Industrial animal agriculture – the next global health crisis?

WSPA
World Society for the Protection of Animals

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"The American Public Health Association (APHA) hereby:

Resolves that APHA urge federal, state and local governments and public health agencies to impose a moratorium on new Concentrated Animal Feed Operations (CAFOs) until additional scientific data on the attendant risks to public health have been collected and uncertainties resolved."

2003-7 Precautionary Moratorium on New Concentrated Animal Feed Operations, American Public Health Association, 2003 Policy Statement.[59]

This is a report prepared by the World Society for the Protection of Animals (WSPA) for presentation at the World Health Organisation, Global Forum for Health Research, Mexico City, Mexico, 16-20 November 2004. An expanded report will be produced following the conference. For more information contact leahgarces@wspa.org.uk

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Foreword*

"Industrial animal agriculture - the next global health crisis?" is a call for attention from the World Society for Protection of Animals (WSPA). With this document, WSPA seeks to alert the World Health Organization (WHO) and other public health institutes to "take immediate steps to reverse the growth of industrial animal agriculture, especially in regions where this production is set to dominate" (i.e. Asia, Latin America and Africa). As a virologist involved in research at a National Public Health Institute, I have read this draft report with great interest. I see merit in this report, in that it lists a number of important health issues arising from the ever-increasing demand for animal protein and the direct consequence of this, namely the increasing scale of industrial animal agriculture. My direct involvement is with zoonotic infections, i.e. infections that can jump from animals to humans. During a recent expert consultation of the WHO*, several recommendations were drafted which are relevant for this topic. The WHO called for involvement of non-traditional partners in improving preparedness for human health hazards arising from the animal world.

The mission of WSPA differs from that of the institutes that it addresses, and therefore recommendations for action will not necessarily be shared. What is important, however, is to not discard the message underneath, namely a joint concern for the consequences of the increasing demand for animal protein to human and animal health. That should be a good staring point for discussion.

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* Prepared for a draft report from which this submission is extracted.

This study highlights the public health effects of the highly intensive farming of animals, whereby large numbers of animals are often confined to a small area along with the attendant waste from the system. Some highly intensive systems, such as battery cages for laying hens and sow stalls for pregnant pigs, are being phased out on animal welfare grounds in some parts of the world, e.g. the European Union. However, in other parts of the world, these same systems are being taken up.

There is no doubt that the use of highly intensive farming systems has accelerated the use of antibiotics and other inputs, and led to the association of these systems with public health risks as outlined in this paper. This paper calls for action to reduce these associated public health risks, not least through the adoption of safe, humane and sustainable production systems such as free-range and organic. It should be recognised that animals can also be kept indoors in a welfare-friendly manner and without damage to the environment.

A large proportion of farm animals worldwide are reared in highly intensive industrial farming systems. Unless action is taken to reverse this situation, the public health impacts are likely to increase. This paper proposes that consumers worldwide will increasingly demand quality food that is produced to high standards of both food safety and animal welfare.

Introduction

Industrial farming is a system of raising animals using intensive 'production line' methods that maximise the amount of animal products produced, while minimising production costs to the industry. Industrial animal agriculture is characterised by high stocking densities and/or close confinement, forced growth rates, high mechanisation, and low labour requirements.[1] According to the United Nations' Food and Agriculture Organization (FAO), Asia has the fastest-developing livestock sector, followed by Latin America and the Caribbean.[2] According to the International Food Policy Research Institute (IFPRI), countries in Latin America, Asia and Africa will be the world's leading producers of animal products by 2020 and much of that meat will be produced in industrial systems.[3] Consumption of animal products is also set to increase the most in these regions over the next 15 years. (See Table 1)[3]

Table 1: Meat consumption by region in 1993 and projected consumption in 2020 (kilograms per person per year).

Region	1993	2020	% Increase
China	33	60	45
Other East Asia	44	67	34
India	4	6	25
Other South Asia	7	10	30
Southeast Asia	15	24	38
Latin America	46	59	22
West Asia/North Africa	20	24	8
Sub-Saharan Africa	9	11	18
Developing World	21	30	29
Developed World	76	83	8
World	34	39	13

In these regions, many industrial animal farms are located beside, or sometimes within, some of the world's most densely populated and fastest growing cities, where they can pollute the water, air and land. With little regulation presently in place to control inputs or outputs of industrial animal farming, the potential consequences on the health of communities is of great concern. Little work is currently being conducted to analyse the public health effects in developing countries related to industrial animal agriculture. Research in more affluent countries such as the United Kingdom and the United States has raised concerns in scientific literature about infectious disease, antibiotic resistance, pollution to drinking waters and land, resulting in serious disease outbreaks and other health concerns as a result of inputs and outputs of industrial animal farming.

