ANIMAL WELFARE AND SUSTAINABLE DEVELOPMENT GOAL 9

Inputs for the High-Level Political Forum 2026

(This position paper was prepared by WFA on behalf of its 73 member organisations, with special contributions from ***Cruelty Free and Compassion in World Farming****.)*

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SUMMARY AND RECOMMENDATIONS

The year 2026 provides important opportunities to further advance and accelerate the implementation of the One Health approach[1] in agrifood systems and promote its holistic integration into food policies. At the Fourth Executive Annual Meeting (Lyon 8-9 April) the Quadripartite advanced coordinated global action on One Health, including in relation to mobilising sustainable financing for One Health.[2] In July, the FAO's Committee on Agriculture is expected to adopt a Framework on One Health in Agrifood Systems for Global Health and Food Security. Then, in September, the Rome-based agency will organise the first ever Global Conference for Actions on One Health in Agrifood Systems. Given that intensive livestock farming contributes to the emergence and spillover of zoonotic diseases, the WHO Pandemic Agreement adopted in 2025 and about to enter the process of signing and the 2026 UN High-level Meeting and Political Declaration on Pandemic Prevention Preparedness and Response should not go unmentioned in this context.

While animal diseases ultimately pertain to the physical health of animals, their emergence and spread are often driven by broader and more complex dimensions of animal welfare. These include factors that are inherently linked to the specific terrestrial and aquatic production systems in which animals live as well as structural features of these systems that can systematically shape welfare conditions.

To date, animal welfare remains a neglected dimension of disease prevention, weakening efforts to enhance public health, food security, and nutrition through One Health. Against this backdrop, the World Federation for Animals encourages all stakeholders to seize these opportunities to broaden the scope of the animal component of One Health by fully integrating animal welfare.

In line with scientific evidence and international recommendations, and the acknowledgement of One Health in international instruments and processes, we urge governments and all stakeholders

[1] As per the definition of the One Health approach see One Health High-Level Expert Panel (OHHLEP), One Health Definition and Principles (World Health Organization, 24 July 2023) https://cdn.who.int/media/docs/default-source/one-health/ohhlep/one-health-definition-and-principles-translations.pdf?sfvrsn=d85839dd_5&download=true accessed 16 April 2026

[2] FAO, 'Strengthening One Health through coordinated action on implementation, science, policy and financing' (8 April 2026) https://www.fao.org/one-health/highlights/strengthening-one-health-through-coordinated-action-on-implementation--science--policy-and-financing/en accessed 16 April 2026

involved in upcoming multilateral discussions on the advancement of the One Health approach in agrifood systems to:

1. **Ensure that the protection of animal welfare is anchored in the One Health approach, recognising that the protection of animal welfare, beyond physical health, is essential for disease prevention and control**, which, contributes, inter alia, to reducing the need for antimicrobials, as well as for enhancing food security, nutrition, livelihoods, and the sustainability of animal production;
2. **Promote the transition towards more sustainable approaches to animal farming, fisheries and aquaculture as part of One Health**, optimising the health of people, animals and ecosystems and working together across sectors, disciplines and communities to foster wellbeing, as well as promoting whole-of-government and whole-of-society approaches;
3. **Guarantee high animal welfare standards as a necessary part of sustainable food systems transformation under the One Health approach**, ensuring the continuity of veterinary services in national disaster risk management plans, in line with the Sendai Framework for Disaster Risk Reduction and United Nations General Assembly resolution 79/205.
4. **Ensure that public and private financial flows are directed to the implementation of high animal welfare standards and to integrated and extensive systems of animal farming, fisheries, and aquaculture, as part of the alignment with the goals and targets of the One Health approach**.

INTRODUCTION:

WHY ONE HEALTH NEEDS TO INCORPORATE ANIMAL WELFARE

As the One Health approach aims to balance and optimise the health of people, animals, and ecosystems[3], its holistic integration into food policies is pivotal to reducing the risk of intersectoral hazards across food systems. Within this framework, strengthening the correct understanding and protection of animal health and welfare is critical and most urgent, with current trends registered by WOAH showing that "infectious animal diseases are affecting new areas and species, undermining global food security, human health and biodiversity."[4]

Animal diseases originating in the food system, indeed, not only have a direct impact on human health, with more than 70% of emerging human infectious diseases having animal origin[5], but also reduce the availability and affordability of animal products, and threaten livelihoods. For example, animal disease and mortality are a major cause of food loss in some regions[6]. Disease emergence threatens international trade and pandemic related pressures, including economic slowdown, disruptions in food supply chains, falling incomes, and food price inflation and volatility compromise the availability and quality of food. According to the FAO, the COVID-19 pandemic contributed chronic hunger for up to 161 million additional people in 2020,- the largest single year increase in global hunger in decades[7].

