Animal welfare in food systems, animal use in science 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 ***Compassion in World Farming and Cruelty Free International*** *)*

Context: SDG 9 will be central in 2026 multilateral discussions (HLPF, SDG Summit stocktakes on innovation and industrialisation).
Purpose: To highlight why animal welfare, a One Health approach, and food-system transformation are essential levers for achieving sustainable industrialisation.
Summary: Industrialised food systems - particularly industrialised livestock supply chains -are major drivers of environmental degradation, climate emissions, zoonotic risk, and public health externalities.
Thesis: A transition toward humane, sustainable, integrated, and innovative food production systems is indispensable for achieving SDG 9.

Contents

1. Recommendations

To achieve the goals of SDG 9, industrial policy must evolve beyond volume-driven growth toward a model of **sustainable industrialisation** that operates within planetary boundaries. Central to this transition is the adoption of a **One Health** approach, which recognises the inextricable links between human health, animal welfare and the environment. By integrating the principles of One Health into industrial strategies, the HLPF 2026 can foster innovation that reduces systemic risks—such as zoonotic spillover and antimicrobial resistance—while building resilient, future-proof food and scientific infrastructures.

2. Priorities for Policy Action

A. Transition toward Sustainable Food Systems

a. Explicitly recognise industrial livestock farming as a core determinant of sustainable industrialisation and reduce reliance on high-input, high-emission production models.

b. Foster innovation pathways for plant-rich diets, alternative proteins, agroecological production, and regenerative livestock systems.

c. Prioritise "Feeding People First" by shifting to sustainable consumption patterns that reduce wasteful industrial throughput.

d. Promote industrial processes and infrastructure designed to prevent pollution, protect biodiversity, and mitigate zoonotic risks.

B. Advance Human-Relevant Science and Innovation

a. Accelerate the replacement of animal testing with modern Non-Animal Methods (NAMs) or New Approach Methodologies to strengthen scientific infrastructure.

b. Reform regulatory frameworks to officially accept and require human-relevant NAMs data for safety and efficacy evaluations.

c. Support international harmonisation of NAMs acceptance criteria to ensure global scientific consistency.

d. Foster innovation through dedicated training in NAMs and ensure equitable global access to these technologies to prevent an "innovation gap".

3. Key messages

- A. Industrialised livestock systems threaten SDG 9 goals
    - They rely on high levels of inputs (feed, water, antibiotics, energy) that undermine resource-efficient industrialisation.
    - They generate significant externalities (pollution, AMR, land degradation) incompatible with sustainable industrial policy.
- B. Sustainable industrialisation requires rebalancing food production toward plant-rich diets
    - Overproduction and overconsumption of animal-sourced foods in high-income regions distort markets, misallocate resources, and drive unsustainable industrial expansion.
    - Feeding People First aligns industrial output with nutritional need, not volume-driven growth.
- C. Innovation for SDG 9 must prioritise systems transformation, not efficiency alone
    - Tech efficiency (biogas, feed additives, precision livestock farming) cannot counter the structural unsustainability of intensive models.
    - True innovation is shifting to integrated, agroecological, improved animal welfare and improved food security.
- D. Animal welfare is a driver—not a co-benefit—of sustainable industrialisation
    - Better welfare reduces disease burden, antimicrobial use, and waste.
    - Welfare-centred systems have more resilient supply chains, lower biological risk, and lower externalised costs.
- E. One Health is foundational to sustainable industrialisation
    - Industrial food systems link animal, human, and environmental health closely; neglecting animal welfare undermines public health infrastructure.

- Innovations that reduce AMR, greenhouse gas emissions, and zoonotic spillover strengthen industrial resilience.

- F. Innovation for SDG 9 must prioritise NAMs for scientific research
  - Prioritising the use of human-relevant NAMs and adequately investing in them will foster innovation in science - which will, in turn, lead to safer products, better-quality medicines and new tools for confronting future challenges and unexpected emergencies such as the COVID-19 pandemic.
  - Advancing and deploying valid, low-cost, high-throughput non-animal technologies strengthens the innovative scientific tools and testing infrastructure needed for modern chemical safety evaluation.

