

# THE FOOD SECURITY, SUSTAINABILITY, PUBLIC HEALTH AND ANIMAL WELFARE IMPLICATIONS OF LIVESTOCK PRODUCTION

Position Paper by

Compassion in World Farming, Humane Society International  
Eurogroup for Animals, International Fund for Animal Welfare,  
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The *Global Livestock Alliance* aims to create a safer, fairer and more sustainable livestock sector. The Alliance stresses that social equity, global health and the environment should be considered among the strategic pillars of the global livestock agenda. We share these aims and additionally believe that good standards of animal welfare should be included in this agenda, both because animal welfare is important to people around the world and because it can contribute to the main aims of the Alliance.

The role of livestock can helpfully be considered through assessment of its contribution to the diverse objectives of food and farming policy. This policy area must aim to end hunger and achieve food security, ensuring that all people have access to safe and sufficient food. It has to provide food of good nutritional quality and promote diets that support good health. It must be environmentally sustainable, as our ability to feed the growing world population is dependent on the continuing availability of healthy and plentiful soils, land, water and biodiversity. Finally, it should ensure that animals are farmed to high welfare standards – which will help in achieving the other objectives. Food and farming policy needs to take an integrated approach, ensuring that one objective is not achieved at the expense of another.

## **Ending hunger**

Olivier De Schutter, who until recently was UN Special Rapporteur on the right to food, stresses that increasing food production will not of itself be sufficient to combat hunger.<sup>i</sup> It must be combined with improved livelihoods for the poorest, particularly small-scale farmers in the developing world. Smallholder livestock farmers must be helped to increase their productivity in ways that are appropriate for their circumstances. This should not entail the introduction of industrial livestock systems as these exclude participation of the poorest farmers. They are out-competed by industrial production which provides little employment.

A constructive approach would be to help small-scale farmers provide improved health care and nutrition for their animals through better disease prevention, care and management and the cultivation of fodder crops such as legumes. For example, in East Africa fodder shrubs have been identified that provide cheaper and easily available protein feeds for improving milk production in smallholder farms. Around 200,000 smallholder dairy farmers (40–50% being women) have planted such fodder shrubs which contribute about US\$3.8 million annually to farmers' incomes across the region.<sup>ii</sup> Veterinary and extension services could play a major role in this process, as they provide an effective channel for delivering information and advice directly into rural farming communities. Furthermore, they are now being restored and modernised with the commitment of major development organisations, including the World Bank and the FAO (having been dismantled under the structural adjustment programme).<sup>iii</sup>

Such programmes can be enabled and enhanced by an emphasis on animal welfare, including good health and nutrition. Better animal health and nutrition result in increased productivity and longevity. This will improve smallholders' purchasing power, making them

better able to buy the food that they do not produce themselves and to have money available for other essentials such as education and health care.

### **Food security**

Achieving food security is often presented as a primarily quantitative challenge. However, more than enough food is already produced to feed the anticipated world population in 2050 of 9.6 billion. The real challenge lies not so much in producing more but in wasting less, and ensuring a more equitable distribution of food and agricultural resources.<sup>iv</sup> Sufficient caloric availability at the national or global level, while a critical component of food security, neither ensures equitable distribution of those calories, nor does it ensure that those calories are nutritionally appropriate.<sup>v</sup> Further, over 50% of global crop calories are lost or wasted or otherwise used in ways that do not contribute to the human food supply:

#### *Food loss and waste*

A 2014 report by the High Level Panel of Experts on Food Security and Nutrition states that worldwide 25% of food calories are lost or wasted post-harvest or at the distribution/retail and consumer levels.<sup>vi</sup> The High Level Panel points out that food loss and waste entails a needless use of resources and in particular it refers to studies that show that:

- The carbon footprint of global food loss and waste, not including greenhouse gas (GHG) emissions from land-use change, is 6-10% of anthropogenic GHG emissions;
- Food loss and waste is also water waste. The global blue water footprint of food wastage (i.e. the consumption of surface and groundwater during food production) is about 250 km<sup>3</sup> per year;
- Food loss and waste accounts for more than 300 million barrels of oil per year;
- Globally 1.4 billion hectares of land are used to produce food which is lost or wasted.

Waste of food from animals represents a waste of animals' lives. Looking after livestock better while they are alive, and using their products better after slaughter, will improve both animal welfare and food availability.