The animal-environment interface is also affected. Sick and stressed animals have lower productivity and require increased use of veterinary medicines, including antimicrobials, which

[3] OHHLEP, One Health Definition and Principles (n.1)
[4] WOAH, 'First report on world's animal health reveals changing spread of disease impacting food security, trade and ecosystems' (23 May 2025) https://www.woah.org/en/first-report-on-worlds-animal-health-reveals-changing-spread-of-disease-impacting-food-security-trade-and-ecosystems/ accessed 16 April 2026. Full report WOAH, The State of the World's Animal Health 2025 (Paris, 2025) https://www.woah.org/app/uploads/2025/05/the-state-of-the-worlds-animal-health-2025.pdf accessed 16 April 2026
[5] Charlotte Milbank and Bhaskar Vira, 'Wildmeat consumption and zoonotic spillover: contextualising disease emergence and policy responses' (2022) 6(5) The Lancet Planetary Health e439 https://pmc.ncbi.nlm.nih.gov/articles/PMC9084621/ accessed 16 April 2026
[6] FAO, Global Food Losses and Food Waste: Extent, Causes and Prevention (2011) https://openknowledge.fao.org/items/4a463cff-586d-433f-9124-af4b99246f91 accessed 16 April 2026
[7] FAO, IFAD, UNICEF, WFP and WHO, *The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all* (FAO 2021) https://doi.org/10.4060/cb4474en accessed 16 April 2026

contribute to the growing threat of antimicrobial resistance (AMR), putting human health at risk. The increased use of some veterinary medicines is also linked to an increased need for and pollution of natural resources, including water and land[8]. For example, antimicrobials are among the most concerning sources of water pollution from chemical contaminants[9] and a source of waterborne AMR[10].

Whereas animal diseases ultimately pertain to the physical health of the animal, the cause of their emergence and spread can depend on other and more complex aspects of animal welfare, including those connected to the specific production system in which the animal lives. Therefore, to effectively counter and prevent the emergence and spread of animal diseases, protect global health, reduce their impact on food systems and the need for antimicrobials and ensure resilience, it is crucial that the One Health approach and related policy initiatives broaden the scope of the animal health pillar, and move to the inclusion of animal welfare.

DEFINITION

Animal welfare includes, but is not limited to, animal health. According to WOAH Terrestrial Code, it is understood as "the physical and mental state of an animal in relation to the conditions in which it lives and dies. An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state."[11] Several prominent frameworks can be used to measure animal welfare, including the five freedoms and the (modernised) five domains.

[8] For an overview of the impact of animal diseases on human health, nutrition and the environment, see WOAH, 'The Global Burden of Animal Diseases (GBADs)' https://gbads.woah.org/ accessed 16 April 2026.
[9] FAO, *The State of the World's Land and Water Resources for Food and Agriculture 2021* (FAO 2021) https://www.fao.org/documents/card/en/c/cb7654en accessed 16 April 2026
[10] WHO, *Joint FAO/WHO/UNEP/WOAH Technical Brief on Water, Sanitation and Hygiene (WASH) and Antimicrobial Resistance (AMR)* (WHO 2020) https://www.who.int/publications/i/item/9789240006416 accessed 16 April 2026
[11] WOAH, 'Codes and Manuals' https://www.woah.org/en/what-we-do/standards/codes-and-manuals/ accessed 16 April 2026

As illustrated below, scientific research has widely shown that different aspects of animal welfare contribute to the worsening of animals' physical health, i.e. chronic stress leading to immunosuppression, disease susceptibility, increased need for antimicrobial use and related AMR,

and that most of them are connected not only with specific husbandry practices, but are more structurally related to the production systems in which animals live. In particular, intensive industrial systems raise significant public health and sustainability concerns, and therefore present hazards also for the environmental component of the One Health approach.

Hence, driving real change requires broadening the current understanding of the animal pillar of the One Health approach and ensuring coherent channeling of financial flows.

ANIMAL WELFARE IMPLICATIONS

ON ANIMAL HEALTH, FOOD SECURITY & NUTRITION

Animal welfare is a critical factor influencing not only the health of individual animals but also the broader dynamics of disease within populations. Conditions that compromise welfare can have wide-ranging effects, shaping resilience, vulnerability to disease, and the overall capacity of animals to thrive. These effects extend beyond animal populations. They affect entire interconnected systems, including public health, food supply chains, disease dynamics, antimicrobial use, environmental sustainability, and global system resilience.

In particular, poor welfare conditions associated with increased and chronic stress characterising intensive systems, including overcrowding, confinement and restricted natural behaviour:

- Can compromise immune function, increase disease susceptibility, and contribute to wider pathogen pressures, greater pandemic risk and increased antimicrobial resistance.
- Undermine the nutritional quality of animal source foods, reduce the nutritional quality, including impacts on protein quality and beneficial nutrient profiles;
- Increase food safety risks, including exposure to microbial agents, such as salmonella, linked in the literature to systemic inflammatory responses, and the transmission of antimicrobial-resistant bacteria to humans through the food chain;
- Weaken food security as they lead to less reliable food systems that rely on unstable food supplies, with animal disease and mortality being a major cause of food loss in some regions[12]. These risks increase in contexts of armed conflict and disasters, where the collapse of veterinary services and agrifood infrastructure represents one of the most acute drivers of food insecurity[13].