Zoonoses: food-borne gastrointestinal disease

Millions of people suffer each year from food-borne illnesses. Developing nations bear the greatest burden of cost and illness because of the presence of a wide range of parasites, toxins, and biological hazards and the lack of surveillance, prevention and treatment measures - all of which can leave the poor in a chronic cycle of infection.[17] In the United States, food-borne diseases causes approximately 76 million illnesses, 325,000 hospitalisations, and 5,000 deaths each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalisations, and 1,800 deaths.[18]

Most outbreaks of Escherichia coli (E. coli) 0157:H7, a virulent and potentially lethal strain of E.coli, have been associated with contaminated beef and with the rise of rapid automated slaughter practices and industrial feedlots systems as the means of raising cattle.[19] E.coli infects meat when it is contaminated with the contents of the gut (faeces) of slaughtered animals. Industrial animal agriculture often requires high throughput slaughter lines. The speed of these slaughter lines can result in gut spillage, as well as poor animal welfare. Infection by E.coli O157:H7 causes bloody diarrhoea, renal failure, and death; particularly amongst children and the elderly. The WHO estimates that pathogenic E. coli is responsible for up to 25% of cases of diarrhoea amongst children in the developing world.[19]

Camplyobacters are the most common bacterial causes of gastroenteritis in both developed and developing countries.[19] One study reported that Campylobacter spp. may be found in up to 90% of broiler (meat) chicken flocks, 100% of turkeys and 88% of domestic ducks.[20] A UK government survey in August 2001 revealed that two-thirds of fresh chickens in British supermarkets and butchers shops are infected with food poisoning bacteria. Laboratory checks showed 63% of samples were contaminated by the Campylobacter bug, which is responsible for approximately three-quarters of confirmed food poisoning cases. [21, 22] In the EU, some 170,000 Campylobacter poisonings are reported annually. [22] The actual number of cases is likely to be as much as seven times higher - at 1.9 million - according to a prominent health expert, as the majority of poisonings go unreported to health authorities. [23] In the United States, where underreporting has been taken into account, the 1.96 million food-borne human cases of Campylobacter each year are said to be responsible for $700 million -1,400 million per annum lost in productivity, and 99 deaths. [12, 5]

Public health risks from industrial farming emanate from large numbers of animals being kept in a small space. In the broiler chicken shed, tens of thousands of chickens are often kept on a litter-covered floor. If litter is not properly maintained, then significant animal welfare and public health risks, such as Campylobacter contamination, can result.[20] A recent Danish study concluded that used poultry litter, when stored, acts as a continuous source of C. jejuni.[24] It is also of concern that poultry growers sometimes reuse litter for two or more 'grow-out cycles', i.e. two or more different flocks, further exacerbating the potential for the spread of Campylobacter.[25]

A fundamental concern for industrial-style livestock farming is that large numbers of animals are often kept in a small area, leading to problems of waste disposal as well as disease potential

Salmonella is a leading cause of food-borne disease. As in the case of Campylobacter, moist litter that is often present in a broiler shed, for example, is likely to contribute to the cultivation and growth of Salmonella.[26] Industrial animal farms can disperse Salmonella widely into the environment, polluting surface waters, the soil, and rivers.[19] Salmonella enteriditis can infect eggs in hens' ovaries and cause fever and diarrhoea in humans. Salmonella DT104 is spread by cattle and is often resistant to almost every available antibiotic. [19] Of particular concern is the increasing number of human Salmonella infections that are resistant to antibiotics, in part as a result of the misuse and overuse of antibiotics in industrial animal farming. One strain of S. Typhimurium has emerged as resistant to five drugs: ampicillin, chloramphenicol, streptomycin, sufolnamides, and tetracycline.[27]

WSPA urges the World Health Organisation and other public health institutes to monitor and make recommendations to ensure the control of food-borne diseases associated with industrial animal

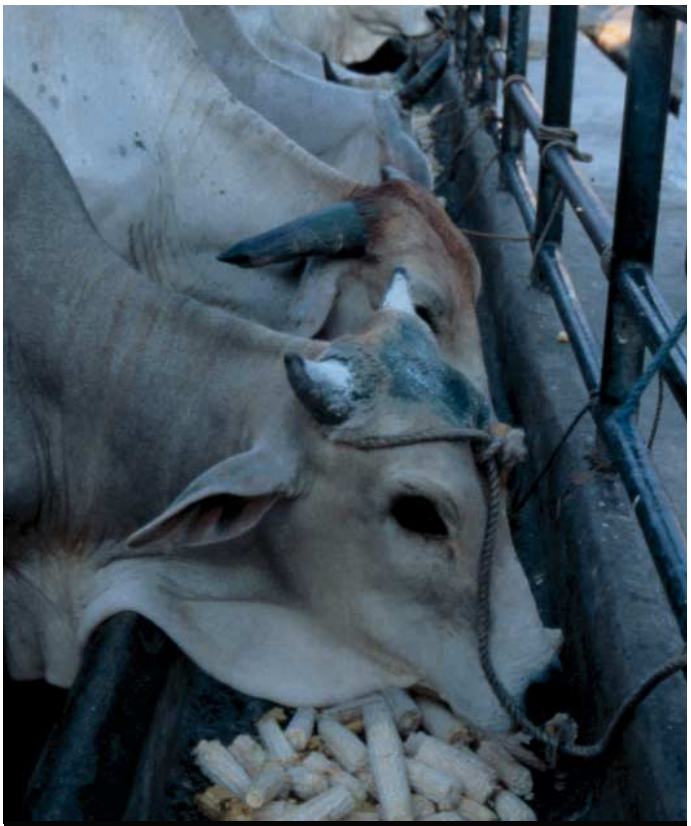
farming. On public health as well as animal welfare grounds, WSPA recommends that industrial animal farming is phased out in favour of more humane and sustainable methods of food production.

Alternative methods to industrial animal agriculture include systems such as free-range or organic methods where animals are given more space, less antibiotics, and where outputs have less negative impact on the water and land. Indoor systems can also be used where the animals are given the space and environment needed to express natural behaviours and meet their welfare needs.

Other zoonoses

Industrial animal agriculture has acted as a 'launch pad' for zoonotic diseases such as Bovine Spongiform Encephalopathy (BSE), avian flu and Nipah virus.

