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FEEDING THE PLANET

BUILDING ON THE MILAN CHARTER

POSITION PAPER BY COMPASSION IN WORLD FARMING

CONTENTS

INTRODUCTION

The Milan Charter helpfully identifies the major challenges related to food as "combating undernutrition, malnutrition and waste" and "feeding a constantly growing population without harming the environment, so as to preserve resources for future generations". This paper examines how these challenges can be met.

Global food policy 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. It needs to substantially reduce food and farming's contribution to climate change. 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.

2015 is a crucial year for determining the shape of the world's future food policy. In addition to EXPO 2015 which focuses on *Feeding The Planet*, the UN post-2015 Sustainable Development Goals are scheduled for adoption in September. Draft Goal 2 is "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture". In December a new international agreement on climate change is due to be adopted in Paris. Also, 2015 is the UN International Year of Soils.

The Milan Charter points out that worldwide some 800 million people suffer chronic hunger, more than two billion people are malnourished or suffer deficiencies in vitamins and minerals; and nearly two billion people are overweight or suffer from obesity.

An EU Discussion Paper produced as part of its participation at Expo 2015 points out that lack of adequate nutrition is primarily due to lack of access to food and this is in most cases due to relative or absolute poverty (rather than to insufficient quantity of global production).[i] Olivier De Schutter, former UN Special Rapporteur on the right to food, stresses that increasing food production will not of itself be sufficient to combat hunger.[ii] It must be combined with greater social equity and 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 healthcare and nutrition for their animals through better disease prevention and management, the expansion of veterinary services and the cultivation of fodder crops such as legumes. Better animal health and nutrition result in increased livestock 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.

Increased production is indeed needed in the world's poorest regions but this must be achieved in a genuinely sustainable manner. A study in resource-conserving agriculture shows that industrialisation is not needed in order to increase productivity. It examined the impact of 286 projects in 57 poor countries.[iii] The projects included integrated pest and nutrient management, conservation tillage, agro-forestry and water harvesting. These projects increased productivity on 12.6 million farms. The average crop yield increase was 79%. All crops showed water use efficiency gains. Of projects with pesticide data, 77% resulted in a decline in pesticide use by 71% while yields grew by 42%.

Malnutrition comprises both hunger and diets that are deficient in essential vitamins and minerals. Deficiencies in vitamin A, iron, iodine and zinc have adverse impacts on health and may impair physical and mental development and the immune system.[iv] Addressing micronutrient deficiencies requires a range of approaches including fortification of food with vitamins and minerals, biofortification (increasing the micronutrient content of crops through conventional plant breeding), greater dietary variety, increased consumption of fruit and vegetables and avoidance of a high proportion of predominantly processed foods.

De Schutter emphasises the need to address the structural causes of micronutrient deficiency such as the priority given to monocropping of certain staples over more diverse farming systems that would help to ensure more adequate diets.[v] He advocates strengthening local food systems that support the livelihoods of poor farmers.

Adverse impact of Western diets on human health

Once considered a problem only in high-income countries, obesity is on the rise in low- and middle-income countries.[vi] Poor diet is contributing to the high and growing incidence of non-communicable disease.

A new study published in *The Lancet* concludes that "diet-related health burdens due to non-communicable chronic diseases (NCDs) are now surpassing those due to undernutrition in nearly every region of the world".[vii] It adds that "increases in unhealthy patterns are outpacing increases in healthy patterns in most world regions". Crucially, it concludes that "left unaddressed, undernutrition and deficiency diseases will be rapidly eclipsed in [poor] populations by obesity and NCDs, as is already occurring in India, China, and other middle-income nations".

A paper in the 2015 *Lancet* series on obesity concludes that "Today's food environments exploit people's biological, psychological, social, and economic vulnerabilities, making it easier for them to eat unhealthy foods." [viii] The paper refers to "the globalisation of food systems that promote

overconsumption of energy-dense, nutrient-poor foods … as the major driver of the obesity pandemic". It adds that "The high profits that come from the successful exploitation of vulnerabilities are often the driving force behind environmental changes that promote overconsumption of food."

