Food and Agriculture Organization of the United Nations

HOW TO USE antibiotics effectively and responsibly in POULTRY PRODUCTION –

for the sake of human and animal health

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HOW TO USE antibiotics effectively and responsibly in POULTRY PRODUCTION –

for the sake of human and animal health

by
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Budapest, 2021

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Key messages

What is antibiotic resistance?

- Antibiotic resistance – when antibiotics stop functioning – is threatening millions of human lives and the health, welfare and productivity of our livestock.
- The more we use antibiotics, the greater the chance that antibiotic resistance will develop. Therefore, it is important that we use antibiotics only when they are really needed.
- Disease prevention – good animal husbandry, biosecurity and vaccination – is the way to reduce the need for antibiotics in the herd. Antibiotics should be regarded as the very last resource for fighting disease.

What can you do?

- Good animal husbandry and most biosecurity measures comprise practices that you as a livestock keeper can control. These practices are in your hands.
- Do not use antibiotics for disease prevention – for instance as feed additives.
- Only use antibiotics when a veterinarian has diagnosed a disease, and treat only the infected birds.

Introduction

Antibiotics are a revolutionary discovery for curing infections in animals and humans. However, during the last decades it has emerged that more and more antibiotics are not functioning as expected – they do not cure the patient or animal of the disease; they do not kill the bacteria that cause it (*Box 1*). This is because the particular bacteria have become resistant to the antibiotic. Antibiotic resistance is an increasing threat to human and animal health worldwide. It is estimated that in the coming decades there will be several million deaths annually and a significant drop in livestock production attributable to infections with resistant bacteria. In order to protect the effectiveness of antibiotics, it is critical to reduce their overall use and to restrict their use to when they are really needed. This applies to both the human health sector and livestock production. It should also be noted that there may be a spread of resistant bacteria from livestock to humans and that farmers are regarded as being at highest risk of being infected (*Figure 1*). Therefore the use of antibiotics in livestock production may also influence the occurrence of antibiotic-resistant bacteria in humans.

BOX 1
There are many different disease-causing bacteria, and different drugs (antibiotics) have been developed to kill them. Thus, there is a specific matching between disease-causing bacteria and kind of antibiotics. However, some bacteria develop resistance to the drug that originally would have killed them. The development of this antibiotic resistance – when the drug no longer kills the bacteria it is intended to kill – is driven by extensive use of antibiotics.

Globally, more antibiotics are used for livestock than for humans, even if in some countries the livestock share is just some 20 percent of the total use. The large use in livestock is mainly caused by regular use for disease prevention and to make the animals grow faster by mixing antibiotics in feed. These practices are not seen in human medicine. However, in many countries, such as those of the European Union, the use of antibiotics to promote growth has been banned, and in several countries the regular use of antibiotics for disease prevention is restricted. However, these restrictions have not lowered animal productivity. Thus, farmers have many options to contribute to reducing the amount of antibiotics used worldwide and thereby attenuating the development of antibiotic resistance. At the same time, these options can protect the effectiveness of antibiotics in livestock production.

Here, we provide advice on how to reduce the need for antibiotics in poultry production and how to use antibiotics in a responsible and efficient way when needed. Poultry farmers in some countries have taken this approach and proven it to be successful without hampering the flocks' productivity. The advice is directed to you if you produce broilers or eggs and have an indoor production with more than 1 000 birds.