The WHO has reported that as of April 2004, 146 people in the UK have succumbed to variant Creutzfeldt-Jakob disease (vCJD), the human form of mad cow disease.[28] BSE, and the subsequent infection of humans with vCJD, is characterised by spongy degeneration of the brain, with severe and fatal neurological signs and symptoms. The practice of feeding rendered animal protein to cattle, which are natural herbivores, in order to cut costs, is believed to have resulted in BSE and subsequent human infection. [28]



'Zero-grazing' systems, where feed is brought to the animal, have led to unnatural farming practices such as feeding rendered animal protein to cattle. Originally only found in North America and parts of Asia, they are now becoming increasingly common throughout the developing world

In Eastern and Southeastern Asia alone, an estimated 6 billion broiler chickens are reared for meat [29] - many of these birds are raised in proximity to the regions' rapidly growing cities. [29] This increasing intensity of production, along with the close proximity of these animals to where people live, raises some serious public health concerns. [29] According to the Food and Agriculture Organization, the spread of avian flu from Pakistan to China may have been facilitated by the rapid scaling-up of poultry and pig operations and the massive geographic concentration of livestock from industrial animal farms in Thailand, Vietnam and China.[30]

At the end of February 2003, an outbreak occurred of highly pathogenic avian influenza A virus subtype H7N7 in commercial poultry farms in the Netherlands. A study found an unexpectedly high number of transmissions of avian influenza A virus subtype H7N7 to people directly involved in handling infected poultry. [31] The 2003 outbreak in the Netherlands resulted in over 30 million chickens – one quarter of the country's flock - being slaughtered in over 1000 commercial holdings, causing two human deaths and over US$150 million in damages.[32]

Since January 2004, avian flu has killed 28 people in Vietnam and Thailand - experts suspect that the outbreak has been responsible for more human deaths than have been reported. The outbreak which was thought to have ceased in March 2004, has resumed in four countries and recently spread to Malaysia.[61] Costs are estimated to be in the billions of dollars for the Asian poultry industry, with over 100 million chickens slaughtered. [33] The Asian Development Bank has stated that the outbreak could result in "tens of billions of dollars" in damage, citing in particular the poultry industry in Thailand - worth $1 billion in exports - and in Indonesia - worth $7 billion in domestic production.[34]

In Canada, two poultry workers became ill with a less virulent strain of the flu. Costs included 17 million culled chickens, turkeys and ducks; thousands of lost jobs and an estimated US$300 million impact on the local economy.[35]

There are concerns that funds to facilitate the 'repopulation' of poultry will be directed to large-scale intensive methods of rearing animals rather than more humane and sustainable alternatives. This is likely to perpetuate the public health risk.

Nipah virus is one of the newest zoonoses to emerge and it is a salient, but complicated, example of what can happen when intensive agriculture combines with the destruction of ecosytems.[36] Nipah was first discovered in 1997 in a small Malaysian village, which was home to one of the largest pig farms

in the country. Residents living near the farm began coming down with flu-like symptoms resulting in more than 100 deaths.[36] In April of 2004, Nipah struck again in Bangladesh, killing 19 people. [36]

Sow stalls are commonly used in industrial animal farming to rear a maximum number of pigs using a minimum amount of space

Scientists predict that as industrial agriculture continues to move into tropical environments, the risk from Nipah viruses and other diseases that can jump the species barrier is growing.[36]

With humans living near and working with high concentrations of enclosed animals, the risks of disease spreading are increased. With animals for slaughter often being transported long distances, sometimes across borders, the spread of disease is further exacerbated. Of particular concern is where outbreaks have occurred in countries less equipped to monitor, control and prevent outbreaks.

Recent outbreaks suggest that the zoonotic disease consequences related to industrial animal farming should be a priority concern. WSPA urges the World Health Organization and other public health institutes to use their influence to advise policy makers against actions that will lead to the further expansion of industrial animal agriculture. Policymakers should also be advised to support humane and sustainable alternatives that are likely to minimise the risk of pandemic or local outbreaks of zoonoses.

Antibiotic resistance

Of the 18,000 tonnes of antibiotics used each year for medical and agricultural purposes in the US, 12,600 tonnes are for non-therapeutic treatment, in order to promote farm animal growth. [37]

According to the World Health Organization and FAO, the widespread use of these drugs in the livestock industry is helping to breed antibiotic-resistant microbes, and making it harder to fight diseases amongst both animals and humans alike.[38]

An example of a manure lagoon, used to process waste on this farm in Malaysia

The EU has recently moved to ban seven antibiotics for use in growth promotion. Four antibiotics are still permitted, though the European Commission Scientific Steering Committee has proposed to ban all growth promoters from 2006, due to concern over antibiotic resistance.[39] In February 2002, three major global companies -Tyson Foods, Perdue Farms and Foster Farms - voluntarily stopped the 20-year-old practice of adding antibiotics to the feed given to healthy chickens for prophylactic purposes.[40] Global fast food companies McDonald's, Wendy's and Popeyes no longer dose chickens with an antibiotic related to the anthrax treatment ciprofloxacin, in case this reduces ciprofloxacin's effectiveness for humans. [40] Despite these actions, the use of antibiotics continues to rise globally. Anti-microbial use by poultry producers has risen 307% per bird since the 1980s. Beef cattle are given 28% more antibiotics than they were 15 years ago, and pigs are fed 15% more.[41] A study in South Africa revealed that meat from slaughtered egg-laying hens was contaminated with large numbers of infectious diseases, diseases that the study community was suffering from. Of further concern, the study showed that the bacteria were 100% resistant to most common antibiotics.[42] A pilot study in Thailand revealed a prevalence of Salmonella and E. coli resistant to anti-microbials in workers in pig and chicken farms in the northern part of the country, presumably from the overuse of antibiotics in livestock raising.[43]