The paper points out that "in high-income countries, energy-dense and nutrient-poor foods tend to be inexpensive, thus saturating low-income neighbourhoods with unhealthy options. It is totally unacceptable that the poorer members of society find themselves having to rely on poor quality, unhealthy food. De Schutter stresses that "any society where a healthy diet is more expensive than an unhealthy diet is a society that must mend its price system."[ix]

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.[x]

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.[xi] Significant health benefits are expected to result from a lower intake in Europe of saturated fats and red meat.[xii] While meat consumption is quite low for many of the world's poor, the developing world should aim for a balanced intake of animal-source foods and should not adopt harmful western diets.

The U.S. 2015 Dietary Guidelines Advisory Committee recommends – on health and environmental grounds - diets with more fruit and vegetables and less red and processed meat.[xiii] Specifically, the report states that *"A diet higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in calories and animal based foods is more health promoting and is associated with less environmental impact than is the current U.S. diet".*

Comparison of nutritional quality of meat from animals reared industrially and extensively

The FAO states that the modern western diet lacks nutrient quality and highlights the need to integrate the dimension of nutritional quality into food policy.[xiv] 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.[xv] Similarly, pasture-fed beef has less fat and higher proportions of omega-3 fatty acids than grain-fed beef.

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. These chickens are in a commercial system in China.

Hilal Elver, the UN Special Rapporteur on the right to food, states: "Support for small-scale family farmers and food producers should be paramount in the adoption of future policies related to food security and food sovereignty. Policy prescriptions that typically call for the expansion of industrial-scale agricultural development and ignore the real threats to global food supply (such as biofuel expansion, inadequate investment in climate-resilient agriculture, lagging support for small-scale farmers and women food producers and the massive loss of food to spoilage and waste) must be reconsidered ...the Special Rapporteur proposes to adopt a qualitative rather than quantitative approach to the right to food".[xvi]

Many, however, continue to present the achievement of food security as a primarily quantitative challenge. It is often asserted that, in order to feed the population of 9.6 billion expected by 2050, food production is going to have to increase by around 70%. The EU EXPO 2015 Discussion Paper suggests that 60-110% more food may be needed by mid-century. And on the basis of these figures we are regularly told that further intensification of agricultural production is essential.

However, more than enough food is already produced to feed 9.6 billion people. Indeed some estimates suggest that we already produce enough to feed up to 14 billion people.[xvii] But over half this food is wasted. The real challenge lies not so much in producing more but in wasting less.

A 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.[xviii] 9% of global crop calories are used for biofuels and other uses.[xix] 36% of the world's crop calories are fed to animals but, as will be explained below, three-quarters of this is wasted due to the low efficiency with which animals convert cereals to meat and milk.

The resource-inefficiency of feeding human-edible crops to animals

Industrial livestock production is dependent on feeding human-edible cereals to animals. This is immensely inefficient. Studies show that for every 100 calories fed to animals in the form of human-edible crops, we receive on average just 17-30 calories in the form of meat and milk.[xx], [xxi] A University of Minnesota paper indicates that the efficiency rates may be even lower for some animal products. It concludes 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.[xxii]

The paper also looks at protein conversion. It reports that for every 100 units of protein contained in grain fed to animals, we receive only about 43 units of protein from milk, 35 from eggs, 40 from chicken, 10 from pork, or 5 from beef.

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".[xxiii]

De Schutter highlights the importance of "reallocating cereals used in animal feed to human consumption".[xxiv] He adds that "continuing to feed cereals to growing numbers of livestock will aggravate poverty and environmental degradation".[xxv]