- G. One Health is foundational to enhancing research and upgrading industrial technologies
  - Non-animal methods, or new approach methodologies (NAMs), are increasingly more efficient and predictive than animal-based approaches, offering significant benefits for animal welfare, human health, and environmental protection.
  - Research which utilises NAMs, including new technologies can enhance research and drive faster, more reliable innovation.

4. Supporting Analysis and Rationale

4.1 Industrial Food Systems and SDG 9

Livestock production has become one of the world's most **resource-intensive and environmentally burdensome industrial sectors**, characterised by high land demands, significant water and energy use, intensive feed-crop supply chains, and pollution from processing and waste streams. These systems also rely heavily on antibiotics as an industrial input, driving antimicrobial resistance (AMR) and undermining long-term productivity.

These characteristics directly impede progress under SDG 9:

- **SDG 9.1 – Resilient infrastructure:**
  Highly concentrated livestock systems experience rapid operational collapse during disease outbreaks or extreme weather events, revealing structural fragility in supply chains.
- **SDG 9.2 – Inclusive and sustainable industrialisation:**
  Industrial livestock systems consolidate market power in vertically integrated corporations, marginalising smallholders and limiting equitable access to markets and innovation.
- **SDG 9.4 – Upgrading industries for sustainability:**
  Despite efficiency improvements, the industrial livestock model remains **structurally incompatible** with climate, biodiversity, and pollution goals due to its high-input nature and scale.

4.2 Reshaping Industrialisation Pathways: Efficiency, Planetary Boundaries, and One Health

Current models of industrial Animal-Source Food (ASF) production divert large volumes of land, water, energy, and calories into feed crops rather than food, reducing system-wide efficiency and misaligning resource use with global nutritional needs. Shifting toward plant-rich diets and increasing the proportion of crops grown for direct human consumption can substantially raise food system efficiency, reduce industrial throughput, and free up capacity for equitable and sustainable nutrition.

At the same time, industrial livestock production is a primary driver of overshoot across multiple planetary boundaries, including climate change, nutrient pollution, land-use change, and biosphere integrity. Sustainable industrialisation under SDG 9 is not achievable unless production and consumption patterns remain within these ecological limits. Continued expansion of industrial livestock systems is structurally incompatible with stabilising these boundary systems.

Animal welfare further shapes the sustainability of industrial production. Intensive systems with poor welfare elevate disease risks, drive routine antibiotic use, and accelerate antimicrobial resistance, now recognised as a global threat to public health and industrial resilience. Welfare-oriented innovations - such as reduced stocking densities, enriched environments, and systems that support natural behaviours - reduce biological risk and decrease reliance on pharmaceutical inputs. Embedding Animal Welfare Impact Assessments into industrial planning and regulation would strengthen One Health outcomes and support innovation aligned with resilient, sustainable industrialisation.

4.3 The Use of Animals in Science and SDG 9

The COVID-19 pandemic demonstrated both the limitations of traditional animal-based research and the promise of **modern, human-relevant scientific infrastructure**. Breakthroughs emerged

from non-animal technologies (e.g., organoids, *in vitro* systems, computational models), accelerating timelines and improving predictive capacity.

Globally, there is growing recognition of the need to transition away from animal-based scientific methods in order to:

- improve human health outcomes,
- support a One Health approach,
- reduce environmental impacts, and
- modernise research infrastructure in line with SDG 9's innovation mandate.

Investing in non-animal, human-relevant research strengthens scientific reliability, supports equitable access to advanced technologies, and positions countries at the forefront of innovative, future-fit industrial development.

5. Enhancing scientific research without testing on animals

Twenty-first-century scientific and technological advances are central to achieving the UN Sustainable Development Goal 9 (Industry, Innovation, and Infrastructure). Modern human-based research approaches are driving innovation in the development of new medicines, vaccines, and safer chemicals that better protect human health and the environment while reducing reliance on animal testing. Strengthening the industries that develop these technologies and the scientific infrastructure that supports them will be critical to scaling these innovations and ensuring that their benefits are accessible globally.