This extends not only to farmed animals raised for consumption, but also to working animals whose health and welfare are integral to the functioning of agrifood systems. For example, working equids are essential for plowing fields, transporting crops and water, and supporting

[12] FAO, *Global Food Losses and Food Waste (6)*
[13] See FAO, *The Impact of Disasters on Agriculture and Food Security 2023* (FAO 2023) https://openknowledge.fao.org/handle/20.500.14283/cc7900en accessed 16 April 2026 and WFP, *The Nexus Between Food Systems, Climate Change, and Conflict* (WFP 2023) https://www.wfp.org/publications/nexus-food-systems-climate-conflict accessed 16 April 2026.

market access for smallholder farmers. Poor welfare of equids reduces their health outcomes and longevity, directly affecting farm productivity and household food security. Chronic stress and pain in these animals can also contribute to increased susceptibility to infectious disease, which may have knock-on effects on other livestock, local communities and impact the broader One Health framework[14]. Working animals also play a critical logistical role in community survival and humanitarian response during and after armed conflict and disasters, making their welfare a direct concern for emergency preparedness frameworks, not only for steady-state agrifood systems[15], as also recognised in paragraph 28 of the Disaster risk reduction resolution on Sustainable development[16].

The table below highlights the scientific evidence connecting welfare with health outcomes and disease dynamics, emphasising why improving welfare is not just an ethical priority but a practical strategy for ensuring One Health and promoting safer, more resilient food systems. It outlines how compromised welfare can negatively affect animal health, food quality, and public health, and considers the broader implications for disease risk and food system resilience.

WEAKER IMMUNE SYSTEM

1. Chronic stress, linked to poor welfare, triggers sustained endocrine responses, including elevated glucocorticoid levels, leading to immunosuppression and therefore higher susceptibility to disease. Overcrowding, confinement and behavioural restriction are some of the factors that induce chronic physiological stress.[17] [18]

[14] Cameron A, Freeman SL, Wild I, Burridge J and Burrell K, 'Scoping Review of the Socioeconomic Value of Working Equids, and the Impact of Educational Interventions Aimed at Improving Their Welfare' (2026) 16(2) *Animals* 165 https://doi.org/10.3390/ani16020165 accessed 16 April 2026.
[15] Brooke Action for Working Horses and Donkeys, *Integrating Working Animals into Disaster Risk Management: Insights from Six Countries* (Brooke 2024) https://www.thebrooke.org/sites/default/files/Brooke%20News/integrating-working-animals-drm.pdf accessed 16 April 2026
[16] UN General Assembly, *Disaster risk reduction* (Resolution A/RES/79/205) (23 December 2024) https://docs.un.org/en/A/RES/79/205 accessed 16 April 2026.
[17] Edwards S. Animal welfare assessment and meat quality through assessment of stress biomarkers in fattening pigs. 2005.
[18] Lebret B. Effects of housing and handling on stress and immunity in pigs. Livestock Science 2008; 113:249–61.

2. Inadequate husbandry is linked to suppressed immunity and increased risk of injury. Research on pigs shows improving socialisation and enriching housing can lead to increased innate immune competence at weaning and fewer body lesions[19].

3. Elevated hair cortisol concentrations in working donkeys exposed to heavy loads and physical punishment indicate chronic activation of the stress response system, leading to physiological dysfunction such as muscle catabolism and immune suppression, which ultimately reduces work capacity and productivity[20].

INCREASED PATHOGEN LOAD AND TRANSMISSION

4. Industrial livestock production serves as a significant breeding ground for pathogens. Scientific evidence highlights large-scale pig and poultry operations as primary hotspots where influenza viruses are most likely to undergo genetic reassortment into strains with pandemic potential[21].

5. The genetic proximity in high-performance breeds compromises immunological resilience[22] and adaptability to environmental stressors.

6. Animal agriculture leads to the expansion into the natural environment and wildlife habitats bringing humans and domesticated animals more frequently in contact with wild animals and their pathogens, therefore increasing the risk of zoonotic disease spillovers[23].

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[19] Gavaud S, Haurogné K, Buchet A, Garcia Vinado I, Allard M, Lehébel A, Leblanc-Maridor M, Bach JM, Belloc C, Lieubeau B, Hervé J. Effects of improved early-life conditions on health, welfare, and performance of pigs raised on a conventional farm. *Animal* 2023; 17:100810.