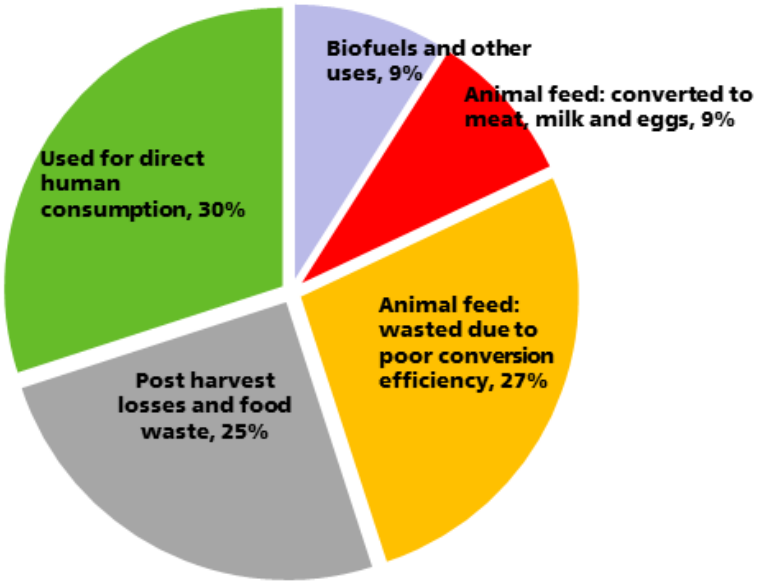
A Chatham House paper concludes that the feeding of cereals to animals is "staggeringly inefficient".[xxvi] The paper points out that the "use of crops and arable land for livestock production indirectly places rich meat and dairy consumers in competition for calories with poor crop consumers." The International Institute for Environment and Development stresses that using cropland to produce corn, soybeans and other crops for animal feed rather than to grow food for direct human consumption is "a colossally inefficient" use of resources.[xxvii]

As indicated earlier, 36% of the world's crop calories are fed to animals but, as we have seen, only 17-30% of these calories are returned for human consumption as meat or milk.[xxviii] The effect of this is that 70-83% of the 36% of the world's crop calories that are used as animal feed are wasted; they produce no food for humans. This means that 25-30% (70-83% of 36%) of the world's crop calories are being wasted by being fed to animals.

Clearly, using human-edible crops as animal feed should be regarded as a form of food waste. Both the Milan Charter and the EU EXPO 2015 Discussion Paper highlight the need to reduce food waste. Neither, however, makes any mention of the waste entailed in feeding human-edible crops to animals. The determination to protect industrial livestock production from criticism is absolute.

Figure 1: Use - and waste - of calories produced by world's crops

52% of global crop calories are wasted: lost, thrown away or fed to animals without being returned as meat, milk or eggs.



Based on data from UNEP, 2009; Lundqvist et al, 2008; HLPE report 8, 2014; & Cassidy et al, 2013

Do we really need to produce 70% more food to feed the growing world population?

The UN Environment Programme (UNEP) calculates that the cereals which, on a business-as-usual basis, are expected to be fed to livestock by 2050, could, if they were instead used to feed people directly, provide the necessary food energy for over 3.5 billion people.[xxix] If a target were adopted of halving the amount of cereals that, on a business-as-usual basis, would be used for feed by 2050, an extra 1.75 billion people could be fed.

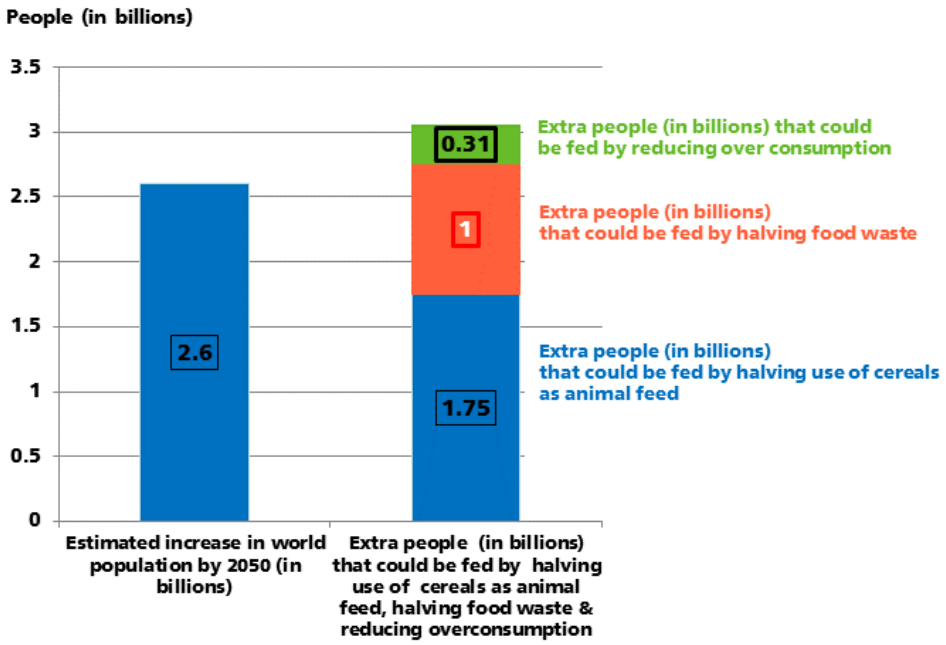
The EU EXPO 2015 Discussion Paper refers to a study that produces a similar figure. It calculates that shifting the crop calories used for animal feed and other uses (biofuels and other industrial uses) to direct human consumption could potentially feed an additional ~ 4 billion people.[xxx]