In some countries, successful measures have been taken to reduce the amount of antibiotics used in livestock rearing. For example, in Denmark, a ban on the use of antibiotics to promote growth has resulted in:

- A reduction of vancomycin-resistant eneterococcus prevalence in chickens from 80% to 10%
- A reduction of antibiotic resistant bacteria in pigs from 65% to 25%
- A significant reduction in the spread of salmonella from livestock to humans without antibiotics, through careful monitoring and control programs for broilers, laying hens and pigs
- A saved expenditure of US$25.5 million in 2001. [44]

In the Philippines, the use of herbs and spices to prevent disease in a free-range poultry farm has proved effective and has added quality to the meat's flavour.[62]

While some measures have been taken to curtail the use of antibiotics in some regions, use globally continues to increase. WSPA believes that as industrial animal agriculture expands in Asia, Latin America and Africa, the use of antibiotics needs to be carefully regulated. WSPA urges the World Health Organization and other public health institutes to advise policy makers to ban the use of antibiotic growth promoters in farm animals.

Free-range farms, such as this chicken farm in the Philippines, use spices and native plants to treat and prevent illness. Chilli, for instance, can be used to treat respiratory problems and to de-worm birds

Toxic chemicals

Livestock in industrial farms are often fed a mixture of high protein grains and other ingredients that help animals put on weight quickly at a low cost. For example, animal fat can be used to supplement feed in order to increase growth. However, animal fat may be contaminated with chemicals such as polychlorinated biphenyls (PCBs). PCBs, dioxins and organochlorines are part of a class of chemicals called persistent organic pollutants (POPs), which bioaccumulate in human and animal tissue, increasing in toxicity as they move up the food chain. Human exposure to POPs is associated with an increased risk of cancers; neurobehavioural impairment, including learning disorders and changes in temperament; disruptions of the endocrine and immune system; reproductive deficits and sex-linked disorders; a shortened period of lactation in nursing mothers; diseases such as endometriosis; and increased incidence of diabetes.[45]

In Belgium in 1999, animal fat supplementing feed, in order to increase growth, contaminated over 1,500 metric tons of animal feed with toxic levels of PCBs and dioxins. [46] In June 1999, the dioxin crisis, caused by dioxin-contaminated feed components, exploded in Belgium, resulting in withdrawal of chicken and eggs from the market. Despite these problems, however, recycling animal fat into animal feed is still allowed in many countries, particularly developing nations. [46] Interestingly enough, a study found that during the dioxin crisis in Belgium, Campylobacter infections decreased by 40% during June 1999, mainly because of the withdrawal of poultry from retail sale. [48]

A study in the journal *Science,* in 2004, reported that farmed salmon contained 11 times more dioxin than in wild salmon.[49] For PCBs, farmed salmon had an average of 36.6 parts per billion (ppb) compared to 4.75 ppb in wild salmon, as a result of feeding practices carried out by fish farms. [49] Farm-reared salmon have also been found to have a higher concentration of potentially toxic flame retardants, or polybrominated diphenyl ethers (PDBEs), than wild salmon.[50]

Another concerning chemical - arsenic - has been found in the meat of industrially reared chickens. While inorganic arsenic is a carcinogen, organic forms of arsenic are less toxic and are used to fight animal diseases and accelerate growth in industrial animal agriculture. Chickens in the United States contain three to four times as much arsenic as other kinds of meat and poultry, according to a 2003 study by the US Department of Agriculture.[51]

Industrially reared farm animals often receive growth hormones in their diet in order to reach slaughter weight as fast as possible. Over 90% of beef cattle in the United States are either implanted or injected with hormones and one-third of the US dairy herd is given recombinant bovine growth hormone or rBST to increase milk production.[52] Because of the concern over the human health consequences of hormone residues in meat, the European Union

has banned the use of steroid hormones. However, hormones continue to be used in many industrial animal farms in other parts of the world.

WPSA urges the WHO and public health institutes to use their influence to advise government policymakers to prohibit the use of production enhancing hormones such as steroid hormones and rBST.

Industrial animal farming and environmental health

A fundamental concern for industrial-style livestock farming is that large numbers of animals are often kept in a small area, leading to problems of waste disposal as well as disease potential. To give an idea of scale, the planet's population of some 2.5 billion pigs and cattle excrete more than 80 million metric tons of waste nitrogen annually. The entire human population, in comparison, produces just over 30 million metric tons.[4] In the United States, the amount of animal waste is 130 times greater than that of human waste, and it is not subject to the same level of waste treatment.[5]

Nitrate contamination of groundwater from manure can create serious risks for the public health of communities. For example, high nitrate levels in wells near animal feedlot operations have been linked to a greater risk of miscarriage in pregnant women.[6] Other examples of pollution effecting environmental health are readily abundant around the globe:

- The Chinese State Environment Protection Administration reports that industrial animal farms have become a major source of pollution. In 1995, for example, 1.7 billion metric tons of unprocessed manure was dumped into rivers that often serve as water supplies. [7]
- In Michigan (USA) in 2001, samples of water downstream of a cattle feedlot contained 1,900 times the state's maximum standard for E. coli in surface waters. In Walkerton, Ontario, more than 1,300 residents were affected by E. coli poisoning, after the town's drinking water was polluted by nearby cattle operations.[8]