[20] Bukhari SSUH, Li CM, Kenéz Á, Steagall PV, McElligott AG, Parkes RSV. Donkey hair cortisol concentrations are associated with carrying heavy load and being beaten at work. *BMC Veterinary Research*. 2025;21(1):582. doi:10.1186/s12917-025-05021-2

[21] Fuller TL, Gilbert M, Martin V, Cappelle J, Hosseini P, Njabo KY, Aziz SA, Xiao X, Daszak P, Smith TB. Predicting Hotspots for Influenza Virus Reassortment. Emerging Infectious Diseases journal – CDC. 19(4):581–588. doi:10.3201/eid1904.120903.

[22] Espinosa R, Tago D, Treich N. Infectious Diseases and Meat Production. Environmental & Resource Economics. 2020;76(4):1019–1044. doi:10.1007/s10640-020-00484-3

[23] Intergovernmental Science-Policy Platform On Biodiversity And Ecosystem Services (IPBES). Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). Zenodo; 2020. https://zenodo.org/record/4147317. doi:10.5281/ ZENODO.4147317

7. Chronic stress also increases intestinal permeability and greater shedding of zoonotic pathogens[24]. Studies in poultry show that flocks with lower welfare scores carry significantly higher levels of Campylobacter and Salmonella at slaughter, indicating a direct link between welfare conditions and pathogen load[25].

8. Animals raised under lower welfare conditions are more likely to contaminate the farm environment, slaughter facilities and food products. This is because stress-induced changes in gut integrity and microbiota composition facilitate pathogen colonisation and excretion. Flocks with lower welfare scores exhibited significantly higher contamination levels on carcasses at slaughter[26].

INCREASED INJURY

9. The European Food Safety Authority (EFSA) Panel on Animal Health and Welfare reviewed evidence on traumatic injuries detected during post-mortem inspection at slaughterhouses and concluded that many lesions identified at slaughter are associated with poor welfare conditions experienced before arrival at the abattoir, such as poor vehicle design, rough handling, mixing of unfamiliar animals and inadequate space allowance[27].

10. Inadequate animal welfare conditions contribute to heightened stress and reactivity in livestock, increasing the likelihood of both animal and handler injury, negatively impacting farm safety[28] [29].

11. The origin of injurious feather pecking in poultry is mostly triggered by frustration caused by poor housing conditions, excessive stocking density, housing systems and absence of

[24] EFSA Panel on Biological Hazards. Impact of stress on pathogen shedding in poultry. EFSA Journal 2017; 15:4666.
[25] Iannetti L, et al. Animal welfare and microbiological safety of poultry meat: impact of different at-farm animal welfare levels on Campylobacter and Salmonella contamination. 2020.
[26] EFSA. Scientific opinion on the public health hazards to be covered by inspection of meat (poultry). EFSA Journal 2012
[27] European Food Safety Authority (EFSA) Panel on Animal Health and Welfare. Welfare of cattle, sheep, goats and pigs from the perspective of traumatic injuries detected at slaughterhouse postmortem inspection. *Animals (Basel).* 2021;11(5):1406
[28] Titterington FM, Knox R, Buijs S, Lowe DE, Morrison SJ, Lively FO, Shirali M. Human–animal interactions with *Bos taurus* cattle and their impacts on on-farm safety: a systematic review. Animals (Basel). 2022;12(6):776. doi:10.3390/ani12060776.
[29] Titterington FM, Knox R, Buijs S, Lowe DE, Morrison SJ, Lively FO, Shirali M. Human–animal interactions with *Bos taurus* cattle and their impacts on on-farm safety: a systematic review. Animals (Basel). 2022;12(6):776. doi:10.3390/ani12060776.

opportunity to forage[30]. This behaviour can lead to injuries and mortality, requiring increased labour and veterinary interventions.

12. Tail biting in pigs is a behavioural problem often predominately occurring in inadequate environmental conditions such as high stocking density, poor management and insufficient enrichment materials. Reducing stocking density and providing an enriching environment which encourages normal behaviours are required to reduce the occurrence of tail biting. These interventions remove the perceived need for tail docking (a mutilation commonly carried out in response to this behaviour)[31].

13. Piglet tooth reduction is primarily intended to prevent injuries caused by competition-related biting; however, in extensive systems, reduced stress and lower competition for teats decreases aggressive behaviour, eliminating the need for routine tooth clipping[32].

14. Inadequate flooring, such as slippery or abrasive surfaces, can result in poor foot and leg health in dairy cows and increased injuries from falling[33].

EPIDEMIC AND PANDEMIC CONCERNS

15. Production systems characterised by high animal densities, low genetic diversity, elevated stress levels, and poor welfare conditions facilitate rapid disease transmission and can act as points of origin and amplification for emerging infectious diseases.

16. Long-distance transportation, a corollary of intensive production systems, creates epidemiological bridges that facilitate the spread of viruses and pathogens between animal populations and increase the risk of spillover into other species and human populations[34].