A report by the High Level Panel of Experts on Food Security and Nutrition states that worldwide 25% of food calories are lost or wasted.[xxxi] If loss and waste could be halved an extra one billion people could be fed.

Based on figures in an interim report by the World Resources Institute[xxxii], we calculate that an extra 310 million people could be fed if the number of people who are expected to be obese and overweight by 2050 were reduced by eliminating obesity and halving the number who are overweight.

If all the above steps were taken, an extra 3 billion people could be fed, more than the anticipated 2.6 billion increase in world population (see Figure 2).

Figure 2: Feeding the 2.6 billion extra people anticipated by 2050



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, the claim that a 70% increase in global food production is needed by 2050 substantially overestimates the quantity of extra production needed. The (arguably erroneous) 70% 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.

We refer earlier to a study in *The Lancet* that suggests that the drive to persuade consumers to over-consume unhealthy food in part stems from the globalisation of food systems and the high profits that come from such food. The study states that "barriers to action [on obesity] have included lobbying from the food industry (specifically, manufacturers of prepared processed foods) and restaurant industry".

What, however, is the source of the insistence that food production must greatly increase and that further industrialisation is needed to achieve this? Could it be that as the growth of industrial agriculture in the West slows down, the huge companies that produce the inputs for industrial farming are seeking to create new markets in the developing world for their proprietary seeds, chemical fertilisers and pesticides, livestock genetics and animal pharmaceuticals?

What are feed-efficient ways of farming animals?

The excessive use of cereals in animal feed should be avoided and instead more emphasis should be given to approaches such as the following:

- *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.[xxxiii] Moreover, their manure, rather than being a pollutant, fertilises the land.
- *The use of by-products and unavoidable food waste*.

The Milan Charter recognises the importance of farming "without harming the environment, so as to preserve resources for future generations". However, neither the Milan Charter nor the EU EXPO 2015 Discussion Paper acknowledge the detrimental impact on natural resources of industrial livestock production and Western diets' excessive consumption of animal protein.

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, ground- and surface-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.

Water: The UN states that "Intensive livestock production is probably the largest sector-specific source of water pollution".[xxxiv] A key study analysed the water footprint of food production.[xxxv] It concluded that animal products from industrial systems generally consume and pollute more ground- and surface-water 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.

Another study points out that by far the largest proportion of the EU total consumption-related water footprint derives from the consumption of edible agricultural goods (84%). It investigated the EU consumption-related water footprint of four different diets including the current diet and a healthy diet based on recommendations of the Deutsche Gesellschaft für Ernährung [German Society for Nutrition].[xxxvi]

The researchers conclude that it is especially the consumption of animal products that accounts for high water footprints. The healthy diet involves a 45% reduction in meat and results in a 20% decrease in the blue and grey water footprints.