As much as 75% of the antimicrobials fed to farm animals may be excreted unmetabolised in their waste, which can contaminate groundwater and soil. [9] Hormones fed to farm animals to promote growth leave residues in eggs, meat and dairy products and are also excreted in manure. Researchers have found that some of these hormones are endocrine disrupters and can influence the reproductive systems of wildlife and humans.[10]

Air quality can also be negatively affected by industrial animal farming. As manure decomposes it releases 160 to 400 volatile compounds, including amines, mercaptans, fatty acids, sulphides, phenols, amides and skatoles.[11]

Further concern for residents living near industrial animal agriculture is readily found in the scientific literature. Research conducted by Duke University in the United States has found that residents living near pig farms report more tension, depression, anger, fatigue, confusion, and less energy.[12] A study published in the *Journal of Agricultural Safety and Health,* found that residents living near industrial animal farms have higher rates of respiratory problems, nausea, fatigue, plugged ears, irritated eyes, nose and throats.[13]

In many countries where industrial animal farming is increasingly dominating production, there are little measures in place to control and prevent the illness associated with its disease-causing wastes. WSPA urges the World Health Organization and other public health institutes to advise policy makers to regulate to ensure that animal farming is conducted by methods which are not hazardous to the land, water and air in which communities live.

Industrial animal farming and workers' health

Studies have revealed that workers on industrial animal farms suffer from a variety of work-related illness including mental problems, repetitive stress injuries and respiratory problems - the latter being the most extensively studied.[14] Workers at industrial animal farms may work 50 to 60 hours per week indoors, resulting in long periods of exposure to high levels of respiratory toxins, including bacterial endotoxins, fungal moulds, and the manure-generated gases hydrogen sulphide and ammonia. [14] The dust in industrial animal farms is an 'organic soup' of allergens, including insect faeces, animal and bird faeces, animal skin and hair particles, pollen, antibiotics, feed components and pesticides.[14] Researchers in the United States, Sweden, Canada, the Netherlands and Denmark found that approximately 50% of industrial pig farm workers studied experienced one or more of the following health problems: bronchitis; occupational asthma; hyper-reactive airway disease; toxic organic dust syndrome (TODS); chronic mucous membrane irritation; or hydrogen sulphide intoxication.[15] A study found that 90% of dust sampled in an industrial pig farm was contaminated with antibiotics including tylosin, various tetracyclines, sulfamethazine and chloramphenicol.[15]

The workers in a modern slaughterhouse have an injury rate that is reportedly three times higher than in a typical American factory.[16] Whilst there is little information on the number of occupational injuries in the meat industry in developing countries, however, the similarity of the systems used, together with a lack of regulation, makes it likely that the health and injury risk for workers in these countries' industrial farms and slaughterhouses are high. Equally, the speed at which workers are expected to slaughter animals in high throughput slaughterhouses puts workers at risk of injury and threatens animal welfare. Measures should be urgently taken to ensure that workers are better protected and trained. This could benefit not only the safety of the worker but also the welfare of the animals being slaughtered.

WSPA urges the World Health Organization and other public health institutes to advise policy makers to protect workers against the negative health effects of working in unsanitary conditions on industrial animal farms created by having many animals crowded into a small space.

The speed at which workers are expected to slaughter animals in high throughput slaughterhouses puts workers puts workers at risk of injury and threatens animal welfare

Indirect impacts: The rise of the fast food nation and chronic disease

Industrial animal farms are often developed in a country to provide low cost, standardised animal products to fast food restaurants, caterers or even airlines.[42] Therefore, fast food restaurant development and industrial animal farm development in a country is often invariably linked, and so it is worth looking more closely at indirect impacts of industrial animal farming on human health.

Between 1996 and 2001, there was a 126% increase in the number of McDonald's outlets doing business in Asia, Pacific, the Middle East and Africa.[54] In China, there are more than 500 McDonald's franchises and over 1,000 KFCs.[55] In India, the fast food industry is growing by 40% per year and is expected to generate over a billion dollars in sales by 2005.[56]

In 2002, two-thirds of the gains in global meat consumption were in the developing world.[53] According to the WHO and the FAO, cardiovascular disease is now more prominent in India and China than in all economically developed countries put together. [57] The China Health Survey has found that, as a result of high intakes of fat and protein, the proportion of overweight teenagers in China has tripled in the past decade.[58]

The costs of these chronic diseases to a nation's health care system should not be underestimated. A study in the United Kingdom revealed that hypertension, coronary heart disease, Type 2 diabetes, osteoarthritis, cancers and strokes were costing the health system and estimated £457 million (US$822 million) in 2002 alone, which can all be related to the increase intake of animal fat and protein.[21] Asia, Latin America and Africa are likely to see a change in diets and disease burdens as industrial animal production and fast food presence increases. The World Health Organization and other public health institutes are strongly urged to advise nations to adopt healthy consumption patterns, where fast food diets and associated high levels of consumption of animal products from industrial animal farming are rejected.

