Factory farming, superbugs and public health crises: A case to answer
Executive summary

Covid-19 should be a wake-up call for factory farming and its regulators around the world. The pandemic has shifted the way we live, eat and shop; disrupted long and complex food supply chains; led to backlogs of animals suffering on farms; and infected low paid, vulnerable slaughter-house workers from Melbourne to Berlin.

The inefficiencies and injustices in the factory farming system have been laid bare: animals ‘euthanased’ via mass suffocation on farms as Covid-19 has closed slaughter houses leaving them nowhere to go; migrant workers forced to work in unsafe conditions to get their next pay cheque; animal feed once sourced cheaply and abundantly from the other side of the world now precarious and expensive.

Unfortunately, the system that creates unspeakable cruelty to animals and great hardship for workers as it pushes our planet beyond planetary limits is not in a hurry to phase itself out.

Rather than using the Covid-19 disruption to rein in the excesses of factory farming and put us on the path to a sustainable food system, governments are being pushed to bail out big agribusiness and further subsidise unsustainably high levels of animal protein production. Is the support lent to factory farming inadvertently laying the foundations for the next pandemic?

Diseases such as swine flu, bird flu and Nipah virus all emerged from farm animals. Keeping large numbers of genetically uniform animals in squashed, confined conditions can lead to emergence of new viral pathogens with the potential to infect humans as well. A United Nations Environment Programme (UNEP) report released in July 2020 finds the risk of pandemics is increasing, and that the next pandemic is entirely predictable as a result of how we grow and trade food, consume animals and alter environments.

It finds intensive farming is responsible for more than 50% of all zoonotic infectious diseases impacting humans since 1940, and points to examples where big outbreaks have taken place alongside rapid intensification of pig and poultry systems.

UNEP calls for an end to unsustainable agricultural practices, and improved monitoring and regulation of food systems. What is meant by unsustainable agriculture? Whilst the report acknowledges that antibiotics are used on factory farms to compensate for low welfare animal husbandry, it doesn’t call for an end to factory farming or elaborate further on the animal welfare, human health or environmental impacts of antibiotic overuse on farms across the globe. Overuse of antibiotics is well documented to lead to the emergence of superbugs on farms that then move to workers, the environment and into the food chain.
Superbugs render antibiotics less effective in treating humans and trigger a global health crisis. This means commonplace operations like caesarean sections or cancer treatment suddenly become dangerous. The World Health Organisation warns we are approaching a post-antibiotic era as a result of the superbug crisis with some 10 million deaths expected annually by 2050, disproportionately impacting the poorest countries in the world. If 700,000 people are already dying annually from superbugs, what happens when a global pandemic comes along?

We do know that up to 50% of Covid-19 deaths in Wuhan, China were caused by secondary bacterial infections. Up to 99% of serious or hospital admitted Covid-19 patients are prescribed antibiotics.

Factory farming has a case to answer: for the welfare of animals and the health of people and our planet. World Animal Protection has previously revealed superbugs critically important to humans in the food chain in Brazil, Spain, Thailand and United States, a snapshot of a global problem about the way animals are treated and antibiotics overused on factory farms.

Never has the public health rationale to end factory farming been clearer and more urgent. Rather than flying in the face of repeated warnings from World Health Organisation to stop dispensing antibiotics across groups of farm animals to prevent sickness or promote fast growth, it’s time to take a stand.

It’s time to stop factory farming and move to higher welfare as part of humane and sustainable protein systems.

It’s difficult to quantify the problem whilst the pandemic is ongoing and separating out multiple factors attributing to mortality is difficult in any case. The proportion of Covid-19 deaths as a result of ineffective antibiotic treatment due to antimicrobial resistance is unknown.

A group of pigs. There is no ear notching, which is good, however, all pigs are tail docked.
Antibiotic overuse infarming and emergence of superbugs

Despite the United Nations, G20 and many world leaders recognising superbugs (antimicrobial resistance) as a global health emergency and calling for comprehensive actions across medicine, the community and agriculture, excessive use of antibiotics in animal farming continues. Globally, three quarters of all antibiotics are used in farming. Swapping for another antibiotic considered less important for humans, or replacing antibiotic use with a probiotic, herb or tightened hygiene and biosecurity isn’t the answer. Robert Lawrence, a professor emeritus of environmental health at Johns Hopkins University, has said,

“We have abundant evidence documenting the fact that when you put animals in crowded, unsanitary conditions and use low-dose antibiotics for disease prevention, you set up a perfect incubator for spontaneous mutations in the DNA of the bacteria [...]. With more spontaneous mutations, the odds increase that one of those mutations will provide resistance to the antibiotic that’s present in the environment.”

