BBFAW
Business Benchmark on Farm Animal Welfare

BRIEFING NO. 17

AUGUST 2014

The impacts of antibiotic use in animals on human health and animal welfare

EXECUTIVE SUMMARY

Antibiotics are widely available today and their use has brought significant health benefits. However every time a dose of antibiotics is given it can provide any bacteria present an opportunity to develop resistance to the drug. This resistance can have serious implications, potentially resulting in antibiotics being ineffective when they are most needed.

Overuse and misuse of antibiotics in human medicine is mainly responsible for the increase in antibiotic resistant bacteria. However, for a range of bacteria, farm animal use contributes significantly, and for some infections it is the main source of resistance.

The therapeutic use of antibiotics in farm animals prevents suffering and, as such, the value of antibiotic use to treat disease is not in question. However, problems arise with the routine prophylactic use of antibiotics (to prevent disease) and the use of antibiotics to promote animal growth. The concerns relate not only to human health but also to farm animal welfare. For farm animals, the prophylactic use 'props up' intensive farming systems where animals live in crowded conditions, where their immune systems are compromised and where disease can spread rapidly. The use of antibiotics as growth promoters in animals pushes them towards their physiological and metabolic limits with negative impacts on welfare. Where animals are kept in crowded intensive conditions, resistant strains of bacteria can spread rapidly.

The recognition of antibiotic resistance as a serious risk to human health means that media and legislative pressure on this issue is likely to grow. This may have the effect of undermining the viability of particular types of food production systems (in particular those that rely on artificial growth promotion and those where animals are reared in very crowded or confined conditions).

Note: This paper draws heavily and at length from the following documents, which are recommended for further reading on the subject:

- 'Antimicrobial resistance – why the irresponsible use of antibiotics in agriculture must stop', a briefing from The Alliance to Save Our Antibiotics, June 2014
- 'Case study of a health crisis – how human health is under threat from over-use of antibiotics in intensive livestock farming', a report for The Alliance to Save Our Antibiotics, November 2011
- 'Antibiotics in animal farming – Public health and animal welfare', Compassion in World Farming, November 2011

Why is Antibiotic Resistance So Important?

Antibiotics are medicines used to control infectious diseases in humans and animals. They are derived originally from natural substances produced as defence systems by micro-organisms to inhibit the growth or multiplication (reproduction) of other micro-organisms. These micro-organisms have then been identified and cultured naturally or synthetically to create the drugs we know today in human and veterinary medicine. The vast majority of antibiotics are used to kill or inhibit the growth of bacteria. They are not effective against viral infections.

Antibiotics are now widely available and their use has brought significant benefits in terms of fighting once commonplace infections and enabling increasingly complex and invasive surgery. However every time a dose of antibiotics is given it provides any bacteria present an opportunity to develop resistance to the drug. The over-use of antibiotics (especially in low doses or incomplete courses) is the main reason for the increase in antibiotic resistance. This resistance has serious implications: it means that antibiotics can be ineffective when they are most needed, i.e. to treat serious disease.

Overuse of antibiotics in human medicine is partly responsible for the increase in antibiotic resistant bacteria. However, for a range of bacteria, farm animal use contributes significantly, and for some infections it is the main source of resistance. This fact has been established by decades of research and is acknowledged by organisations such as the World Health Organisation and the European Food Safety Authority.

Critically important antibiotics

The World Health Organisation (WHO) has developed and applied criteria to rank antimicrobials (which include antibiotics[1]) according to their relative importance in human medicine[2]. The list is designed to help guide usage in farm animals and thus preserve the effectiveness of currently available antimicrobials.

The antimicrobials are classified into three groups: critically important, highly important, and important. Critically important antibiotics include cephalosporins and fluoroquinolones; one example of the latter is ciprofloxacin, relied on as a first-line treatment for severe Salmonella and Campylobacter infections in adults.

It is also important to note that the efficacy of antibiotics varies, with older antibiotics often being less efficacious and requiring a higher dose or a longer course than modern antibiotics. For example, the same weight of the newer active ingredient of flouroquinolone is capable of treating 70 times as many animals as the

[1] Antibiotics are a type of antimicrobial, but not all antimicrobials are antibiotics. For example, anti-viral drugs and anti-fungal drugs are also antimicrobials, but not antibiotics.