Furthermore, the direct economic cost of food wastage of agricultural products (excluding fish and seafood), based on producer prices only, is about USD 750 billion per annum - equivalent to the GDP of Switzerland.<sup>vii</sup>

#### *Feeding human-edible crops to animals*

A University of Minnesota paper calculates that 36% of the world's crop calories are fed to animals but, as will be explained below, only 17-30% of these calories are returned for human consumption as meat or milk.<sup>viii</sup> The effect of this is that 70-83% of the 36% of the world's crop calories that are used as animal feed are lost, i.e. 25-30% of the total; they are not retained in food for humans. This means that one quarter or more of the world's crop calories are being lost by being fed to animals.

As indicated above, the loss and waste of 25% of global food calories post harvest or at the distribution/retail and consumer levels results in substantial quantities of land, water and energy being used to produce food that is not eaten. Similar quantities of land, water and energy are used to grow the 25-30% of global crop calories that are fed to livestock but are then not available in food for humans. And this misuse of resources then increases the pressures for intensification of livestock production, which often reduces animal welfare, as discussed below, while not ensuring efficient resource use.

#### *Use of crops for biofuels and other uses*

9% of global crop calories are used for biofuels and other uses.<sup>ix</sup>

In sum, over half of the world's food is lost or wasted post-harvest or at distribution/retail and consumer levels or by being fed to animals or used as biofuels. We do not need to produce large amounts of extra food; we just need to use the food we produce more sensibly.

Increased production may be needed in certain regions or specific cases but, in light of the various forms of loss and waste referred to above, we believe that the claim that a 60% increase in global food production is needed by 2050 substantially overestimates the quantity of extra production needed.<sup>x</sup> The (arguably erroneous) 60% figure leads policy makers to place undue emphasis on further intensification while giving insufficient weight to the need to farm in ways that do not undermine the natural resources on which our continuing ability to produce food depends.

### **The resource-efficiency of different forms of animal feed**

Feeding human-edible cereals to animals is inefficient as much of their food value is lost during conversion from plant to animal matter. Studies, including a UNEP report, show that for every 100 calories that we feed to animals in the form of human-edible crops, we receive on average just 17-30 calories in the form of meat and milk.<sup>xi xii</sup> In short, feeding cereals to livestock has an efficiency ratio of just 17-30%.

A 2013 University of Minnesota paper indicates that the efficiency rates may be even lower for some animal products. It reports that for every 100 calories of grain that we feed to animals, we get only about 40 new calories of milk, 22 calories of eggs, 12 of chicken, 10 of pork, or 3 of beef.<sup>xiii</sup>

The FAO has said “When livestock are raised in intensive systems, they convert carbohydrates and protein that might otherwise be eaten directly by humans and use them to produce a smaller quantity of energy and protein. In these situations, livestock can be said to reduce the food balance”.<sup>xiv</sup> Using cereals as animal feed is a wasteful use not just of these crops but of the land, water and energy used to grow them.

De Schutter highlights the importance of “reallocating cereals used in animal feed to human consumption”.<sup>xv</sup> He adds that “continuing to feed cereals to growing numbers of livestock will aggravate poverty and environmental degradation”.<sup>xvi</sup>

The excessive use of cereals in animal feed should be avoided and instead more emphasis should be given to approaches such as the following. The welfare of animals in these systems is generally better than in intensive farming, so again, a focus on animal welfare can help to achieve benefits for efficiency and sustainability.

- *Raising animals on pastures or other grasslands:* The benefit of extensively reared ruminants is that they convert grass and other inedible vegetation into food that we can eat and are able to use land that is generally not suitable for other forms of food production. Also, semi-natural grasslands support biodiversity and store carbon. However, care must be taken to avoid overgrazing which in marginal lands can lead to desertification. Nor should new pastures be created by deforestation.
- *Integrated crop/livestock production:* The World Bank is extremely positive about the benefits of such rotational mixed farming as crop residues can be used to feed animals.<sup>xvii</sup> Moreover, their manure, rather than being a pollutant, fertilises the land and improves soil quality.