This overuse of antibiotics in farming facilitates the development of superbugs. Superbugs can then be spread via food, animals, animal feed, manure and the environment and pose major risks for people and public health.

Use of antibiotics in feed or water to promote fast growth of farm animals or to prevent disease across entire groups remains widespread in most countries. National surveillance and reporting of antibiotic use and surveillance for superbugs is nascent. There are no internationally agreed maximum environmental safe levels or resistance indicators. Antibiotics most critical for use in humans have been the focus of discussion to date, but antimicrobial resistance is transferable between classes and types of antibiotics.

Free range broiler breeding hens and cockerels depicting high welfare farming.
Antibiotic overuse props up low welfare farming

Factory farms squash large numbers of genetically identical animals into stressful, barren environments, with no access to outdoor space or natural light. Animals are often caged, with no room to turn around or lie down with their limbs, head or wings fully extended. This highly stressful and completely barren environment can lead to injuries and severe behavioural issues such as aggression or stereotypies like cage-biting or sham chewing, feather pecking or cannibalism. Antibiotics are used across groups to prevent stressed animals getting sick, propping up a system of suffering for food production.

It’s no accident that pig farming uses very high levels of antibiotics: pigs are one of the most intensively farmed species on the planet. In some studies, up to 90% of antibiotics were administered in the first 10 weeks of pigs’ lives and associated with painful mutilations (especially surgical castration) and related gut and respiratory infections.  

Larger farms use more antibiotics than smaller farms, and farms with pigs in the last fattening phase use the most antibiotics, often to prevent disease and in the absence of clinical signs of disease.

Fish farming also uses large quantities of antibiotics to treat or prevent disease. Recent research shows high antimicrobial resistance in aquaculture systems for 40 countries that account for 93% of global production. Resistance is especially high in Indonesia and China. The problem is likely to worsen as climate change progresses. Researchers modelled the impact that changing water temperature is likely to have on bacterial growth and fish health, leading to increased use of antibiotics and antimicrobial resistance. Disclosure of antibiotic use in farming by industry is often sorely lacking. FAIRR’s 2019 Protein Index shows Asian aquaculture companies are particularly poor at reporting on antibiotic use, but that there is a problem right across the animal protein sector.

More than 40% of E. coli bacteria detected in poultry production in the US, China, Brazil, Poland, United Kingdom, Germany, France, and Spain are resistant to antibiotics commonly used in those farm systems. Rates of antimicrobial resistance to fluoroquinolones and quinolones (antibiotics critically important to humans) are also above 40% in Brazil, China, and EU, where use of fluoroquinolones are still legal.
Environmental risks from factory farming

Superbugs do not remain on the farm. Intensive animal production generates large quantities of animal waste, which is often spread on land for use as a fertilizer, or discharged into public waterways. It can also seep into groundwater\(^{12}\) and aquifers that may supply drinking water.

As animals do not metabolise around 70\% of the antibiotics that are administered to them, antibiotics can transfer into animal waste. Bacteria can survive in untreated farm animal waste for two to twelve months.\(^{13}\) As these antibiotics pass through the animals and into the environment via manure, they speed the evolution of antibiotic resistant bacteria in soil and water.\(^{14}\)

Manure or related offtake may be spread onto crops. Antibiotic resistant bacteria can also be found in the air surrounding livestock farms.\(^{15}\) Flies and insects also come into contact with livestock and manure. Research from Johns Hopkins University in the USA found that many houseflies near chicken operations carried antibiotic-resistant bacteria strains.\(^{16}\)

Several studies have also demonstrated antibiotic resistant bacteria in wildlife on or near swine farms and nearby conservation areas in Canada.\(^{17}\)\(^{18}\)\(^{19}\)

As well as antibiotics, use of heavy metals in animal feed for growth promotion and nutritional supplements and key disinfectants used for cleaning farms or in foot baths and washes also drive antimicrobial resistance in the environment.\(^{21}\)

Despite all this, surveillance and monitoring of antimicrobial resistance in the environment is minimal. A United Nations Food and Agriculture Organisation 2017-2018 global survey found of 78 countries surveyed, only 10 have regulations that limit the discharge of antimicrobial residues into the environment.\(^{22}\)

There is no international standard indicating what the limits should be on environmental antimicrobial resistance contamination nor internationally agreed methodologies to track such contamination.

