PEOPLE | FOOD SAFETY

"The proximity of thousands of confined animals** [in intensive livestock systems] **increases the likelihood of transfer of pathogens within and between these populations, with consequent impacts on rates of pathogen evolution"

Otte, J., Roland-Holst, D., Pfeiffer, D., Soares-Magalhaes, R., et al 2007. Industrial Livestock Production and Global Health Risks. *(1)*

Introduction to the problem and scale

- Every year there are around 600 million cases of foodborne diseases and 420,000 deaths. (2)
- Foodborne disease (FBD) has a global health burden comparable to malaria, HIV/AIDS, and tuberculosis, accounting for 33 million Disability Adjust Life Years (DALYs). (3)
- Contaminated meat and poultry are responsible for 40% of all bacterial foodborne diseases in the U.S. (4) The annual cost of illnesses—for instance, direct medical costs, lost income, and productivity—attributable to the consumption of animal products in the U.S. has been estimated at $2.5 billion for poultry, $1.9 billion for pork, and $1.4 billion for beef. (5)
- Costs of foodborne disease to the UK have been estimated at approximately £9.1bn a year, with the majority of this accounted for loss of earnings. There are additional costs to businesses due to sickness and absenteeism. (6)
- Foodborne illness can be caused by bacteria, viruses, parasites, toxins or chemical substances.
- The most common causes of foodborne disease and mortality include campylobacter and salmonella. (7) (8)
- The provision of safe food has been identified as "fundamental to support national economies, trade, tourism, food and nutrition security and underpin sustainable development." (9)
- Food safety and food security are inextricably linked, as people are more prone in times of food insecurity to consume "unsafe foods," in which chemical, microbiological, and other hazards pose health risks. (10)
- Chemical substances found in or on food, such as those found in pesticides, can also pose a risk to human health. (11)

Link to intensive animal farming

- Animals naturally harbour foodborne pathogens such as Salmonella, Campylobacter, and E. Coli. Of the 335 infectious diseases that emerged between 1940 and 2004, 60% were of animal origin. (12)
- Campylobacter is a particular problem in meat poultry: Intensive breeds are much more susceptible to infection than more robust slower growing breeds. Whilst the gut contents of all kinds of bird can be infected, infection of the tissues in susceptible faster-growing birds kept in stressful crowded conditions may increase risk of transmitting infection. (13) The process of "thinning" flocks of broiler chickens, removing part of a flock for slaughter at a lower weight, risks higher levels of Campylobacter both due to pathogens being brought in by catching staff and through the stress caused to the rest of the flock. (14) (15)
- Salmonella is mainly caused (but not limited to) by contaminated eggs and egg products: The risk is higher with larger flock sizes and with battery cage systems. (16) A large-scale UK

survey found that battery-cage farms are six times more likely than non-cage farms to be infected with the strain of salmonella most commonly associated with food poisoning. (17)

- E. Coli is a greater risk in intensive feedlots for beef: Callaway et al (2009) state: "Transmission from one animal to another is more likely as a result of high stocking densities in feedlots. Also, feedlot cattle are fed a diet of grain to fatten them for slaughter quickly. This diet promotes the growth of E. coli, including Enterohemorrhagic Escherichia coli (**EHEC**) in the hindgut, leading to increased colonisation and shedding of EHEC, which can then spread to other animals". (18)
- Rearing cattle on diets high in fibre (e.g. grass) substantially reduces the risk of infection. Transport stress can also increase the shedding of E. coli in calves, especially if the journeys are long. (19)
- Commercial broilers selected for fast growth can have reduced resistance to disease. (20) On top of this, stressful conditions can also reduce immunity. (21) Research shows that antibiotic use is lower in higher welfare systems for keeping pigs and chickens than it is in intensive production. (22) In the Netherlands where around 40% of chicken production uses slower-growing breeds of chicken to meet the health and welfare requirements of their retailers, these slower growing breeds are consistently at least three times less likely to need antibiotic treatment than the fast growing breeds they keep for export. (23)
- Increased proximity of animals increases the risk that viruses will mutate into new forms. One meta-study showed that 37 out of 39 cases of independent H7 and H5 LPAI to HPAI (low to high pathogenicity Avian Influenza) conversion events occurred in commercial poultry farms. (24)
- Pathogens can be spread via animal manure (which is untreated and often applied as fertilizer in crop fields) or can contaminate food products during the slaughter/processing stage. Workers in industrial animal operations and processing facilities can also contract diseases and infections directly from animals and spread those infections within their communities. For example, rates of infection by methicillin-resistant Staphylococcus aureus (MRSA) was over 760 times higher than that amongst patients admitted to hospitals. (25) One study showed levels of MRSA were substantially higher in pig farms where cephalosporin antibiotics were used. (26)
- The stress caused by industrial farming and long-distance transport increases the risk of immuno-suppressed animals succumbing to disease. Long-distance transport also increases the risk of transporting disease over those same distances.

Link to the relevant SDG's

- **SDG 3:** Good Health and Wellbeing: Ensure healthy lives and promote well-being for all at all ages (27)

https://www.cdc.gov/foodsafety/production-chain.html

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