2 Critically Important Antimicrobials (CIA) for Human Medicine, 3rd Revision, World Health Organisation, 2011, see http://www.who.int/foodborne_disease/resistance/cia/en/

same weight of active ingredient for tetracycline. These newer drugs are now being utilised by the farming industry as fewer antibiotics can be used for the same effect. However, these antibiotics are also 'critically important' drugs for human medicine and are needed in the treatment of bacteria that are resistant to older antibiotics.

Resistance vs. residues

This briefing does not address residues in food, which is a separate issue from antibiotic resistance. Residues are traces of veterinary drugs, including antibiotics, which have been given to farm animals that can remain in food products such as meat, eggs and milk for a certain period after treatment.

In the EU and other countries around the world, regulation is in place to address the issue of residues. The regulation is intended to ensure that traces of drugs ingested by people via their food are kept below a safe limit. A withdrawal period of days, weeks or months may be necessary after the administration of antibiotic veterinary drug to an animal, during which time the animal or an animal product cannot go into the food chain.

Codex Alimentarius, the international food standards agency of the Food and Agriculture Organisation and the World Health Organisation, publishes the 'Maximum Residue Limits' (MRLs) of certain veterinary drugs that are considered to be safe in food. At the EU and national levels, MRLs are set for drugs that have been approved for use in food animals. Monitoring is carried out under European Directive 96/23/EC by testing samples of meat, imports and other food for residues that exceed the accepted limit.

What's the relationship between antibiotics and farming?

It is believed that farm animals consume nearly half of all the antibiotics produced worldwide[3].

There are four broad categories of antibiotic use on farm:

- *Therapeutic* – Giving a treatment when clinical disease is identified.
- *Metaphylatic* – Giving treatment to a group of animals when some are showing signs of illness.

[3] Overview of Antimicrobial Usage and Bacterial Resistance in Selected Human and Animal Pathogens in the UK: 2007, https://www.vmd.defra.gov.uk/pdf/AMR_overview07.pdf Although farm antibiotic use - as in human medicine - is prescription-only, no prescription records are collected.

- *Prophylactic* – Giving a treatment in anticipation of a disease. On-farm this is often to a group of animals when there is a perceived risk of infection.
- *Growth promotion* – Giving antibiotics to improve the growth rates of animals. At low doses of particular antibiotics, food conversion rates improve, most likely due to changing the composition of gut microflora, which enables animals to grow faster using less feed. This practice is banned in the EU but widely practised outside Europe.

The therapeutic use of antibiotics is an important part of managing disease and preventing poor welfare. However, the use of antibiotics on-farm is frequently prophylactic, rather than therapeutic. Reliance on frequent, prolonged, low-dose use of antibiotics in this way creates ideal conditions for antibiotic resistant strains of bacteria to develop. However, antibiotics are often used prophylactically as animals reared in intensive production systems are at a high risk of infection. This is because they usually:

- Live caged, confined or penned in crowded, often stressful conditions
- Are weaned at a very early age
- Are often pushed to their physiological and metabolic limits to maximise productivity.

These pressures can suppress animals' immune systems and encourage the spread of infection as animals are in close, cramped conditions. **Intensive farming therefore often relies on prophylactic use of antibiotics to compensate for an inherently low-welfare environment.**

Pigs, poultry and rabbits are the animals most likely to be reared in highly intensive conditions, crowded together in large numbers and kept indoors for most if not all of their lives. It is not surprising therefore that they are also the three species given the most frequent and greatest quantity of antibiotics. Antibiotic use is not confined to intensive systems but the majority of farming systems are intensive and therefore use the majority of antibiotics. Prophylactic use is most common in intensive systems for the reasons outlined above.

Outside of the EU, antibiotics are also routinely used at very low doses as growth promoters. Even within the EU, whilst growth promoters are officially prohibited, the prophylactic use of antibiotics, particularly at very low doses, has the same effect, exploiting a loophole in the current law.

Organic food

Organic farming regulations typically prohibit the routine use of antibiotics, thus ensuring animals only receive antibiotics when they require them. If an animal receives antibiotics, the legal withdrawal period (the time between the drug being administered and the sale of its meat or milk) must be at least doubled and often tripled before the meat or milk can be sold as organic.