Box 1 - Case study - The COVID-19 Pandemic

The COVID-19 pandemic underscored the importance of investing in innovative, human-relevant research infrastructure and the industries developing these technologies. As scientists struggled to generate meaningful data from animals that do not develop COVID-19 the way humans do, major vaccine companies accelerated progress by moving to human trials before animal efficacy studies were completed[1]. At the same time, U.S. researchers used cutting-edge tools—such as miniature human brain-like structures (cerebral organoids) grown from human stem cells—to produce the first direct evidence that coronavirus could infect and replicate within human brain cells[2]. These advances highlight how supporting modern research industries and infrastructure can drive faster, more reliable biomedical innovation.

---

[1] Osborne, Darrel. "*Coronavirus Vaccine Clinical Trial Starting without Usual Animal Data.*" STAT, March 11, 2020. https://www.statnews.com/2020/03/11/researchers-rush-to-start-moderna-coronavirus-vaccine-trial-without-usual-animal-testing/.

[2] Bullen, C. Korin et al. "*Infectability of Human BrainSphere Neurons Suggests Neurotropism of SARS-CoV-2*.*" *ALTEX* 37, no. 4 (2020). https://doi.org/10.14573/altex.2006111.

Box 2 - Case study - Growing support for enhancing scientific research without the use of animals

There is a growing global acknowledgement of the importance of moving away from animal-based testing and momentum amongst governments to replace the use of animals in research and testing.

Examples include:

In 2016, the Dutch government announced its plan to phase out toxicology tests on animals for chemicals, food ingredients, pesticides, veterinary medicines, and vaccines by 2025.[1]

In 2021, the European Parliament passed a resolution to accelerate the transition from the use of animals in research and testing to human-relevant science across the European Union[2].

In November of 2025, the UK government launched a strategy to support the development, validation and uptake of alternative methods[3]. The plan includes cutting the use of dogs and non-human primates in tests for human medicines by at least 35% by 2030.

In July 2025, Health Canada (HC) and Environment and Climate Change Canada (ECCC) published a federal strategy to reduce vertebrate animal testing under chemicals legislation[4].

In December 2025, the US Food and Drug Administration (FDA) released a new roadmap to reduce and replace animal testing in drug development and regulation[5].

In January 2027, US Environmental Protection Agency's (EPA) renewed and reinstated commitment to end toxicity testing on mammals by 2035, and to expand the use of non-animal methods[6].

---

[1] NCad. "Transition to Non-Animal Research on Opportunities for the Phasing out of Animal Procedures and the Stimulation of Innovation without Laboratory Animals Opinion of the Netherlands National Committee for the Protection of Animals Used for Scientific Purposes (NCad)," December 15, 2016.

[2] Haahr, Thomas. "MEPs Demand EU Action Plan to End the Use of Animals in Research and Testing" | Nyheter | Europaparlamentet." Europa.eu, September 16, 2021. https://www.europarl.europa.eu/news/sv/press-room/20210910IPR11926/meps-demand-eu-action-plan-to-end-the-use-of-animals-in-research-and-testing.

[3] Government of the United Kingdom. “Replacing Animals in Science: A Strategy to Support the Development, Validation and Uptake of Alternative Methods.” GOV.UK, 2025. https://www.gov.uk/government/publications/replacing-animals-in-science-strategy/replacing-animals-in-science-a-strategy-to-support-the-development-validation-and-uptake-of-alternative-methods.

[4] Environment and Climate Change Canada . “Strategy to Replace, Reduce or Refine Vertebrate Animal Testing under the Canadian Environmental Protection Act, 1999 (CEPA) - Canada.ca.” Canada.ca, 2025. https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/implementing-modernized-cepa/strategy-replace-reduce-refine-vertebrate-animal-testing.html.

[5] FDA. “Roadmap to Reducing Animal Testing in Preclinical Safety Studies.” Https://Www.fda.gov/Media/186092/Download, April 2025.

[6] EPA Press Office. “Administrator Zeldin Gets EPA Back on Track to Eliminate Animal Testing after Biden Admin Halted Phase out | US EPA.” US EPA, January 22, 2026. https://www.epa.gov/newsreleases/administrator-zeldin-gets-epa-back-track-eliminate-animal-testing-after-biden-admin.