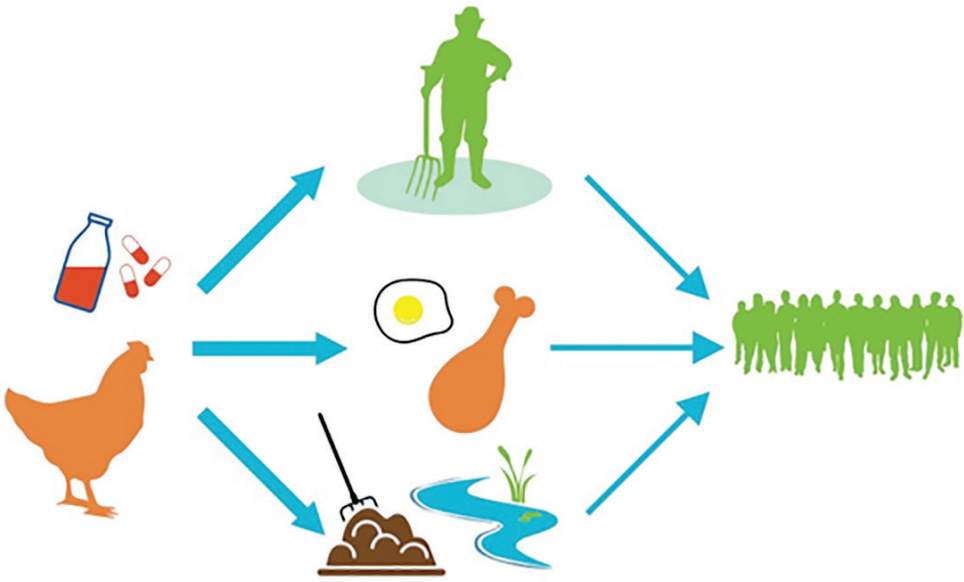

Figure 1. Resistant bacteria can move from poultry to humans: (i) via direct contact with the farmer; (ii) via food products; or (iii) via the environment. The routes via direct contact and food products are regarded as the most important. Also, note that resistant bacteria may be spread from the general human population to poultry via farmers or the environment.

How to reduce the need for antibiotics

This section is about how to keep your poultry healthy and productive without the regular use of antibiotics. The number of countries where there are restrictions on the use of antibiotics in livestock is increasing every year. Notably, egg or broiler production in these countries continues to increase. This is because farmers have adopted good husbandry practices that make their animals not only healthier but also capable of producing more eggs and growing faster.

The transition to animal farming with low use of antibiotics is a stepwise process that must be carefully monitored. We describe a set of measures that has proven to be successful in several countries with maintained productivity. However, it is important to have these measures in place before changing the use of antibiotics. The measures fall into three levels of disease prevention measures (*Figure 2*), which are arranged in hierarchical order. We also discuss the costs and benefits of applying these measures.

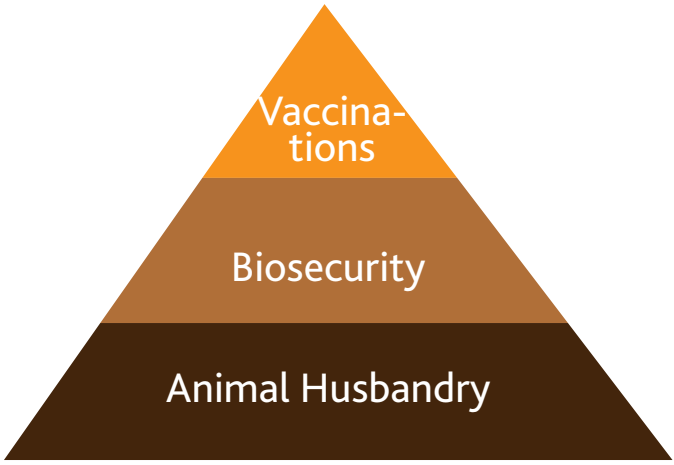

Figure 2. The three main measures to prevent infectious disease on a farm: Good animal husbandry is the basis for robust and healthy animals (e.g. quality of feed and water, good ventilation, efficient inspection of the animals); Effective biosecurity acts as a broad-range filter for keeping disease out of your farm (e.g. only buying chickens or pullets from disease-free suppliers, strict hygienic demands when entering the stables); Vaccinations protect your poultry against specific diseases (e.g. against Marek's or Newcastle disease).

Good animal husbandry

This area of disease prevention, together with biosecurity, is where you as a poultry farmer can make the most difference to keep your broilers or laying hens healthy and reduce the need for antibiotics. Good animal husbandry includes several elements, and most of them are applicable to all kinds of animal-rearing.

Both feed and water must be of good quality and in sufficient amounts. The feed must contain sufficient energy and appropriate minerals in an adequate balance, as well as be of proper hygienic quality. It is particularly important to store the feed in such a way that it doesn't become contaminated by microbes. Waste from the food industry and other uncontrolled sources is a potential source of infectious agents and should be avoided as feed. Freely available water of good hygienic quality is another must. The watering system should ideally be arranged so that medicines can be distributed through it and be easily cleaned (to get rid of medicine residues).