Conclusion and recommendations

In a recent statement, the American Public Health Association has called for a moratorium on the construction of new industrial animal farms until more scientific data on their risks has been collected, and for more research on the environmental effects of such operations, especially in regard to exposure to infants and children.[59] In 2001, a World Bank report said that as the livestock sector grows "there is a significant danger that the poor are being crowded out, the environment eroded, and global food safety and security threatened." It promised to use a "people-centred approach" to livestock development projects that will reduce poverty, protect environmental sustainability, ensure food security and promote animal welfare. [60]

WSPA urges the World Health Organization and other public health institutes to ensure that policy advice does not promote or otherwise encourage the growth of industrial animal agriculture. If the potential, detrimental, public health effects of industrial animal agriculture are to be avoided, then the World Health Organization, public health institutes, policy makers and other key stakeholders are advised to:

- Put in place environmental and animal welfare laws in countries where they do not exist to protect the populations, animals and the environment against the negative impacts of industrial animal agriculture
- Research and support humane and sustainable alternatives to industrial animal agriculture, such as free-range and organic farming, and commit to their implementation
- Begin the difficult task of resolving the negative human health impacts of industrial animal agriculture
- Improve data collection on food-borne illness and animal disease in countries where industrial animal farming is set to dominate
- Remove governmental subsidies that encourage the growth of industrial development
- Improve farmer knowledge about animal health and welfare
- Educate consumers about the health consequences of industrial animal agriculture.

The health issues discussed here are well known. The fact that they stem from industrial animal farming has not been clearly recognised by the international health or agriculture community. Many countries still lack the policy, technology and control methods to prevent the health repercussions of industrial animal agriculture.

This report is a call to action for the World Health Organization, public health institutes and policy makers to prioritise the reversal of the growth of industrial animal agriculture in order to prevent its potentially serious human health effects.

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References:

[1] Millstone, Erik and Lang, Tim (2003), *The Penguin Atlas of Food*, pp. 36-37, Penguin Books, London; Lymbery, Philip, World Society for the Protection of Animals (WSPA), (2004).

[2] de Haan, Cees et al, (1997), *Livestock and the Environment: Finding a Balance,* p. 53 of a report of a study coordinated by FAO, U.S. Agency for International Development, and World Bank, Brussels; FAO (October, 2002), *Meat and Meat Products*, p. 11, FAO Food Outlook No. 4; Nierenberg, Danielle, (2003), *Meat Production and Consumption Grow,* pp. 30-31, Vital Signs, W.W. Norton, New York; U.N. Food and Agriculture Organization (FAO), FAOSTAT Statistical Database, apps.fao.org; idem, (October 2002), *Meat and Meat Products*, p. 11, Food Outlook No. 4.

[3] Delgado, Christopher, et al, (1999), *Livestock to 2020: The Next Food Revolution*, International Food Policy Research Institute, Washington DC.

[4] Vitousek, Peter M., et al., (1997), *World Resources Institute, 'Global Nitrogen Glut'* Table, available at www.wri.org/wri/wr-98-99/nutrient.htm, Human Alteration of the Global Nitrogen Cycle, Issues in Ecology, vol. 1, Ecological Society of America, Washington DC.

[5] U.S. Senate Committee on Agriculture, (December, 1997), *Nutrition, & Forestry, 'Animal Waste Pollution in America: An Emerging National Problem'*, p. 11 of a report compiled for Senator Tom Harkin.

[6] McCasland, Margaret, Nancy Trautman, and Porter, Keith, (May, 1998), *Nitrate: Health Effects in Drinking Water*, Center for Environmental Research ; Wagenet, Cornell University, Natural Resources Cornell Cooperative Extension View at http://pmep.cce.cornell.edu/facts-slides-self/facts/nit-heef-grw85.html; Sampat Payal, (January/February, 2000); *Groundwater Shock: The Polluting of the World's Major Freshwater Stores*, p. 14; World Watch idem, (2001), *Uncovering Groundwater Pollution*, p. 27, *State of the World 2001,* W.W. Norton & Company, New York.

[7] Tao, Betsy, (2003) *A Stitch in Time: Addressing the Environmental, Health, and Animal Welfare Effects of China's Expanding Meat Industry*, Georgetown International Environmental Law Review, 321.

[8] Sierra Club, (27 December, 2001*), Animal Factory Manure Discharge Tests at 1,900 Times State Maximum E. Coli Levels; Lenawee County Facility Already Under USEPA Order: Secon Facility Nearby Has Massive Violation Following Day*, press release, Washington DC; Associated Press, (20 December, 2000), *Canadian Town Wary of Water*; Health Canada, (May-June 2000), *Waterborne Outbreak of Gastroenteritis Associated With Municipal Water Supply*, Canada Communicable Disease Report, v. 26.

[9] 'Chee-Sanford, JC, Aminov RI, Krapac IJ, et al, (2001), *Occurrence and diversity of tetracycline resistance genes in lagoons and groundwater underlying two swims production facilties,* Applied and Environmental Microbiology, 67: 1494-1502.

[10] Balter, M., *Scientific Cross Claims Fly in Continuing Beef War*, pp. 1453-1455, Science, v. 284; Orlando, Edward, et al. (3 March, 2004), *Endocrine-Disrupting Effects of Cattle Feedlot Effluent on Aquatic Sentinel Species, the Fathead Minnow*, p. 353, Environmental Health Perspectives, v. 112, no.3.

[11] Chapin, Amy, (Spring, 1999), *Environmental Health Effects of Industrial Swine Production*, The Kerr Center for Sustainable Agriculture.

[12] Schiffman, Susan, et al, (1995), *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, pp. 369-375, Brain Research Bulletin, v. 37, no. 4.

[13] Thu, Kendall, et al, (1997), *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, pp. 13-26, Journal of Agricultural Safety and Health, v. 3, no. 1.

[14] Chapin, Amy, (Spring, 1999), *Environmental Health Effects of Industrial Swine Production*, Speaker's Kit, The Kerr Center for Sustainable Agriculture; Kirkhorn, Steven R, (October, 2002), *Community and Environmental Health Effects of Concentrated Animal Feeding Operations,* Minnesota Medicine, v. 85.