6. Transition Toward Sustainable and High-Welfare Production Systems

Sustainable industrialisation under SDG 9 requires a shift toward production models that are resource-efficient, regenerative, resilient, and aligned with integrated health and environmental objectives. Transition pathways rooted in agroecology, integrated crop–livestock systems, regenerative grazing, and diversified mixed farming demonstrate how innovation can simultaneously advance productivity, environmental stewardship, and animal welfare.

These systems re-engineer industrial processes to operate within ecological limits while improving the reliability and resilience of supply chains. By reducing reliance on high-input industrial livestock models, they support more efficient use of land, water, energy, and nutrients, while strengthening the adaptive capacity of rural economies and decreasing vulnerability to disease outbreaks, market shocks, and climate-related disruptions.

Lower stocking densities, enhanced housing and enrichment, and the integration of animal welfare considerations into production design all contribute to healthier herds and flocks, reducing the need for routine antibiotic use and supporting One Health objectives. At the same time, diversified systems that integrate crops and animals improve soil fertility, close nutrient loops, and reduce external fertiliser demand - key features of circular and resource-efficient industrial development.

By embedding these approaches into national industrial strategies, countries can:

- **Lower input use** through improved nutrient cycling, reduced reliance on synthetic fertilisers, and minimised dependence on imported feed crops;
- **Reduce pollution** by decreasing emissions, nutrient runoff, and waste burdens associated with intensive livestock production;

- **Enhance resilience** through diversified production systems that are less vulnerable to disease, climate stress, and market volatility;
- **Improve animal welfare** as a structural component of sustainable industrialisation, reducing disease burdens and strengthening overall productivity;
- **Align with SDG 9's innovation mandate** by prioritising systems-level transformation, not efficiency improvements within inherently unsustainable production models.

Transforming industrial food production in this direction positions countries to meet SDG 9 targets on resource-efficient, resilient, and sustainable infrastructure, while also advancing climate, biodiversity, and health commitments. High-welfare and low-input agricultural systems exemplify the type of innovation-driven industrial development that the 2030 Agenda envisions: modern, inclusive, future-proof, and respectful of planetary boundaries.

Box 3 - Case study - Climate-Driven System Failure in Industrial Livestock Production

In 2024 Rio Grande do Sul, Brasil experienced extreme flooding, subsequently revealing how vulnerable industrial livestock systems are to climate-driven infrastructure failures. Total rainfall was 455% above national average levels, collapsing roads, bridges, and dams, cutting off supply chains and leaving more than one million farmed animals dead. The livestock sector alone lost over R$1.2 billion, worsening food insecurity in a region where nearly half the population had already faced some level of food insecurity since 2022 [1].

This disaster highlights the extent to which achieving SDG 9 depends on shifting away from high-input industrial livestock models toward resource-efficient, regenerative, and welfare-centred systems. Working towards this transition will inevitably forge systems that strengthen resilience, reduce environmental impacts, and minimise health risks for humans and animals alike [2].

[1] Compassion in World Farming. "*Climate Doom Loop: Factory Farming's Toll on Animals, Farmers & Food Security.*" Ciwf.org.uk, 2025. https://www.ciwf.org/explore-our-resources/reports-position-papers-briefings/climate-and-environment/climate-doom-loop-report/

[2] Li, Chaohui, Maximilian Kotz, Prajal Pradhan, Xudong Wu, Yuanchao Hu, Zhi Li, and Guoqian Chen. "*Climate Change Drives a Decline in Global Grazing Systems.*" *Proceedings of the National Academy of Sciences* 123, no. 7 (February 9, 2026). https://doi.org/10.1073/pnas.2534015123.

7. Conclusion

- Achieving SDG 9 requires redefining what "sustainable industrialisation" means in the food system.
- The principles of One Health provide a framework to rebalance production, protect public health, and promote truly innovative, future-proof models.
- Animal welfare is not peripheral but foundational to industrial sustainability.
- Reliance on animal-based methods reflects outdated research infrastructure. Phasing out these approaches will accelerate scientific progress and align economic modernization, scientific rigor, and ethical advancement with the SDG 9 goal of innovation-led sustainable development.

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 have Special Consultative Status with the UN Economic and Social Council and we are accredited observers to the FAO Committee on Agriculture, the UN Environment Programme and to the UN Framework Convention on Climate Change.

www.wfa.org