World Animal Protection is investigating antimicrobial resistance contamination of water courses adjacent to factory farms in Africa, Asia, the Americas and Europe.

This is not just a problem for land-based farming. Up to 75\% of antibiotics used in aquaculture may also be lost into the surrounding environment.\(^{20}\)
Human health risks from factory farming

Superbugs can spread to humans via animals, the environment or food, posing a great threat to food safety and public health. Antibiotic resistant infections cause greater rates of sickness and death, are costlier to treat, result in longer hospital stays and place a greater burden on health systems and lives. Antibiotics previously effective in treatment of various common or foodborne infections may no longer be a solution and treatment options may be costly, inaccessible or come with serious side effects. The risk of bloodstream infections is also higher. Those World Health Organisation are most at risk of superbug illness include:

- Infants especially premature babies
- seniors, especially in care homes
- people with weak immune systems due to illness or injury
- vulnerable communities living in crowded, unhygienic conditions
- farmers, slaughter and meat processing workers or those who work with sick animals

The superbug problem pre-Covid-19 was already considered dire, and predicted to be very costly. Modelling of the human and economic burden of superbugs was released in 2014.

The pivotal O’Neil report showed that a continued rise in antimicrobial resistance by 2050 would lead conservatively to 10 million people dying every year or a total of 300 million people by 2050. It would cost the world 100 trillion USD over this period plus an additional 120 up to 310 trillion USD if key surgical interventions are not possible in a post-antibiotic era. The report also showed that if antimicrobial resistance can be slowed or delayed by just 10 years it would save 65 trillion USD to 2050.

The 2017 World Bank report modelled that the global increase in healthcare costs associated with antimicrobial resistance may range from $300 billion to more than $1 trillion per year by 2050.24

Globally, the two most common foodborne infections are from Campylobacter and Salmonella (from chicken and / or pork) which can account for between 15% up to 50% of foodborne illnesses regionally25 and cause severe issues or death among the elderly, children or the immuno-suppressed.26 Bacteria resistant to antibiotics to treat Campylobacter and Salmonella have emerged.27

Between April and September 2015, 192 people across five U.S. states were sickened by two species of multi-drug-resistant Salmonella, an outbreak that the US Center for Disease Control and Prevention attributed to commercial pork products.28 This is just one of several retail examples. Analysis commissioned by World Animal Protection confirmed superbugs critically important to humans in pork products being sold in supermarkets in Brazil, Spain, Thailand29, and United States.30

One of the most well documented examples of excessive use of antibiotics in factory farming chickens was confirmed in Canada, with the excessive use of Ceftiofur (an antibiotic considered critically important to humans) resulting in superbugs in chickens that were ultimately found in humans, confirming transmission to the food chain31.
Human health benefits of ending irresponsible use of antibiotics in farming

The World Health Organisation strongly recommends an overall reduction in the use of all classes of antibiotics critically important to humans in food-producing animals, including a complete restriction on their use to promote fast growth or prevent disease.

A World Health Organisation study quantifies the human health benefits of reduced antibiotic use in farm animals: a World Health Organisation funded meta-analysis shows that interventions that restrict antibiotic use in food-producing animals are associated with a reduction in the presence of antibiotic-resistant bacteria in these animals. This review demonstrates that reduced antibiotic use in food-producing animals is associated with up to 24% lower antibiotic resistant bacteria in humans than the control group.

We could consider the potential economic justification of the reduced use of antibiotics in farming associated with 24% lower bacterial resistance in humans. Referring to the most conservative modelling scenario of the World Bank report, investment for a 25% containment of antimicrobial resistance would provide an expected 45% rate of return. Even in the most modest of simulations, the World Bank report concludes that investment to contain this global issue delivers such high returns which are rare in the public sector and are compellingly ‘hard-to-resist’. Despite this evidence, clear investment and global direction for an end to irresponsible use of antibiotics in farming is yet to be committed.