Land and soils: Animal products from industrial systems generally use more arable land than animal products from grazing or mixed systems.[xxxvii] 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. The Commission points out that "45% of European soils face problems of soil quality, evidenced by low levels of organic matter".[xxxviii] Research shows that soil biodiversity is under threat in 56% of EU territory with intensive agriculture being a key factor in loss of soil biodiversity.[xxxix] Globally, approximately 33% of soils are facing moderate to severe degradation.[xl]

Industrial livestock production is a key factor in the decline of our soils. The need to grow huge amounts of grain to feed factory farmed animals has fuelled intensive crop production with its use of agro-chemicals and monocultures. This has eroded soil quality, undermining the ability of future generations to feed themselves.

A recent study concludes that "modern agriculture, in seeking to maximize yields ... has caused loss of soil organic carbon and compaction, impairing critical regulating and supporting ecosystem services".[xli] It highlights "the extent to which modern agricultural practices have degraded soil natural capital".

If the quantity of crops needed as animal feed were reduced, arable land could be farmed less intensively. 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.

Nitrogen pollution: Nitrogen is one of the major environmental challenges of the twenty-first century.[xlii] 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.[xliii] Agricultural emissions of nitrogen in the EU dwarf those from traffic and industry.[xliv] Most production of N_r in Europe is used for fertiliser to grow feed crops for animals.[xlv] The global nitrogen cycle is dominated by humanity's use of N_r to raise livestock.[xlvi]

Animal farming is inherently less efficient in its use of N_r than crop production.[xlvii] Livestock production involves a double burden of nitrogen losses. First, when fertilisers are applied to cereals, only 30–60% of the nitrogen in the fertiliser is taken up by the crops.[xlviii]

Second, when these crops are fed to animals, they only assimilate half or less of the nitrogen in their feed; half or more is 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.

The *European Nitrogen Assessment* concludes that "the full chain of animal protein production generates much more losses to the environment than plant protein production".[xlix] The inefficiency of livestock production is highlighted by the fact that globally, the 80% of nitrogen and phosphorus in crop and grass harvests that feeds livestock ends up providing only around 20% … of the nitrogen and phosphorus in human diets.[l]

SECTION 4: CLIMATE CHANGE

The FAO estimates that the livestock sector is responsible for greenhouse gas (GHG) emissions of 7.1 gigatonnes CO_2-e per annum, i.e.14.5% of human-induced emissions.[li] The European Council Conclusions of October 2014 stress "the need to ensure coherence between the EU's food security and climate change objectives". The Council Conclusions also encourage the sustainable intensification of food production. However, further intensification of the EU's highly industrialised agriculture sector will impair sustainability.

It is questionable whether further intensification of livestock production will reduce GHG emissions.

Cattle: A common assumption is that intensification of dairy production reduces GHG emissions per unit of milk produced. Recent studies show substantially higher GHG emissions for European confinement dairy systems as compared with pasture-based dairying.[lii] [liii] [liv] US researchers have found that GHS emissions are 8% lower in year-round outdoor dairy systems than in high-production confinement systems.[lv]

The FAO states that grassland carbon sequestration could significantly offset emissions with global estimates of about 0.6 gigatonnes CO_2–e per year.[lvi] The French Agriculture Minister, Stéphane Le Foll, argues in favour of agro-ecology which enables carbon to be stored while also improving yields due to increased soil organic matter.[lvii] He points out that this would benefit both food security and the fight against climate change

The French Institut de L'Elevage estimates that in dairy production carbon sequestration in pasture compensates for 10-70% of methane emissions. It adds that in beef suckler systems carbon sequestration compensates for 60% to over 100% of methane emissions.[lviii]

The supplementation of ruminant diets with concentrate is often advocated as a way of reducing methane emissions. However, a FAO report points out that this could threaten food security by reducing the grain available for human consumption and that it may also have an impact on land-use change which itself produces GHG emissions.[lix]

Pigs and poultry: Another common argument is that industrial pig and poultry are an efficient option for minimising GHG emissions. However as further intensification will increase demand for feed grain, cropland will have to be farmed more intensively and/or it will have to expand.[lx] Expansion of cropland, e.g. for soy production, is likely to be at the expense of forests and grasslands.[lxi] This will

involve increased GHG emissions due to release of stored carbon into the atmosphere as land is cleared for cropland. The FAO states that, in part due to its need for soy, industrial pork production entails higher emission intensities than backyard systems.[lxii]

