**Antibiotic use and livestock production systems**

‘*Irrational and inappropriate use of antimicrobials is by far the biggest driver of drug resistance…And this includes the massive routine use of antimicrobials, to promote growth and for prophylaxis, in the industrialized production of food. In several parts of the world, more than 50% in tonnage of all antimicrobial production is used in food producing animals…. Evidence shows that pathogens that have developed resistance to drugs in animals can be transmitted to humans.’* ***World Health Organization, 2011***

*‘In animal production systems with high density of animals or poor biosecurity, development and spread of infectious diseases is favoured, which leads more frequently to antimicrobial treatment and prevention of those diseases. This provides favourable conditions for selection, spread and persistence of antimicrobial-resistant bacteria. Some of these bacteria are capable of causing infections in animals and if zoonotic also in humans. Bacteria of animal origin can also be a source for transmission of resistance genes to human and animal pathogens”.* ***European Medicines Agency, 2006***

**Intensive farming – link to poor animal health and increased stress**

* Animals are more susceptible to disease when stressed. Stress releases hormones such as cortisol in animals which can reduce immunity by compromising the immune system. Stress has also been linked to increased salmonella risk in pigs and campylobacter in chickens[[1]](#footnote-1).
* A primary example is respiratory problems in cattle (‘shipping fever’). Ever present bacteria in the respiratory tract cause the disease when animals come under stress. Shipping fever is linked with Bovine Respiratory Disease, the most costly disease to the US cattle industry. US Cattle can be trucked thousands of miles to feedlots, frequently resulting in immune compromise and disease.
* A 2007 FAO report on avian influenza and other animal diseases shows that industrial livestock production plays an important part in the emergence of highly pathogenic avian influenza and other diseases.  The paper also shows that, once created, these contagious diseases are spread around the world by the international trade in animals and animal products. The FAO stresses that “excessive concentration of animals in large scale industrial production units should be avoided”.
* Research has demonstrated that certain resources, such as enrichment materials and sufficient living space, are necessary for attaining acceptable welfare outcomes. A Technical Report on pigs produced for the European Food Safety Authority (EFSA) in 2011 reviews the literature and concludes that “all new data reinforce the importance of providing suitable enrichment materials to allow expression of species relevant behaviours and reduce risk of injurious biting”.[[2]](#footnote-2)
* A range of studies show that fast growth rates in broilers contribute to leg disorders and metabolic disorders such as sudden death syndrome. A large-scale UK study into leg disorders in broilers found that 27.6% of the chickens had gait scores of 3 or more, i.e. lameness that is likely to be painful. The study concluded that “the primary risk factors associated with impaired locomotion and poor leg health are those specifically associated with rate of growth”[[3]](#footnote-3)
* An analysis of data of chickens reared to *Red Tractor* standards and *Freedom Food* illustrates the beneficial impact that a good system can have on welfare.[[4]](#footnote-4) The *Freedom Food* chickens had an average level of foot pad burn of 3.5% compared with 6.5% for the *Red Tractor* birds. The average mortality rate for the *Freedom Food* broilers was 1.8%, while that of the *Red Tractor* birds was 5.1%. The better performance of the *Freedom Food* birds resulted from the higher standards (lower stocking density, provision of enrichment and slower growth rate) in *Freedom Food* farms rather than from poorer husbandry in the *Red Tractor* farms.
* Scientific research indicates that zero grazing has a detrimental impact on the health and welfare of dairy cows. EFSA has stated, in what they characterised as a high priority conclusion, that: “If dairy cows are not kept on pasture for parts of the year, i.e. they are permanently on a zero-grazing system, there is an increased risk of lameness, hoof problems, teat tramp, mastitis, metritis, dystocia, ketosis, retained placenta and some bacterial infections.”[[5]](#footnote-5)

