock farming.

Overall improvements to animal health allow for key productivity and sustainability gains, as drawn from the associations established in the case studies and findings included in this report. This in turn balances integrated animal and human health and advances shared societal priorities.

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