17. Historical outbreaks illustrate this risk. During the Nipah virus outbreak in Malaysia, intensive pig farming created conditions that amplified transmission from wildlife

[30] Cronin GM, Glatz PC. Causes of feather pecking and subsequent welfare issues for the laying hen: a review. Animal Production Science 2020;61:990–1005.
[31] Schroder-Petersen DL and Simonsen HB, 'Tail biting in pigs' (2001) 162(3) *The Veterinary Journal* 196–210.
[32] Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs [2009] OJ L47/5.
[33] EFSA Panel on Animal Health and Welfare, 'Welfare of cattle' (2022) 20(8) *EFSA Journal* e07494
[34] Chua KB and others, 'Nipah virus: a recently emergent deadly paramyxovirus' (2000) 288 *Science* 1432–1435.

reservoirs to pigs and subsequently to humans, causing severe respiratory and neurological disease. These outbreaks were facilitated by habitat fragmentation and deforestation, which brought fruit bats, the natural reservoirs of the virus, into closer contact with livestock.

18. Similarly, highly pathogenic avian influenza viruses have repeatedly emerged and spread within high-density poultry systems.[35] [36]

19. In these intensive environments, the close confinement of animals increases contact rates not only among domestic birds but also at the interfaces with wild populations. By concentrating susceptible hosts in a limited space, intensive farming amplifies pathogen transmission and magnifies the risk of spillover events, making it a far greater threat to both animal and human health than lower-density, extensive systems.

20. Improving welfare through lower stocking densities, better environmental conditions and enhanced monitoring can reduce viral amplification, improve early detection and strengthen biosecurity within the One Health framework.

ANTIMICROBIAL RESISTANCE THREAT

21. Poor welfare conditions frequently lead to increased disease pressure, which in turn drives routine or prophylactic antibiotic use in intensive farming systems[37] [38].

22. The widespread use of antimicrobials in such systems contributes to the selection and dissemination of antimicrobial-resistant bacteria, which can be transmitted to humans through the food chain and the environment[39].

23. Reducing disease incidence through improved welfare conditions can therefore contribute

[35] Centers for Disease Control and Prevention (CDC), 'Avian influenza: highly pathogenic avian influenza (HPAI) outbreaks in poultry' (2022)
[36] Dhingra MS and others, 'Geographical and historical patterns in the emergences of novel highly pathogenic avian influenza H5 and H7 viruses in poultry' (2018) 5 *Frontiers in Veterinary Science* 84.
[37] Shaikh SS and others, 'The rising threat of antibiotic resistance in poultry: veterinary and One Health perspectives' (2025) 12 *Veterinary Sciences* 1059.
[38] Slegers Y and others, 'Broiler flocks in production systems with slower-growing breeds and reduced stocking density receive fewer antibiotic treatments and have lower mortality' (2024) 103 *Poultry Science* 104197.
[39] WHO, *Antimicrobial resistance: global report on surveillance* (WHO 2014) https://www.who.int/publications/i/item/9789241564748 accessed 16 April 2026.

to lowering antimicrobial use and mitigating AMR risks within the One Health approach[40].

24. Studies have shown that poor welfare in working equids is associated with high levels of infected wounds and infectious disease, often requiring antimicrobial treatment. In some countries that rely on working equids, weak regulation and limited veterinary access allow unsupervised use, increasing the risk of misuse[41] [42].

REDUCED GENETIC DIVERSITY

25. Industrial animal production often relies on a narrow range of highly selected breeds optimised for rapid growth or high yield. While productive, these populations show reduced genetic variability and reduced adaptation to the environment, which can compromise immune resilience, and increase susceptibility to infectious disease[43].

26. Maintaining greater genetic diversity, including the use of slower-growing or locally adapted breeds, enhances resilience to disease challenges and reduces the likelihood of large-scale outbreaks. Such diversity also supports better welfare outcomes by aligning animals' biological capacities with their production environments[44].

27. Genetic diversity within higher-welfare systems can contribute simultaneously to animal health, disease resilience and long-term food system sustainability[45].

[40] Albernaz-Gonçalves R and others, 'Diseases associated with antimicrobial use in pig farms and risk factors thereof: a cross-sectional study in the Netherlands' (2022) 204 *Preventive Veterinary Medicine* 105632.
[41] Tefera T and Takele T, 'Assessment of welfare and health conditions on working donkeys in Humbo District in Wolaita Zone, Southern Ethiopia' (2024) 17(3) *Journal of Dairy, Veterinary & Animal Research* 555961 https://doi.org/10.19080/JDVS.2024.17.555961 accessed 16 April 2026 accessed 16 April 2026.
[42] Nye C, Watson T, Kubasiewicz L, Raw Z and Burden F, 'No Prescription, No Problem! A Mixed-Methods Study of Antimicrobial Stewardship Relating to Working Equines in Drug Retail Outlets of Northern India' (2020) 9(6) *Antibiotics* 295 https://doi.org/10.3390/antibiotics9060295 accessed 16 April 2026.
[43] FAO, *The State of the World's Animal Genetic Resources for Food and Agriculture* (FAO 2015) https://www.fao.org/3/i4787e/i4787e.pdf accessed 16 April 2026.
[44] EFSA Panel on Animal Health and Welfare, 'Laying hens' welfare: policy recommendations' (2020) 18 *EFSA Journal* e06057.
[45] Van den Bogaard AE, Stobberingh EE and others, 'Mitigating the risks posed by intensification in livestock production: the examples of antimicrobial resistance and zoonoses' (2021) 20 *Current Opinion in Environmental Science & Health* 100237.