**Intensive/extensive farming systems & antibiotic use**

* The main cause of food-animal related antibiotic resistance is factory farming. In intensive production, animals are confined in overcrowded conditions, usually with no outdoor access, and are bred for maximum yield. These conditions compromise their health and immune responses, and encourage disease to develop and spread. [[6]](#footnote-6) [[7]](#footnote-7) Without the aid of drugs for disease prevention, it would not be possible to keep animals productive in the intensive conditions in which they are often kept.
* Animal welfare can play a big role in reducing antimicrobial usage. Proper production practices, such as maintaining flock and herd health by preventing disease through biosecurity and the use of vaccines, help minimize the need for antimicrobial use.  Good animal husbandry, preventive health care, use of proper rations and providing quality care are the keys to raising healthy animals. [[8]](#footnote-8)
* Livestock farming should focus on disease prevention through good practice rather than through routine use of antibiotics. Animals farmed with full access to the outdoors, in conditions which are not overly intensive, require far fewer antibiotics than those farmed entirely indoors. Organic farming bans routine preventative use of antibiotics on a whole herd or flock basis to prevent disease.
* A small study by British government scientists compared 12 organic farms (5 pig farms and 7 poultry) with 13 non organic (7 pig farms and 6 poultry farms). Per kilogramme of meat produced, the non-organic pig farms used between 13 times and 330 times more antibiotics than the highest-consuming organic pig farm. Six of the seven organic poultry farms and two of the five organic pig farms did not use antibiotics at all during the 2 year study.
* A useful example which links veterinary antibiotic use to farm production system is provided by sheep – which are mainly farmed outdoors, even when farmed non-organically. Sheep account for a very small fraction of total farm antibiotic use. In the UK, total use in pigs is 200 times than in sheep (even though there are 7x more sheep than pigs).
* Cattle raised outdoors for beef also generally have very low antibiotic use in comparison to species like pigs and poultry.Contrastingly, in the Netherlands and some other European countries where calves are farmed very intensively, calves can receive even higher levels of antibiotics than pigs.
* Pigs and poultry are the animals most likely to be reared in intensive conditions. Pigs account for the majority of farm-antibiotic usage in the UK (for around 60% of the tonnage of antibiotics (active ingredient) sold in the UK in 2008). The use of medicated feed is most common in intensive production. Around 85% of farm antibiotic administration in the UK is through mass medication, mostly for pigs and poultry.[[9]](#footnote-9)
* A Defra survey of about 450 farms, which was published in 2012, found that about 85% of non-organic farms used routine (ie. no somatic cell count) dry-cow therapy, (infusion of antibiotics into the udder)[[10]](#footnote-10)
* The study states: "Overall, this study suggests that characteristics that are related to intensification of the dairy industry are also associated with high on-farm mortality of dairy cows".[[11]](#footnote-11) Farms that allow their dairy cows to have more access to pasture have lower mortality, as do smaller herds.[[12]](#footnote-12)

**Farm antibiotic use and the emergence of resistant bacteria**

* The link between farm antibiotic usage and the emergence of resistance been widely confirmed by scientists and Government officials. Studies of animals from different farms have shown that higher antibiotic usage in animals equals higher antibiotic resistance, and that pig and poultry farms that do not routinely use antibiotics tend to have lower levels of resistant bacteria. [[13]](#footnote-13) [[14]](#footnote-14)
* MRSA provides a useful example: A study of veal farms in the Netherlands in 2010 showed that calves group-treated with antibiotics were more likely to be carriers of MRSA than calves that were not group-treated. When MRSA ST398 also emerged, it was found that calves on large farms were ‘significantly more often colonised [by MRSA] compared to calves from smaller farms. [[15]](#footnote-15)
* EFSA reported that large pig farms were twice as likely to be MRSA-positive as smaller farms and that this might reflect ‘managerial practices typical of larger holdings’[[16]](#footnote-16); ie higher levels of stress among animals, more transport of animals, more opportunities for transmission of bacteria and more use of antibiotics.
* A Dutch study of 2007-2008 also found that larger pig breeding farms (over 500 sows) were twice as likely to be positive for ‘pig’ MRSA as were smaller farms (under 250 sows).[[17]](#footnote-17)
* A review by Danish government scientist Frank Aarestrup which highlights the links between farm antibiotic use and resistance in human infections states: "Studies have…shown that it is possible to substantially reduce the use of antimicrobials in livestock production without compromising animal welfare or production".[[18]](#footnote-18)
* A [Consumers Union report](http://www.consumerreports.org/cro/food/how-safe-is-your-ground-beef) found that beef from conventionally raised cows was more likely to have bacteria that are resistant to antibiotics than beef from sustainably raised cows. They found that18 percent of conventional beef samples were contaminated with superbugs with just 9 percent of beef from samples that were sustainably produced.
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