Moreover, the additional grain that is needed will often be grown intensively with the aid of synthetic fertilisers. The manufacture of these fertilisers uses considerable amounts of fossil fuel which results in sizeable CO_2 emissions.[lxiii] In addition, the application of nitrogen fertiliser leads to substantial emissions of nitrous oxide, the most aggressive GHG.[lxiv]

Supply-side measures insufficient on their own to prevent rise in GHG emissions

Mitigation techniques (such as improved manure management) can reduce emissions though care must be taken to ensure that any technique used does not harm animal welfare. A recent Chatham House paper concludes that technical mitigation measures and increased productivity will be insufficient on their own to prevent an increase in farming's GHG emissions, let alone achieve a reduction.[lxv] The study stresses that it is unlikely that global temperature rises can be kept below 2°C without a reduction in meat and dairy consumption.

Healthier diets would lead to reduced GHG emissions

Recent research shows that a high meat diet (>100g/day) is responsible for much higher GHG emissions than a low meat diet (<50g/day). A high-meat diet produces 7.19kg CO_2-e per person per day while a low meat diet emits 4.67kg CO_2-e per person per day, a reduction of 35% [lxvi]

A 2014 study points out that 'business-as-usual' will lead to agriculture's GHG emissions being so high by 2050 that they alone will push global temperatures to increase by almost 2°C.[lxvii] This would be a disaster as it leaves no room for emissions from energy, transport and industry. The study stresses that only a shift to healthy diets and a halving of food waste will allow farming's GHG emissions to be reduced. The healthy diets in this study varied between regions. For example, they involve a 66% and 23% decrease in meat and milk consumption respectively in West Europe and a 268% and 47% increase in meat and milk consumption respectively in South Asia.

SECTION 5: ANIMAL WELFARE: ADVERSE IMPACT OF FURTHER INTENSIFICATION ON ANIMAL WELFARE

The World Organisation for Animal Health (OIE) has 180 Member countries. Paragraph 6 of the OIE *Guiding Principles for animal welfare* states: "the use of animals carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable".

In the EU, Article 13 of the Treaty on the Functioning of the EU provides that: "in formulating and implementing the Union's agriculture [and] fisheries … policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals".

Extensive indoor systems and outdoor systems have the potential, if well-designed and well-managed, to deliver good welfare outcomes. However, even where stockmanship is good, industrial systems have little potential to provide satisfactory welfare.

Globally many indoor-housed animals are kept at high densities in barren conditions or confined in cages or crates. In such conditions animals are unable to perform their normal behaviours. For example, hens have powerful drives to lay their eggs in a nest, peck and scratch in the ground, dust-bathe and perch.[lxviii] None of these behaviours is possible in barren battery cages which are widely used in much of the world.

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 smaller muscles and a poorer level of cardiovascular fitness due to lack of exercise and a higher incidence of urinary tract infections, associated with inactivity.[lxix] Moreover, stereotypies, such as bar-biting, which are a major indicator of poor welfare, are frequently observed in sows confined in crates or tethers.

The health of intensively farmed animals is often seriously impaired by genetic selection for fast growth or high yields. The European Food Safety Authority 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".[lxx] A UK study into leg disorders in broilers found that, primarily due to high growth rates, 27.6% of the chickens had levels of lameness that are likely to be painful.[lxxi] The high productivity of modern laying hens causes osteoporosis which results in a high level of bone fractures.[lxxii]

The stressful conditions in which industrially farmed animals are kept impair immune competence and facilitate the development and transmission of pathogens. The US Council for Agriculture, Science and Technology has warned that a major consequence of modern industrial livestock production systems is that they potentially allow the rapid selection and amplification of pathogens.[lxxiii]

We believe that animals must be raised in conditions and selected for productivity levels that avoid the problems described above.