COMPROMISED FOOD SAFETY

28. Chronic stress, high stocking densities, and heat or handling stress can alter post-mortem muscle biochemistry associated with abnormal pH decline, poorer meat quality, and increased lipid and protein oxidation, which may facilitate microbial proliferation and toxin formation[46].

29. Meat from animals under chronic stress is often higher in intramuscular fat, which can promote the absorption of bacterial endotoxins in the human gut after consumption.[47]

30. Repeated dietary exposure to endotoxins and chronic foodborne infections may contribute to systemic low-grade inflammation in humans, a recognised risk factor in colorectal and gastric cancers and in metabolic inflammatory diseases[48] [49].

31. As evidenced, increased contamination of food products due to greater pathogen colonisation and excretion in animals kept under poor welfare conditions pose a direct risk for food safety[50].

32. Campylobacter and Salmonella are recognised as priority zoonotic hazards by international food safety authorities[51]. They have been associated with chronic inflammatory conditions in humans such as reactive arthritis and post-infectious irritable bowel syndrome.

33. As shown by EFSA, lesions identified at slaughter and associated with poor welfare conditions, including bruising, skin lesions, fractures and other tissue damage, can lead to the need for carcass trimming, partial condemnation and reduced meat quality[52].

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[46] Tadesse T and others, 'Effects of heat stress on animal physiology, metabolism, and meat quality: A review' (2020) 162 *Meat Science* 108025.
[47] Erridge C, Attina T, Spickett CM, Webb DJ. A high-fat meal induces low-grade endotoxemia: evidence of a novel mechanism of postprandial inflammation. *Am J Clin Nutr.* 2007 Nov;86(5):1286-1292. doi:10.1093/ajcn/86.5.1286.
[48] Erlanson-Albertsson C and Stenkula KG, 'The importance of food for endotoxemia and an inflammatory response' (2021) 22 *International Journal of Molecular Sciences* 9562.
[49] Kang M and others, 'Association of plasma endotoxin and inflammatory cytokines with colorectal adenomas' (2013) 13 *BMC Cancer* 91.
[50] EFSA Panel on Biological Hazards, 'Scientific opinion on the public health hazards to be covered by inspection of meat (poultry)' (2012) *EFSA Journal* 10(6) 2741.
[51] WHO and FAO, *Salmonella and Campylobacter in Chicken Meat: Meeting Report* (WHO Microbiological Risk Assessment Series No 19, 2009) https://www.who.int/publications/i/item/9789241563819 accessed 16 April 2026.
[52] See point 10 above

34. The widespread use of antimicrobials in certain production systems, including prophylactic use, can lead to the transmission of antimicrobial-resistant bacteria to humans through the food chain[53].

REDUCED NUTRITIONAL QUALITY

35. Physiological stress diverts metabolic energy away from growth and muscle development and towards survival responses mediated by stress hormones, leading to altered muscle fibre composition and a higher incidence of myopathies, fibrosis, and fat infiltration.

36. These structural and biochemical changes are associated with reduced protein digestibility, altered amino acid profiles, higher fat-to-protein ratios, and depletion of micronutrients and antioxidants[54].

37. Welfare-related stressors, including heat stress common in intensive systems, increase the production of reactive oxygen species in muscle tissue, promoting oxidative modification of proteins and lipids. Such oxidation can impair nutrient bioavailability[55].

38. Higher-welfare production systems, particularly pasture-based and lower-stress environments, are associated with more favourable nutritional profiles in animal products. Meat and dairy from such systems have been shown to contain higher levels of omega-3 fatty acids, conjugated linoleic acid, and antioxidant vitamins such as vitamins E and A[56] [57].

[53] See points 15-17 above

[54] Silva DCF, de Arruda AMV, Gonçalves AA and others, 'Quality characteristics of broiler chicken meat from free-range and industrial poultry system for the consumers' (2017) 54 *Journal of Food Science and Technology* 1818–1826.

[55] Liu F, Cottrell JJ, Furness JB and others, 'Heat stress reduces growth performance and alters oxidative status in livestock: mechanisms and implications' (2016) 7 *Journal of Animal Science and Biotechnology* 14.

[56] Davis H, Magistrali A, Butler G and others, 'Nutritional benefits from fatty acids in organic and grass-fed beef' (2022) 11 *Foods* 646.

[57] Anderson KE and others, 'Comparison of fatty acid, cholesterol, and vitamin A and E composition in eggs from hens housed in conventional cage and range production facilities' (2011) 90 *Poultry Science* 1600–1608.