Pigs in enriched group housing in a higher welfare indoor farm. Straw on the ground is effective enrichment as it is edible, chewable, odorous, deformable and destructible, allowing for expression of natural behaviour.
Higher welfare enables reduction of antibiotics in farming

The World Health Organisation’s recommendation to end the use of antibiotics to promote fast growth and prevent disease in farm animals can be achieved by moving to higher animal welfare systems. The animal farming industry must stop routinely giving antibiotics to groups of animals with no infection, or no signs or diagnosis of disease. To enable this change, they must adopt higher welfare practices.

Farm animals in higher welfare systems have reduced stress and improved immunity and resilience to disease.

When Sweden introduced regulation to ensure piglets remain with their mothers for a minimum 28 days following birth, improved immunity and robustness of piglets allowed farmers to significantly reduce antibiotics used. This reduction was in the order of 100-times less antibiotics than other countries including France, Belgium and Germany.35

43-day old broiler (meat) chickens in caged systems. Farming meat chickens in cages is an inherently poor system which does not humane welfare standards.
Avoiding painful routine mutilations like tail docking and teeth clipping of pigs avoids the need to use antibiotics routinely to prevent infection.

Allowing animals to express natural behaviour by providing manipulable materials and room to move has allowed for reduced antibiotic use, alongside ending the tail cutting of piglets in commercial farming in Finland, Sweden, Denmark, Netherlands and Thailand. Studies in Europe show that pigs raised in organic, higher welfare systems have lower rates of antibiotic resistance compared with pigs raised in conventional intensive systems.

The use of higher welfare, slower growing chicken breeds has been shown to allow for substantial reductions in antibiotic use compared with conventional intensive systems. Studies of higher welfare turkey systems have also shown enhanced natural immunity and significantly less bacterial resistance.
“Antibiotic free” and “high hygiene” farming can be worse for animal welfare

Some farmers have started to market “raised without antibiotics” or “antibiotic free” products in response to consumer concern over this issue. World Animal Protection does not support such approaches as it is important that antibiotics are reserved to treat sick individual animals after disease is clinically diagnosed. The antibiotic-free trend can act as a disincentive for farmers to treat sick animals and resolve underlying issues, and this is not in the interest of animal welfare. More than 500 American vets and producers familiar with antibiotic-free conventional production have expressed concern with these schemes and animal welfare outcomes. Antibiotic Free chicken schemes have been associated with serious animal welfare issues including skin burns, and eye and respiratory injuries contrary to researched consumer beliefs that these schemes promote healthier animals.

Studies are emerging to indicate that higher welfare farm systems have lower antibiotic resistant E coli bacteria and pose a lower risk to the environment and consumer than antibiotic-free, intensive systems.

Increasingly ‘hygienic’ and ‘biosecure’ environments or ‘specific pathogen free’ lines of animals and tight farm ‘biosecurity’ are often defended to prevent or control disease in factory farming. These approaches commonly involve high use of disinfectants, bioexclusion or biocontainment and invariably barren living conditions for animals. They may also contribute to driving antimicrobial resistance and are not necessarily very successful in preventing disease or animal pandemics. Barren living conditions do not enable animals to express natural behaviours such as social, forage, explore, seek physical or thermal comfort and generate stress, damaging and abnormal behaviours which all weaken immunity of animals and predispose to disease. Such approaches are not only worse for animal welfare but contribute, along with mass genetic uniformity and overcrowding typical of factory farming, to the problem of antimicrobial resistance and pandemics.
End factory farming for a more sustainable food system

From 2022, the European Union will prohibit all routine antibiotic use in farm animals including the use of antibiotics in animal feed to prevent disease across groups. Antibiotics sales and use data will be collected. Live animals and animal products imported into the EU must not have been administered antibiotics to promote fast growth.

This development will bring the EU into line with Denmark, Finland, Sweden, Norway, Iceland and Netherlands that already have prohibitions on use of antibiotics to prevent disease in groups of animals.

To address the unsustainable overuse of antibiotics in farming and improve farm animal welfare, we need to stop factory farming and to move to more sustainable, higher welfare food systems and lower animal production overall.49

Recommendations for the global retail sector, animal protein production sector, governments and intergovernmental organisations, and the global finance sector follow.
Recommendations

Global food retail sector:

- Develop an overarching animal welfare policy aligned with the 5 Domains Model and phase in procurement requirements in line with the FARMS animal welfare requirements as a minimum.