Why does this matter for farm animal welfare?

The direct and indirect impacts of antibiotics on farm animal welfare are summarised in the following table:

Type of antibiotic use	Direct impact on animal welfare	Indirect impact on animal welfare	Indirect impact on human health
Prophylactic	May be positive in short-term as prevents an animal from falling ill	Enables continuation of low welfare environment	Contributes to risk of antibiotic resistance
Growth promotion	Negative as puts excessive physiological and metabolic strain on the animal		Contributes to risk of antibiotic resistance

There are alternatives - ones that enable a better quality of life for farmed animals and do not present the associated risks for antibiotic resistance. Disease outbreaks can often be minimised or prevented by good husbandry, hygiene and an improved living environment. Reducing stocking density and using robust breeds also improve the quality of lives animals experience and can reduce the need for antibiotics.

Perspective: Compassion in World Farming and World Animal Protection

The therapeutic use of antibiotics – to treat sick animals - is an important component of maintaining good animal welfare. Neither Compassion in World Farming nor World Animal Protection believe the therapeutic use of antibiotics in farming should be prevented, as this could cause significant suffering and greatly compromise the welfare of sick animals, which should receive treatment when they need it.

However, the routine, prophylactic administration of antibiotics is frequently used to 'prop up' intensive farming systems where animals are kept in confined and stressful conditions, where animals are bred to operate at their physiological limits, and where their immune systems are compromised - and disease outbreaks can spread rapidly.

It is vital that prophylactic use of antibiotics is drastically reduced, and in the case of some specific antibiotics, completely banned. However, to enable this reduction the fundamental features of intensive systems must also be addressed; simply stopping the routine use of antibiotics without also changing the animals' environment could increase the risk of sickness and have a negative impact on animal welfare.

What are the implications for human health?

The implications for human health are serious. The World Health Organisation (2011) describes some antibiotic resistance in humans as being 'associated with more frequent and longer hospitalisation, longer illness, a higher risk of invasive infection and a twofold increase in the risk of death ...'[4]. The UK's Chief Medical Officer Professor Dame Sally Davies, has stated that 'Antimicrobial resistance poses a catastrophic threat. If we don't act now, any one of us could go into hospital in 20 years for minor surgery and die because of an ordinary infection that can't be treated by antibiotics'[5].

The impact of antibiotic use in farm animals on human health occurs because so many of the same or similar antibiotics are used on-farm and in human medicine. The overlap can be explained by looking at the different classes (or families) of antibiotics. Antibiotics in a particular class tend to have similar chemical structures, modes of action, and ranges of effectiveness. Bacteria that have a mechanism of resistance to one antibiotic are more likely to develop resistance to a closely related antibiotic. This problem is compounded by the fact that considerable quantities of the same active ingredients are used in farm animal antibiotics as in human related antibiotics.

Although absolute proof of cause and effect in this field can be extremely difficult to identify, **scientists have established a clear link between antibiotic use in farm animals and resistance in humans.** In particular, the scientific evidence shows that[6]:

1. For some major human bacterial infections, such as *Salmonella* and *Campylobacter*, farm animals are the most important source of antimicrobial resistance.

2. For certain other human infections, such as *E. coli* and *enterococci*, there is strong evidence that farm animals are an important source of antibiotic resistance.

3. For some infections, like MRSA, there is evidence that in the UK the farm use of antibiotics currently makes a small contribution to treatment problems in human medicine. But based on the experiences in some other countries[7], this contribution may increase significantly unless we take urgent decisive action.

---

[4] 'Tackling antibiotic resistance from a food safety perspective in Europe', World Health Organisation, 2011.

5 Department of Health Press release: 'Antimicrobial resistance poses 'catastrophic threat', says Chief Medical Officer', Published 12 March 2013, see https://www.gov.uk/government/news/antimicrobial-resistance-poses-catastrophic-threat-says-chief-medical-officer--2

6 Detailed in 'Antimicrobial resistance – why the irresponsible use of antibiotics in agriculture must stop', a briefing from The Alliance to Save Our Antibiotics, June 2014