Buildings and facilities should be arranged, often implying several compartments or buildings, so they allow for batch-wise rearing ("all-in/all-out") of birds (see below: Biosecurity). They should also be easy to clean and disinfect. In addition, proper ventilation in a poultry stable is critical for

achieving good air quality, which reduces susceptibility to respiratory infections. Proper spacing for each bird is equally important. Over-crowding may lead to an increase in diseased birds.

Daily inspections of the poultry, during which their health and behaviour are recorded, is important in order to be on the alert for changes in health status, whether sudden or gradual. This includes body weight, number of eggs, feed and water consumption, among others. At these inspections, any dead birds should be removed and disposed of either by burning or being buried in a deep pit at the farm.

If you practice thinning in broiler farming, i.e. when you remove some 25–30 percent of the birds and the remainder are left to continue growing, it is imperative to do so with a high level of biosecurity standards comprising clean equipment and hand-washing as well as clean boots and clothing for the catchers.

Biosecurity

A high standard of biosecurity is of utmost importance in modern poultry farming for two reasons: several of the poultry diseases are from viruses and are therefore very contagious; and poultry are often kept in large flocks where a virus can easily spread. It is important that the poultry do not come in contact with wild birds, which may carry avian influenza or Newcastle disease, or rodents that may introduce other diseases. Besides wildlife, the main routes of introduction of infections to the farm are shown and commented on in Figure 3. When recruiting birds, it is imperative that the health status of the birds at the supplier's farm is known (including vaccinations) and that it meets your biosecurity needs.

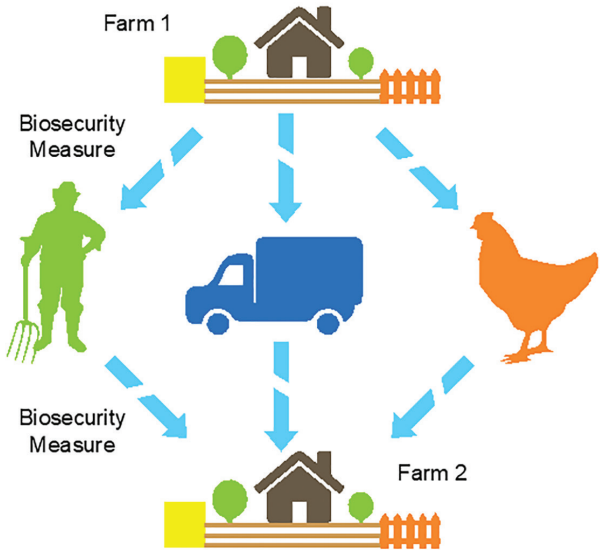

Figure 3. Biosecurity measures protect the farm from the introduction of infections. In this case, an infection in Farm 1 (delivering chickens or laying hens) could be spread to Farm 2 if biosecurity measures are not applied to people, vehicles and, in particular, animals.
i) Movement of people – neighbours, animal health personnel, people delivering feed – into the farm should be highly restricted and anyone who enters the stables with poultry must wear boots and protective clothing, and wash their hands.
ii) Transport vehicles for feed and egg and slaughter poultry may spread infections, and drivers of these vehicles should not come in contact with the birds.
iii) Make sure that chicken or pullets entering the farm are free from disease.

The "all-in/all-out" management is vital to reduce disease risk. It can be practiced at both farm and flock levels and for egg production and broiler production alike (*Figure 4*). The principle is to empty the entire farm or building/compartment of all birds, thoroughly mechanically clean the interior of the building and all adjacent equipment, disinfect it and let remain empty for some days. This is a very efficient way to stop the spread of disease from one batch of poultry to another. The "all-in/all-out" management is most efficient to do at the farm level – meaning that it will be just a single age group at the entire farm.