### **Improved nutrition and diet-related health**

The FAO states that globally 1.4 billion people are overweight, of whom 500 million are obese.<sup>xviii</sup> Once considered a problem only in high-income countries, obesity is on the rise in low- and middle-income countries.<sup>xix</sup>

Livestock policy must aim to reduce the contribution of poor diet to the high and growing incidence of non-communicable disease. The high levels of meat consumption that have been made possible in the western world by industrial farming are having an adverse impact on human health. The European Commission points out that overconsumption of animal protein can lead to obesity, diabetes, heart diseases and certain cancers.<sup>xx</sup> EU citizens on average consume around 40% more saturated fat than the recommended maximum dietary

intake proposed for Europe by the World Health Organisation and almost 50% more red meat than the maximum level advised by the World Cancer Research Fund.<sup>xxi</sup>

Even developing countries, where industrial farm animal production is expanding, do not require an overall increase in the average consumption of animal source foods amongst all segments of their populations, as a significant proportion of their populations are already meeting or exceeding their energy requirements. Ironically, many developing countries with high levels of hunger and malnutrition now simultaneously bear the burden of an obesity-related public health crisis,<sup>xxii,xxiii</sup> with the number of overweight women exceeding the number of underweight women in most developing countries.<sup>xxiv</sup>

In countries that bear the double burden of under-nutrition and obesity, under-nutrition is greater in rural areas.<sup>xxv,xxvi,xxvii</sup> Certainly eggs, meat, and milk can offer a valuable source of nutrition for rural households suffering from malnutrition, particularly for children. Further, farm animals can also provide a variety of other supports to approximately 70% of the world's rural poor, including pastoralists, mixed farmers, and landless peoples.<sup>xxviii</sup> Industrial farm animal production systems, however, which are capital intensive systems dominated by resource-rich and sometimes foreign producers, cannot fulfill these other social needs met by small-scale farm animal production because such large-scale systems inherently exclude poor, small-scale producers and often pollute the natural resource base critical to the well-being of rural communities.

The developing world should aim for a balanced intake of animal-source foods and should not adopt western diets as these have an adverse impact on health.

The FAO has pointed out that the modern western diet lacks nutrient quality and highlights the need to integrate the dimension of nutritional quality into food policy.<sup>xxix</sup> Free-range animals – that consume fresh forage and have higher activity levels (with benefits for their welfare) – often provide meat of higher nutritional quality than animals that are reared industrially. Meat from free-range chickens contains substantially less fat and generally a higher proportion of the beneficial omega-3 fatty acids than meat from chickens reared industrially.<sup>xxx</sup> Similarly, pasture-fed beef has less fat and higher proportions of omega-3 fatty acids than grain-fed beef. Hens kept with outdoor pasture access have higher vitamin D<sub>3</sub>,<sup>xxxi</sup> vitamin E, vitamin A, and omega-3 fatty acids in their eggs.<sup>xxxii</sup>

### ***Antimicrobial use in livestock production: its contribution to antimicrobial resistance***

The overuse of antimicrobials in industrial animal production contributes significantly to the emergence of bacteria that are resistant to certain antimicrobials used in human medicine. Antimicrobials are used in farming:

- for growth promotion: this is prohibited in the EU but common elsewhere
- as prophylaxis to prevent disease: in order to suppress the diseases that would otherwise be liable to emerge when large numbers of animals are housed together at high densities, antimicrobials are frequently given to whole herds or flocks via their feed or water, preventing disease but simultaneously, thereby, allowing other problems for welfare. The European Medicines Agency has said that “this provides favourable conditions for selection, spread and persistence of antimicrobial-resistant bacteria. Some of these bacteria are capable of causing infections in animals and if zoonotic also in humans. Bacteria of animal origin can also be a source for transmission of resistance genes to human and animal pathogens”
- therapeutically: the therapeutic treatment of individual sick animals with antimicrobials is often essential to relieve suffering.

We believe that the use of antimicrobials for growth promotion and the non-therapeutic use of antimicrobials in the intensive livestock sector should be brought to an end. Disease should instead be prevented by good hygiene, husbandry and housing and improved immune competence should be promoted by reducing stress. This is another example of the principle

that emphasis on animal welfare produces other benefits, in this case for health and food safety. It is sometimes said that ‘Animal welfare is the best vaccine.’

### **Sustainable agriculture**

As indicated earlier, human-edible crops are the main form of feed used in industrial livestock production but animals are inefficient in converting these crops into meat and milk. As a result, more arable land, blue and grey water and energy are generally needed to produce a unit of nutrition from industrially produced meat than from meat derived from animals that are fed little or no human-edible crops or from non-animal products.