[15] Hamscher, G, HT Pawelzick, S Sczeny, et al., (Accessed April 29, 2004 online at http://ehpnet1.niehs.nih.gov/docs/2003/6288/abstract.html) *Antibiotics in dust originating from a pig fattening farm: a new source of health hazard for farmers?* Environ Health Perspectives 2003.

[16] Schlosser, Eric, (2001), *Fast Food Nation, The Dark Side of the All-American Meal*, Houghton Mifflin Company, New York.

[17] WHO, (2000), *Food-borne Disease: A Focus for Health Education*, Geneva.

[18] Mead, Paul S, et al, (September/October 1999), *Food-related Illness and Death in the United States*, p. 607, Emerging Infectious Diseases.

[19] www.cfsan.fda.gov/~mow *Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins Handbook*; WHO, (2000), *Foodborne Disease: A Focus for Health Education,* Geneva; WHO, (January, 1997) *Multi-drug Resistant Salmonella typhimurium* Fact Sheet No. 130, Geneva; Fletcher, Anthony, (April 23, 2004), *Campylobacter Reviewed* Food Production Daily; U.S. Food and Drug Administration (FDA), *Camplyobacter Jejun* in and Center for Food Safety and Applied Nutrition http://www.foodproductiondaily.com/news/news-NG.asp?id=51567

[20] Calnek, B.W, (Editor), (1997), *Campylobacteriosis, Diseases of Poultry*, 10th Edition, Mosby-Wolfe, Iowa State University, p235-245.

[21] Food Standards Agency, (16 August,2001), *Salmonella in retail chicken drops to all time low but the battle with campylobacter continues,* http://www.food.gov.uk/news/pressreleases/2001/aug/salmonellachick

[22] Kessel, A S, Gillespie, I A, O'Brien, S J, Adak, G K, Humphrey, T J and Ward, L R, (2001), *General outbreaks of Infectious Intestinal Disease linked with poultry, England and Wales 1992- 1999,* PHLS CDSC,Commun Dis Public Health; 3: 171-7.

[23] Engel, Cindy, (2002), *Wild Health. How Animals Keep Themselves Well and What We Can Learn From Them,* Weindenfeld & Nicolson, London.

[24] Petersen, L, Nielsen, E M, Engberg, J, On, S L W, and Dietz, H H, (July, 2001), *Comparison of Genotypes and Serotypescheck word of C. jejuni Isolated from Danish Wild Mammals and Birds and from Broiler Flocks and Humans,* Applied and Environmental Microbiology. Vol 67, No. 7 pp. 3115-3121, Danish Vet. Lab. Department of poultry, fish and fur animals, Aarhus, Denmark.

[25] Gregory, E, Barnhart, H, Dreesen, D W, Stern, N J, and Corn, J L, (1997), *Epidemiological Study of Campylobacter spp. in Broilers: Source, Time of Colonization and Prevalence. Avian Diseases,* Vol 41: 890-898.

[26] World Poultry, (2000), *Research, Humidity and litter moisture important factors in Salmonella and E.coli multiplication,* World Poultry, Vol 16, No.10.

[27] Helms, Morten, Vastrup, Pernille, Gerner-Smidt, Peter, and Molbak, Kare. (May, 2002), *Excess Mortality Associated with Antimicrobial Drug-Resistant Salmonella Typhimurium,* Emerging Infectious Diseases, Vol. 8, No 5.

[28] WHO, (5 May, 2004), *Recommendations from WHO's consultation on zoonoses*, http://www.who.int/mediacentre/news/briefings/2004/mb3/en/

[29] FAO, (2004), *Animal Health and Production Division, Avian Influenza - Questions & Answers*, http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_qa.html

[30] WHO, (January, 2004), *Avian Influenza*, Fact Sheet No 277,http://www.who.int/mediacentre/factsheets/fs277/en/; FAO, (28 January, 2004), *High Geographic Concentration May Have Favored the Spread of Avian Flu,* http://www.fao.org/newsroom/en/news/2004/36147/index.html

[31] Koopmans, Marion, et al, (February, 2004), *Transmission of H7N7 avian influenza A virus to human beings during a large outbreak in commercial poultry farms in the Netherlands*, Lancet 21: 363 (9409): pp.587-93.

[32] Maxwell, Fordyce, (30 April, 2003), *19 million birds slaughtered as avian flu epidemic hits Europe,* The Scotsman – Business section.

[33] Hong Kong US Consulate, (March, 2004), *Size of Asian Bird Flu Outbreak Unprecedented, says Health Agency*. http://hongkong.usconsulate.gov/avian/2004/030201.htm

[34] BBC News, (27 January, 2004), *Avian flu "could cost billions'*.

[35] Leahy, Stephen, (27 August, 2004), *Bird Flu Defeated – at High Cost*, IPS News Service Agency.

[36] Fritsch, Peter, (19 June, 2003), *Scientists Search for Human Hand Behind Outbreak of Jungle Virus*, Wall Street Journal, p.1; Bienen, Leslie, (2003), *Bats Suspected in Disease Outbreak*, Frontiers in Ecology, The Ecological Society of America, p. 117; Daszak, Peter, (2003*), Peter Daszak's Comments on the 60 Minutes Nipah Virus Report,* Consortium for Conservation Medicine website, www.conservationmedicine.com/index.htm; Wildlife Trust, (28 April, 2004), *Nipah Virus Breaks Out in Bangladesh: Mortality Rates of 60 to 74 percent, Human-to-Human Transmission May Be Implicated*, press release, New York.