- Require suppliers to commit to using antibiotics responsibly in farming: ending the routine use of antibiotics including to promote fast growth and to prevent disease across groups. They should not, however, pursue ‘antibiotic free’ or ‘no antibiotics ever’ or ‘raised without antibiotics’ policies or product lines; this can create a disincentive for producers to treat sick animals and does not address underlying welfare issues.

- Increase the proportion of plant-based protein options available to customers to support an average global reduction in meat production and consumption of 50% by 2040.

- Publish annual reports on their progress towards implementing higher welfare commitments in conjunction with antibiotic use data on supplier farms; and progress on humane and sustainable protein diversification.

Global animal protein production sector:

- Develop an overarching animal welfare policy aligned with the 5 Domains Model and phase in production systems in line with the FARMS animal welfare requirements as a minimum.

- Commit to using antibiotics responsibly in farming: ending the routine use of antibiotics including to promote fast growth and to prevent disease across groups. They should not, however, pursue ‘antibiotic free’ or ‘no antibiotics ever’ or ‘raised without antibiotics’ policies or product lines; this can create a disincentive for producers to treat sick animals and does not address underlying welfare issues.

- Increase the proportion of plant-based protein options in the production portfolio to support an average global reduction in meat production and consumption of 50% by 2040.

- Publish annual reports on progress towards implementing higher welfare commitments in conjunction with antibiotic use data on supplier farms; and progress on humane and sustainable protein diversification.
Governments and intergovernmental organisations:

- Introduce and enforce regulations in line with FARMS animal welfare requirements as a minimum.
- Introduce and enforce regulations ending the routine use of antibiotics including to promote fast growth and to prevent disease across groups.
- Commit to national surveillance and public reporting of antibiotic use at farm level in conjunction with reporting on welfare practices on farms.
- Redirect subsidies and financial incentives to higher welfare systems that align with the 5 Domains Model and in support of an average global reduction in meat production and consumption of 50% by 2040.

For financial investors in food systems:

- Require companies to meet FARMS animal welfare requirements as a minimum. Phase in requirements for companies towards systems that align with the 5 Domains Model.
- Require companies to commit to using antibiotics responsibly in farming: ending the routine use of antibiotics including to promote fast growth and to prevent disease across groups. They should not, however, pursue ‘antibiotic free’ or ‘no antibiotics ever’ or ‘raised without antibiotics’ policies or product lines; this can create a disincentive for producers to treat sick animals and does not address underlying welfare issues.
- Increase the proportion of plant-based protein in the investment portfolio to support an average global reduction in meat production and consumption of 50% by 2040.
- Influence policy such as supporting regulations on stricter animal welfare requirements, antibiotic use, mandatory disclosures, and due diligence processes.
- Participate in efforts to accurately measure and assess climate risks throughout agricultural supply chains, to meet the Paris Agreement. They should engage with upstream companies to set science-based emissions reductions targets that involve a shift towards humane and sustainable proteins, rather than seeking to increase efficiency within meat and dairy.
References


8. Ibid


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Singer AC, Shaw H, Rhodes V and Hart A (2016) Review of Antimicrobial Resistance in the Environment and Its Relevance to Environmental Regulators. Front. Microbiol. 7:1728. doi: 10.3389/fmicb.2016.01728 (Some common relevant disinfectants or biocides used on farms include: chlorhexidine, triclosan, and quaternium ammonium compounds and relevant heavy metals such as Pb, Cu, Zn, Cd have been used as animal growth promoters and nutritional supplements. The most relevant to swine production globally is Zinc oxide which will be banned for use as a veterinary product for diarrhoea management in 2022 in the EU but still retained for low dose use in animal feed animal feed though already prohibited in some member states. It is widely used globally.)


The review on ANTIMICROBIAL RESISTANCE chair ed by Jim O’Neil (2014) This is a pivotal independent review that has been subsequently academically by Brogan and Mossialos (2016) Comparatively: 2050 global prediction of cancer toll 8.2 million, 1.5 million diabetes annually.


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https://www.worldanimalprotection.org.uk/whats-in-your-pork


We are World Animal Protection.

We end the needless suffering of animals.

We influence decision makers to put animals on the global agenda.

We help the world see how important animals are to all of us.

We inspire people to change animals’ lives for the better.

We move the world to protect animals.

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