**Water:** The UN states that “Intensive livestock production is probably the largest sector-specific source of water pollution”.<sup>xxxiii</sup> A key study analysed the water footprint of food production.<sup>xxxiv</sup> It concluded that animal products from industrial systems generally consume and pollute more ground- and surface-water resources than animal products from grazing or mixed systems. The study concludes that the anticipated further intensification of animal production systems globally will result in increasing blue (volume of surface and groundwater used) and grey (pollution caused) water footprints per unit of animal product; the authors explain that this is due to the larger dependence on concentrate feed in industrial systems. We are also concerned about the welfare implications of such intensification, as explained below.

**Land and soils:** Animal products from industrial systems generally use more arable land than animal products from grazing or mixed systems.<sup>xxxv</sup> Clear benefits could arise if a proportion of the arable land used to grow feed crops for livestock were instead used to grow crops for direct human consumption. First, a greater number of people could be fed from the same area of land. This could help avert the anticipated expansion of cropland into grasslands, savannahs and forests. Such expansion would be damaging as it would entail release of stored carbon into the atmosphere, loss of biodiversity and the erosion of indigenous livelihoods that accompanies deforestation.

Second, arable land could be farmed less intensively with reduced use of monocultures, chemical fertilisers and pesticides. This would enable the quality of agricultural soils to be restored by methods such as the use of rotations, legumes, green manure and animal manure. This is a pressing challenge as an estimated 23% of global soils are degraded.<sup>xxxvi</sup>

Third, fewer animals would be reared in intensive systems. If the majority of livestock were instead kept in extensive systems – including on marginal land that cannot be used for crops – this would benefit both their welfare and sustainability.

**Nitrogen pollution:** Nitrogen is one of the major environmental challenges of the twenty-first century.<sup>xxxvii</sup> Excess reactive nitrogen ( $N_r$ ) in the environment results in damage to water quality, air quality (and hence human health), soil quality, the greenhouse balance and ecosystems and biodiversity.<sup>xxxviii</sup> Agricultural emissions of nitrogen in the EU dwarf those from traffic and industry.<sup>xxxix</sup> Most production of  $N_r$  in Europe is used for fertiliser to grow feed crops for animals.<sup>xl</sup> The global nitrogen cycle is dominated by humanity’s use of  $N_r$  to raise livestock.<sup>xli</sup>

Animal farming is inherently less efficient in its use of  $N_r$  than crop production.<sup>xlii</sup> Livestock production involves a double burden of nitrogen losses. First, when fertilisers are applied to feed crops, much of the nitrogen in the fertiliser is not taken up by the crops. Second, when these crops are fed to animals, much of the nitrogen in the crops is not assimilated by the animals and is instead excreted in their manure. The nitrogen that is not absorbed by feed crops and animals pollutes the environment; for example, it is washed into rivers and lakes and leaches from the soil into groundwater, contaminating sources of drinking water and damaging aquatic and marine ecosystems. Globally, the 80% of nitrogen and phosphorus in crop and grass harvests that feeds livestock ends up providing only around 20% (15-35%) of the nitrogen and phosphorus in human diets.<sup>xliii</sup> All these problems are growing rapidly with increasing livestock production, much of which is in intensive systems.

**Climate change:** A high meat diet (>100g/day) is responsible for much higher greenhouse gas (GHG) emissions than a low meat diet (<50g/day).<sup>xiv</sup> Meat and dairy products are generally responsible for a higher level of GHG emissions than non-animal foods.<sup>xiv</sup> Plant-based diets are estimated to be 22% to 26% less greenhouse gas intensive than the average UK diet.<sup>xvi</sup> Encouraging developed countries, where a high meat diet is also linked to human health problems, to consume less resource-intensive food should be a key component of any livestock sustainability discussion.

A sustainable approach to agriculture would promote farming systems that enhance soil quality, make judicious use of land and water without polluting it, restore biodiversity and ecosystems, and keep animals in socially acceptable ways. Industrial livestock production fails on all these counts. Animal products from industrial systems generally use more arable land and consume and pollute more ground- and surface-water than animal products from grazing or mixed systems. The need for cereals to feed industrially produced animals leads to intensification of crop production. With this comes abandonment of the rotations that traditionally maintain soil fertility as well as biodiversity loss. These problems could be addressed by placing a greater emphasis on raising animals on pasture and in integrated crop-livestock farms, as well as promotion of more plant-based foods.