[37] European Commission Health and Consumer Protection Directorate-General, (Adopted on 3 July, 2001),*Opinion of the Scientific Committee on Animal Nutrition on the Criteria for Assessing the Safety of Micro-organisms Resistant to Antibiotics of Human Clinical and Veterinary Importance*.

[38] WHO and FAO, (2003), *Antimicrobial Resistance* Fact Sheet, No. 194, Geneva.

[39] Animal Pharm, (July 6 , 2001), *EU growth promoter ban closer*, No. 472.

[40] Nature, (21 February, 2002), *Poultry Trade Reacts to Antibiotic Resistance*, Vol 415.

[41] Mellon, Margaret, Charles Benbrook, and Lutz Benbrook, Karen, (2001), *Hogging It! Estimates of Antimicrobial Abuse in Livestock,* Union of Concerned Scientists, Washington DC.

[42] Garcés, Leah, (2002), *The Detrimental Impacts of Industrial Animal Agriculture,* Compassion in World Farming Trust.

[43] Hanson, R, Kaneene, J B, Padungtod, P, Hirokawa, K, Zeno, C (2002), *Prevalence of Salmonella and E. coli, and their resistance to antimicrobial agents, in farming communities in Northern Thailand*, Southeast Asian Journal of Tropical Medical Public Health, Suppl 3: 120-6.

[44] Brown, David, (July, 2003), *Gains from Antibiotic Ban Noted*, p. A11, Washington Post (27 March, 2002); Henrik C. Wegener, et al., (July, 2003) 'Salmonella Control Programs in Denmark', Emerging Infectious Diseases, v. 9, no. 7.

[45] Center For International Environmental Law, (May, 2004), *Impacts of Persistent Organic Pollutants*, CIEL, Washington DC. N.B. Not all POPs chemicals have the same health impacts. For more specific information on the health impacts associated with specific POP chemicals see WWF Issue Brief, 'Persistent Organic Pollutants: Hand Me Down Poisons that Threaten Wildlife and People', (Washington DC, WWF, January 1999), available at http://www.worldwildlife.org; Physicians for Social Responsibility, (February, 1998), *POPs and Human Health,* 13 PSR MONITOR 4; WWF, (September, 1998), *Chemicals that Compromise Life: A Call to Action,* Issue Brief , Washington DC, available at URL: http://www.worldwildlife.org

[46] Schepens, Paul JC, et al., (February, 2001), *Surprising Findings Following a Belgian Food Contamination with Polychlorobiphenyls and Dioxins*, Environmental Health Perspectives, v. 109, n. 2.

[48] Vellinga, A, Van Loock F, (January, 2002), *The dioxin crisis as experiment to determine poultry-related campylobacter enteritis,* Emerging Infectious Diseases, 8(1): 19-22.

[49] Hites, Ronald A,et al, (9 January, 2004), *Global Assessment of Organic Pollutants in Farmed Salmon*, pp. 226-229, Science, v. 303.

[50] Hites, Ronald A, et al, (10 August, 2004), *Global Assessment of Polybrominated Diphenyl Ethers in Farmed and Wild Salmon*, Environmental Science and Technology.

[51] Wershaw, R L, Garbarino, J R, and Burkhardt, M R, *Roxarsone in Natural Water Systems*, http://water.usgs.gov/owq/AFO/proceedings/afo/pdf/Wershaw.pdf

[52] Balter, M, *Scientific Cross Claims Fly in Continuing Beef War,* pp. 1453-1455, Science, v. 284; Janet Raloff, (5 January, 2002), *Hormones: Here's the Beef, Environmental Concerns Re-emerge Over Steroids Given to Livestock*, p. 10, Science News, v. 161, no. 1.

[53] FAO, (October, 2002), *Meat and Meat Products*, p. 11, FAO Food Outlook No. 4.

[54] Millstone, Erik, and Lang, Tim, (2003), *The Penguin Atlas of Food*, Penguin Books, London.

[55] Kentucky Fried Chicken, Yum Brand Foods, www.yum.com/investors/units.htm and McDonald's from Millstone, Eric and Lang, Tim (2003), *The Penguin Atlas of Food*, Penguin Books, London.

[56] Rai, Saritha, (29 April, 2003), *Taste of India in U.S. Wrappers*, New York Times.

[57] WHO and FAO, (26 April, 2002), *DRAFT Diet, nutrition and the prevention of chronic disease,* Report of the Joint WHO/FAO expert consultation.

[58] Chen, J, et al., (1990), *Diet, Lifestyle, and Mortality in China: A Study of the Characteristics of 65 Chinese Counties*, Oxford University Press, Oxford, T. Colin Campbell presented *Associations of Diet and Disease - A Comprehensive Study of Health Characteristics in China*, at a conference on 'Social Consequences of Chinese Economic Reforms', Harvard University, Fairbank Center on East Asian Studies, Cambridge, MA (23-24 May, 1997).

[59] American Public Health Association, (APHA), (12 January, 2004), *American Public Health Association Adopts 27 New Policies,* press release, Washington, DC, http://www.apha.org/news/press/2004/policies.htm

[60] de Haan, Cornelius, et al. (2001), *Livestock Development: Implications for Rural Poverty, the Environment, and Global Food Security,* pp. xii-xiii, World Bank, Washington DC.

[61] Editorial, New Scientist, (18 September, 2004), *Monster in the making*.

[62] Management Guide, SASSO, (2002), *Free-Range Colored Chickens*, A.P. Inocencio Farms, Teresa Farms.

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