HIGHER-WELFARE & SUSTAINABLE ANIMAL PRODUCTION SYSTEMS AS A MATTER OF ONE HEALTH

The previous section has highlighted how poor animal welfare conditions linked to intensive production systems can lead to the emergence, spread and spillover of animal diseases. These conditions notably occur due to specific structural characteristics, including:

1. High stocking densities, which increase chronic stress, injuries and contact rates between animals, including wildlife, which drives disease emergence, spread and spillover to humans[58];
2. Husbandry systems which do not allow for the expression of species-specific behaviours;
3. Greater reliance on routine disease control measures, including with antimicrobials[59];
4. Reliance on genetically uniform, fast-growing breeds, which increases vulnerability to infectious disease and facilitates pathogen adaptation and spread[60].

Intensive production systems have also contributed to biodiversity loss, greenhouse gas emissions and water pollution, among others[61]. Furthermore, they are particularly vulnerable in emergency contexts such as armed conflict or natural disasters, because their high density, dependence on infrastructure, genetic uniformity and reliance on continuous veterinary oversight mean that any disruption rapidly escalates welfare stress, disease spread and food safety risks[62].

By contrast, integrated production systems that allow for higher welfare, such as those with lower stocking densities, environmental enrichment and access to outdoors, support stronger immune resilience, lower disease incidence and more robust genetic diversity. Similar considerations apply

[58] See points 1, 2 and 6
[59] See points 21, 23, and 24
[60] See points 25, 26 and 27
[61] IPES-Food, *Too Big to Feed: Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector* (IPES-Food 2017) https://www.ipes-food.org/_img/upload/files/Concentration_FullReport.pdf accessed 16 April 2026.
[62] Rust JM, 'The impact of climate change on extensive and intensive livestock production systems' (2019) 9(1) *Animal Frontiers* 20–25 https://doi.org/10.1093/af/vfy028 accessed 16 April 2026.

to aquatic animal production, where system design, stocking densities and environmental conditions play a defining role in shaping welfare outcomes, disease dynamics and the need for antimicrobial interventions.

Alongside enhancing animal health, these systems also promote the overall sustainability of animal food production and are positively interconnected with the environmental aspects of the One Health approach.

FAO studies have long stressed that integrated approaches to land, water and soil management are crucial for sustainable livestock production, food security and livelihood protection[63], as they "can lead to direct improvements in the state of land, soil and water, help smallholder farmers, livestock keepers and pastoralists, fisherfolk and forest-dependent people adapt to climate change, and generate multiple ecosystem benefits including secure livelihoods, better nutrition, healthy diets, and reduced greenhouse gas (GHG) emissions"[64]. Similarly, the Committee on Food Security identified the promotion of integrated agricultural systems as key in its policy recommendations on the livestock sector[65]. Also UNEP and ILRI, in a comprehensive study on pandemic prevention, has found that "extensive livestock production systems, including pastoralism, can provide proteins efficiently while also providing environmental co-benefits and reduced zoonotic disease risk"[66] and has recommended supporting "agroecological methods of production that mitigate waste and pollution while reducing the risk of zoonotic disease transmission"[67].

[63] FAO, *Managing soil, land and water resources for sustainable livestock production* (COAG:LI/2024/10) https://openknowledge.fao.org/server/api/core/bitstreams/4ff66416-611c-4ff6-b0e7-a4d3f2be3c98/content accessed 16 April 2026.
[64] FAO, *Conceptual Framework for Integrated Land and Water Resources Management* https://openknowledge.fao.org/server/api/core/bitstreams/965aab0f-068d-4b54-aeda-b1ccdbd190c7/content accessed 16 April 2026.
[65] CFS, *Sustainable Agricultural Development for Food Security and Nutrition: What Roles for Livestock?* (CFS 43 Policy Recommendations, 2016) https://www.fao.org/fileadmin/templates/cfs/CFS43/MS207_Food_Sec_General_SAD_Livestock_en.pdf accessed 16 April 2026. see in particular recommendations V.b, XI,b
[66] UNEP, *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission* (UNEP 2020) https://wedocs.unep.org/items/426976c7-ee73-4cd8-a3f2-8659d1e88b04 accessed 16 April 2026. p. 51
[67] UNEP, *Preventing the Next Pandemic* (67) p. 53

Integrated and extensive production systems essential to implement One Health in agrifood production transformation, include: agroecological approaches[68], pastures, agroforestry and agrosilvopastoral systems, and integrated crop-livestock systems. Such systems also demonstrate greater resilience when agrifood production is disrupted by shocks, including natural disasters and armed conflict, which can rapidly destroy livestock populations, agrifood infrastructure and the livelihoods that depend on them[69].

Agroecology deserves particular consideration from a One Health perspective. It could be considered complementary to One Health, as it strongly contributes to the operationalisation of One Health by promoting balanced interactions between plants, animals, humans and the environment in agrifood systems. The two indeed share the same foundational approach and objectives, as illustrated by the internationally agreed definition of agroecology, where it is described as an integrated approach which "seeks to optimize the interactions between plants, animals, humans and the environment"[70], while also bringing in additional socio-ecological and economic considerations that extend beyond a purely health-focused framework.