### **Animal welfare**

Extensive indoor systems and outdoor systems have the potential, if well-designed and well-managed, to deliver good welfare outcomes. In contrast, even where stockmanship is good, industrial systems have little potential to provide satisfactory welfare. Industrial production can be broadly defined as farming where the production system and management style treat the animals as commodities and do not proactively support or allow management according to their individual needs, and where the performance of normal behaviour is impeded to such an extent that welfare is compromised.

Many indoor-housed animals are kept in crowded, barren conditions or confined in cages or crates. In such systems animals are unable to perform important natural behaviour. For example, scientific research has established that hens have powerful drives to lay their eggs in a nest, peck and scratch in the ground, dust-bathe and perch.<sup>xlvii</sup> None of this behaviour is possible in barren battery cages.

Animals kept in highly confined conditions can experience a range of health and welfare problems. For example, as compared with sows housed in groups, sows confined in gestation crates have weaker bones and lower muscle weight, and a reduced level of cardiovascular fitness due to lack of exercise. They also have a higher incidence of urinary tract infections, associated with inactivity.<sup>xlviii</sup> Moreover, stereotypies (a form of abnormal behaviour that develops in impoverished environments), such as bar-biting and sham chewing, are frequently observed in sows confined in crates or tethers. Stereotypies are forms of repetitive behaviour induced by repeated coping attempts, frustration, and/or brain dysfunction.<sup>xlix</sup>

In barren, industrial production environments that do not meet the needs of the animals, other abnormal behaviour can develop. For example, young piglets in bare pens, with an innate exploratory nature and little opportunity to express normal rooting, digging and foraging behaviour, begin to redirect this behaviour toward the only available substrate, their pen-mates. This can lead to the development of tail-biting, which can become severe enough to cause serious injuries. Rather than raising piglets in a more enriched and rewarding environment, the crude solution developed by industrial producers is to cut off the piglets' tails at a young age.

Scientific research on veal crates recognises that a young animal needs proper exercise for normal bone and muscle development.<sup>1</sup> Calves kept in narrow crates where they cannot turn round have severe locomotor problems after six months in these conditions. They are often fed an all liquid diet, deficient in iron. A better alternative is to raise these young animals in

spacious, bedded pens, or outdoors on pasture, providing them a fibrous diet and opportunity for energetic play and exercise.

The health of intensively farmed animals is often seriously impaired by genetic selection for fast growth or high yields. The European Food Safety Authority (EFSA) has concluded that “long term genetic selection for high milk yield is the major factor causing poor welfare, in particular health problems, in dairy cows”.<sup>i</sup> EFSA has also concluded that genetic selection of pigs for rapid growth has led to leg disorders and cardiovascular malfunction.<sup>ii</sup> The high rate of egg production of the modern laying hen causes osteoporosis and so creates a substantial risk of fractures both during the laying period and at depopulation at end of lay.<sup>iii</sup> A large-scale UK study into leg disorders in broilers found that 27.6% of the chickens had gait scores of 3 or more, i.e. lameness that is likely to be painful and that fast growth rates are the primary risk factors for these problems.<sup>iv</sup>

We believe that animals must be raised in conditions and selected for productivity levels that avoid the problems described above. Vitality, for the reasons outlined in the previous sections, such care for animal welfare will on balance promote rather than hinder other aspects of sustainability. Indeed, the ‘Principles on Responsible Investment in Agriculture and Food Systems’ adopted by the Committee on World Food Security in October 2014 recognise the positive linkage between animal welfare and product quality – including food safety - and the ability to increase productivity in a sustainable manner.

## Conclusions

For the new Global Alliance for a Safer, Fairer and More Sustainable Livestock Sector, animal welfare should be at the forefront of discussions on the future of livestock farming. Indeed, care for animal welfare helps to achieve benefits for all the pillars of sustainability: economic, environmental and social.

Furthermore, calls for an increase in livestock use and productivity, especially by intensification, must be tempered with consideration of the broader picture—*inter alia* food security (including efficient resource use and reducing all forms of food loss and waste), poverty alleviation (including the livelihoods of small-scale farmers), environmental protection, healthy consumption patterns, and the health and welfare of the animals. All of these factors are undermined by industrial livestock production. To be truly sustainable, the full societal implications of intensive farming practices must be addressed.

## November 2014

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