[7] See for example: Voss A., Loeffen F., Bakker J.,Klaassen C. and Wulf M., 2005. Methicillin-resistant Staphylococcusaureus in pig farming, Emerging Infectious Diseases, 11: 1965–1966, http://wwwnc.cdc.gov/eid/article/11/12/pdfs/05-0428.pdf, and NethmapMaran 2012, www.uu.nl/SiteCollectionImages/Fac_DGK/Nieuwsplaatjes/Nieuws/2012/NethmapMaran_Web.pdf

4. For a further small number of antimicrobial-resistant infections, such as *Neisseria gonorrhoeae*, there is as yet no evidence of any link with on-farm antimicrobial use. There is, however, a solid theoretical case that the horizontal transmission of resistance genes of farm-animal origin could contribute to the rise of potentially untreatable cases in humans. This would be such a serious and quite possibly irreversible development that precautionary action is advised, even if the probability of the worst-case scenario is only moderate.

5. For many other infections, such as multi-drug resistant tuberculosis and the wide range of infections caused by antibiotic-resistant strains of *Streptococcus* pneumonia, the use of antibiotics on farms currently appears to play no part in antibiotic resistance in human medicine.

Company expectations

Companies seeking to address the use of antibiotics in their supply chains should:

- Publish clear policies on their commitment to avoid antibiotics as growth promoters and to reduce or avoid antibiotics for prophylactic use.
- Actively monitor usage levels of antibiotics and the ingredients used.
- Implement an active programme to significantly reduce antibiotic usage, including absolute targets or year-on-year reduction targets.
- Ensure 'critically important' antibiotics are not used. If, however, exceptional circumstances and veterinary sign-off necessitate one-off use, companies should report on this wherever possible.
- Be transparent about the nature of their antibiotic reduction targets, including:
  - Whether these relate to all geographies and all species.
  - Whether these are related to the number of treatments, total volume of antibiotics or volume of active ingredient.
  - Which type of antibiotics the active ingredient targets relate to.
- Report on and provide an explanation for annual progress against targets.

Opinion: Alliance to save our Antibiotics

The Alliance does not call for a total withdrawal of all antibiotic treatment of animals. On the contrary, we believe it is vital to maintain the effectiveness of antibiotics for treating actual sick animals, so reducing suffering and maintaining good welfare.

The Alliance believes that a strategy to reduce overall farm antibiotic use is an urgent necessity. Some of the most important elements of a truly effective strategy would be:

- A legally binding timetable to phase out the routine use of antibiotics.
- All veterinary antibiotics to be classified as first, second and third choice, according to their importance for treating antibiotic-resistant infections in humans and animals.
- Legislation to improve animal health and welfare. This should ensure that farm animals are kept in less intensive conditions, and have access to the outdoors where possible, to decrease their susceptibility to disease and therefore the need for antibiotics.
- Improved surveillance of antibiotic use (including collection of prescription data) and antibiotic resistance.

Specific bans on the use of certain antibiotics in farming systems would also be beneficial, including:

- A ban on the use of modern cephalosporins ('critically important' drugs in human medicine) in pigs and for dry-cow therapy[8]
- A ban on all off-label (i.e. unapproved) farm use of modern cephalosporins
- A ban on the use of fluoroquinolones in poultry (another critically important group of antibiotics in human medicine because of their importance for treating infections such as Campylobacter, Salmonella and E. Coli).

The Alliance to Save our Antibiotics is an alliance of health, medical, environmental and animal welfare groups working to stop the over-use of antibiotics in animal farming. It was founded by the Soil Association, Compassion in World Farming and Sustain in 2009 and is supported by the Jeremy Coller Foundation. Its vision is a world in which human and animal health and well-being are protected by food and farming systems that do not rely routinely on antibiotics and related drugs.

[8] Dry cow therapy is the use of intramammary antibiotics immediately after the last milking of lactation to avoid mastitis.

Authors and Contact Details

Vicky Bond, EU Food Business Manager, Compassion in World Farming, vicky.bond@ciwf.org

Jemima Jewell, Head of Food Business, Compassion in World Farming, jemima.jewell@ciwf.org

The **Business Benchmark on Farm Animal Welfare** is designed to help drive higher farm animal welfare standards in the world's leading food businesses. It is the first global measure of animal welfare standards in food companies and is designed for use by investors, companies, NGOs and other interested stakeholders.

For more information, go to www.bbfaw.com or contact the Programme Director, Nicky Amos: nicky@nicky-amos.co.uk.