International and national investments in One Health and agrifood policies should be aligned with the evidence and recommendations outlined above, hence complying with the Principles for Responsible Investment in Agriculture and Food Systems[71], notably principles 8 "Promote safe and healthy agriculture and food systems" and 10 "Assess and address impacts and promote accountability". Coherent investments would entail: 1. Ensuring adequate investments for the implementation of high animal welfare standards[72]; 2. phasing out "subsidies and perverse

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[68] A comprehensive review screening nearly 12,000 articles found that 78% of cases reported positive effects of agroecological practices on food security and nutrition, with more complex, multi-component systems, including integrated crop-livestock approaches, yielding the strongest outcomes. Bezner Kerr R, Madsen S, Stüber M, Liebert J, Enloe SK, Borghino N, Parros P, Mutyambai D, Prudhon M and Wezel A, 'Can agroecology improve food security and nutrition? A review' (2021) 29 Global Food Security 100540 https://doi.org/10.1016/j.gfs.2021.100540 accessed 21 April 2026.

[69] FAO, *The Impact of Disasters on Agriculture and Food Security 2023: Avoiding and Reducing Losses through Investment in Resilience* (FAO 2023) https://openknowledge.fao.org/handle/20.500.14283/cc7900en accessed 16 April 2026.

[70] FAO, *The 10 Elements of Agroecology: Guiding the Transition to Sustainable Food and Agricultural Systems* (FAO 2018) https://openknowledge.fao.org/server/api/core/bitstreams/3d7778b3-8fba-4a32-8d13-f21dd5ef31cf/content accessed 16 April 2026.

[71] CFS, *Principles for Responsible Investment in Agriculture and Food Systems* (FAO, IFAD and WFP 2014) https://openknowledge.fao.org/server/api/core/bitstreams/f05f6d3d-d434-43da-99e9-a68c04c41342/content accessed 16 April 2026.

[72] WOAH, Codes and Manuals (International Standards for Animal Health and Welfare) https://www.woah.org/en/what-we-do/standards/codes-and-manuals/

incentives of industrialised agriculture"[73] as highlighted by UNEP and ILRI, while redirecting public and private financial flows toward integrated and extensive systems of animal farming, fisheries, and aquaculture. Such investments would contribute to ensuring improved outcomes for humans, animals and the environment, alongside strengthening food security and nutrition.

[73] UNEP, Preventing the Next Pandemic (67) p. 53

RECOMMENDATIONS

In order to strengthen and effectively advance the One Health approach, ensuring it fully contributes to improved food security and nutrition, the World Federation for Animals urges governments and all stakeholders to use upcoming international discussions on One Health—including the discussion of the Framework on One Health in Agrifood Systems, the renovated commitment of the Quadripartite to mobilising sustainable financing[74], and the FAO Global Conference for Actions on One Health in Agrifood Systems—to address the current animal welfare gap within the animal pillar of the approach and eventually translate international commitment into national action.

IN PARTICULAR, WE ISSUE THE FOLLOWING RECOMMENDATIONS:

1. **Ensure that the protection of animal welfare is anchored in the One Health approach, recognising that the protection of animal welfare, beyond physical health, is essential for disease prevention and control**, which, contributes, inter alia, to reducing the need for antimicrobials, as well as for enhancing food security, nutrition, livelihoods, and the sustainability of animal production;
2. **Promote the transition towards more sustainable approaches to animal farming, fisheries and aquaculture as part of One Health**, optimising the health of people, animals and ecosystems and working together across sectors, disciplines and communities to foster wellbeing, as well as promoting whole-of-government and whole-of-society approaches;
3. **Guarantee high animal welfare standards as a necessary part of sustainable food systems transformation under the One Health approach**, ensuring the continuity of veterinary services in national disaster risk management plans, in line with the Sendai

[74] FAO, *Strengthening One Health* (2)

Framework for Disaster Risk Reduction and United Nations General Assembly resolution 79/205.

4. **Ensure that public and private financial flows are directed to the implementation of high animal welfare standards and to integrated and extensive systems of animal farming, fisheries, and aquaculture, as part of the alignment with the goals and targets of the One Health approach.**

ABOUT WORLD FEDERATION FOR ANIMALS

We are a federation of more than 70 NGOs working towards the recognition of animal welfare as an essential component of the sustainable development agenda. Our efforts focus on integrating animal welfare into international health, food, and environmental regimes, as well as trade and development finance rules.

We are accredited observers to the FAO Committee on Agriculture, the UN Environment Programme and to the UN Framework Convention on Climate Change, and we have Special Consultative Status with the UN Economic and Social Council. We are also members of GASL's Action Network on Animal Welfare and of the CFS' Civil Society and Indigenous Peoples' Mechanism.

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