Worryingly, the EU EXPO 2015 Discussion Paper advocates 'sustainable intensification'. It adds that "within the livestock sector, sustainable intensification also requires consideration of a range of welfare issues". It seems unaware that any further intensification of the EU's highly industrialised livestock sector will almost inevitably have a damaging impact on animal welfare.

The EU Paper proposes the 'genetic improvement' of livestock using "modern biotechnology (which spans a continuum between conventional breeding and genetic modification)". Again it appears unaware of the serious animal welfare problems (outlined above) that already arise from genetic selection aimed at pushing animals to extreme yields and growth. In the interests of animal welfare we should move away from selection for excessive production levels. However, the EU Paper advocates driving animals to even higher yields through selective breeding and genetic engineering.

SECTION 6: THE WAY FORWARD - FEEDING PEOPLE SUSTAINABLY

Food policy sometimes gives excessive weight to the assumption that food security inevitably necessitates substantially increased production. Food policy should not be dominated by a productionist paradigm but should instead seek to fulfil a number of objectives including:

- Food security: ensuring that all people have access to sufficient food
- Provision of food of high nutritional quality
- Promotion of diets that support good health
- Resource efficiency: efficient use of food and the resources used to produce it
- Enhancement of soil quality and judicious use of arable land
- Use water sparingly without polluting it
- Restore biodiversity and ecosystem services
- Minimise food-related greenhouse gas emissions
- Sustainable consumption
- Good standards of animal welfare.

Food policy must strive to satisfy all these criteria; synergies should be maximised and trade-offs avoided as far as possible. Identifying and addressing interlinkages between the different facets of food policy is necessary to avoid working in silos and to ensure balanced progress.

Many, including the EU EXPO Discussion Paper, advocate 'sustainable intensification'. But further intensification in those parts of the world where agriculture is already highly industrialised would impair sustainability by degrading the natural resources on which farming depends.

Sustainable intensification is based on the flawed assumption that huge increases in food production are needed. However, we already produce enough food to feed the anticipated maximum world population. A large overall global increase in production is not needed although growth is necessary in the poorest countries. This growth must be achieved in ways that enhance the livelihoods of small-scale farmers and regenerate the natural resource base critical to the well-being of rural communities.

Animal farming in all regions should be based on systems in which animals convert matter that cannot be eaten by humans (grass, crop residues, by products, unavoidable food waste) into meat and milk. The use of human-edible crops should be minimized. Good standards of animal welfare should be a core objective.

Crop production should be based on the following principles and actions which can both restore the natural resources on which farming depends and increase productivity:

- the fostering of beneficial ecosystem services including healthy pollinators such as bees and carbon sequestration which can be best achieved by halting deforestation and restoring degraded soils;
- the development of improved biodiversity at ecosystem, farm, seed and soil levels;
- integrated nutrient management; this involves improving soil fertility and quality by methods based on natural processes such as the use of rotations, legumes and nutrient cycling (though in some regions fertility may be so poor that the use of synthetic fertilisers is needed to aid the process of building fertility). It also entails preventing the escape of nutrients into the environment where they can become pollutants;
- the use of practices that conserve water and are drought-resistant e.g. techniques for improving water retention in the soil. Water harvesting in dryland areas allows for the cultivation of abandoned and degraded lands. In West Africa, stone barriers built alongside fields slow down runoff water during the rainy season, allowing an improvement of soil moisture, the replenishment of water tables, and reductions in soil erosion. The water retention capacity is multiplied five- to ten-fold, the biomass production multiplies by 10 to 15 times, and livestock can feed on the grass that grows along the stone barriers after the rains[lxxiv];
- using the principles of integrated pest management to control insects, plant pathogens and weeds;
- the use of agroforestry where multifunctional trees are incorporated into agricultural systems. Nitrogen-fixing trees can build up soil health and increase crop production. The roots of the trees can slow down soil erosion. Thanks to the trees, birds return to feed off insects – this reduces the use of chemicals;
- the encouragement of localised and seasonal food systems;
- the development of resilience to climate shocks and price volatility.

The benefits of a shift in consumption patterns

The Western diet with its high levels of animal products and of *per capita* food consumption is unhealthy and environmentally damaging. Studies show clear synergies between healthy and sustainable diets.

A briefing prepared for the UN 2015 Global Sustainable Development Report (GSDR) stresses that the efficiency of producing food calories or protein can be 4-20 times greater without the intermediate step of feeding livestock. It also points out that high levels of consumption of meat and dairy products, typical of western diets, may be 2-3 times above health recommendations.[lxxv]

A 2014 study summarised research integrating ten million person-years of observations across eight study cohorts, to show the marked health benefits of diets with lower-than-average meat consumption. These benefits include a 15-42% reduction in the risk of Type II Diabetes, and 6-12% reduction in the risk of cancer.[lxxvi] The GSDR briefing states: "while the priority is to tackle overconsumption in high and middle-income populations, the positive effects on public health would be felt universally. If integrated, nutrition focused agricultural policies were adopted, more grains and pulses would likely be available to improve the diets of those most vulnerable amongst the global population."

A reduction in EU consumption of animal products would have multiple benefits. A move to healthier diets with around 50% less meat could lead to a:

- reduction in heart disease and certain cancers[lxxvii] [lxxviii]
- 20% reduction in the use and pollution of surface- and ground-water[lxxix]
- 40% reduction in agricultural emissions of nitrogen[lxxx]
- 23% reduction in cropland use[lxxxi]
- 25-40% reduction in greenhouse gas emissions[lxxxii]
- 75% reduction in imports of soybean for animal feed.[lxxxiii]

A FAO paper sets out the preliminary results of its study into low-input livestock production. The paper states: "the intensification of livestock systems during the past few decades has resulted in a number of downsides. With the substitution of grassland with feed concentrates, the pressure on arable land increased and led to severe nutrient imbalances at farm, country and regional levels." [lxxxiv]

The FAO study shows that by moving to livestock production without concentrate feed, overall food availability in 2050 increases while pressure on forest areas decreases. Furthermore, many positive environmental impacts could be achieved, including lower GHG emissions and energy use and improved biodiversity. However, the study points out that this cannot be sustainable without a global shift to sustainable diets (i.e. decreased consumption of livestock products).

Need for fundamental shift in food system is receiving increasing recognition

The FAO's Director-General has stressed that a paradigm shift is needed in our model of food production as the current model cannot ensure food security and prevent soil degradation and biodiversity loss.[lxxxv]

Continuing with current food policies will be a disaster. A major study[lxxxvi] concludes that business-as-usual will – even with substantial increases in yields - lead by 2050 to a:

- 5-42% increase in global cropland
- 13-15% increase in global pasture
- 8-14% reduction in forest cover
- 42-77% increase in greenhouse gas emissions
- 56-120% increase in irrigation water use
- 45-79% increase in fertiliser use.

The study shows that these changes can only be mitigated by a major reduction in global consumption of animal products and a 50% fall in food waste.

CONCLUSION

Our current food system is failing. Much of the world's population is either hungry, malnourished or over-eats, usually consuming unhealthy food. Globally, intensive farming is degrading soils, polluting water, destroying forests and eroding biodiversity. A core contributor to the system's poor outcomes is the industrialisation of livestock production. This is dependent on feeding human-edible crops to animals which are converted very inefficiently into meat and milk. This inefficiency leads to industrial livestock's wasteful use of natural resources and undermines food security.

We need a new food model. Animals should be fed on materials that cannot be eaten by humans which they convert into meat and milk. The use of human-edible crops should be minimized. Good standards of animal welfare should be a core objective.

We already produce sufficient food to feed the growing world population which is expected to reach 9.6 billion by 2050. Large global increases in food production are not necessary (though they are needed in the poorest regions). If all forms of food waste were just halved we could readily feed 9.6 billion people.

A major reduction in global consumption of animal products (while allowing for an increase in regions with very low consumption) is needed to avoid dangerous levels of climate change and further degradation of the natural resources on which farming depends. Such a reduction would also produce health benefits in the west and middle-income countries.

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