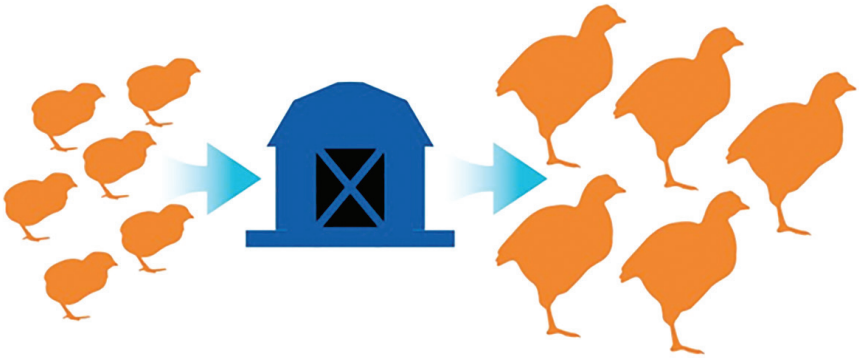

Figure 4. The "all-in/all-out" practice is key in modern egg and poultry production.
i) A new batch of laying hens or chickens is placed in a building/compartment that has been empty for a few days, after the interior of the building and all adjacent equipment have been thoroughly mechanically cleaned and disinfected.
ii) When the laying period is over or when broilers are ready for slaughter, empty the building/compartment of all birds at the same time and start the cleaning/disinfection procedure again before the next batch of poultry arrives.

Within the farm, separate sets of clothing and boots should be used for each building/compartment/flock (each should be regarded as a unique biosecurity zone). This is particularly important if there are birds of different age categories at the farm. Always start your tour among the poultry with the youngest; washing hands and disinfecting equipment are also musts when moving around the farm (*Figure 5*).

- Each building/compartment is a unique biosecurity zone.
- Change clothes, boots and tools/instruments and wash hands when moving from one building/compartment to the next.
- In your daily routines, start with the youngest and finish with the oldest poultry.

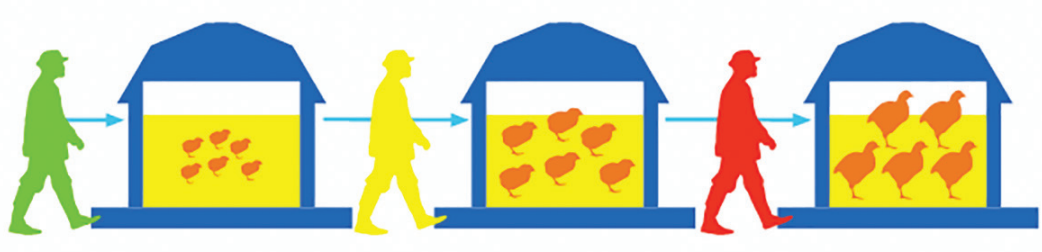

Figure 5. Do not spread disease within the farm!

Vaccinations

Using good vaccines in a systematic way and applying them correctly is an efficient and effective measure to prevent specific infectious diseases in poultry farming. Note that most vaccines are sensitive to how they are stored and handled before use, and they must be quality-assured. You should request this information from your veterinarian, who also may advise you on which vaccines are relevant for your farm or area. This is important, since each vaccine is specific for just a certain disease. At the same time, there are some diseases, such as Marek's and Gumboro, that affect the birds' immune defense and can make them more susceptible to other diseases. Thus, vaccination against these two diseases supports the resistance to other infections as well. Finally, it is critical that you stick to a vaccination scheme that includes an appropriate vaccination interval, a specification of which age category of birds should be vaccinated, and other factors. These are aspects of a professional vaccination scheme that your veterinarian will know about. Performing vaccination in a non-systematic way may risk the immunity of the poultry and the vaccination may thus not protect against disease as intended.

Costs and benefits

Some of the disease prevention measures recommended may require capital for initial investments and then for running costs, whereas others are based on improved management skills. Many will increase revenues in both the short and long terms. In the short term, for instance, the cost for medicines and veterinary care will be reduced. In the long term, farmers who apply a production with low use of antibiotics may gain access to more high-quality markets with better pricing. Below is a schematic summary of some of the costs and benefits in connection with improved preventive measures to be considered by you (*Table 1*).

Table 1. Examples of costs and benefits related to improved disease prevention

COSTS			BENEFITS	
Investment	Running	Skills	Short term	Long term
Adequate housing and facilities; Extra clothes and boots	Better feed and vaccinations	Improved animal management	Reduced spending on antibiotics	Better production; Access to new markets

How and when to use antibiotics

Antibiotics may be needed when a group of poultry becomes sick despite the disease prevention measures described. If so, the following two principles should be applied.

Only use antibiotics when based on a diagnosis of disease by a veterinarian

Only use antibiotics after consulting with a certified veterinarian, even if you can buy direct from a pharmacy or agrochemical shop (Figure 6). Note that antibiotics are effective only against bacterial disease and not against viruses. Using antibiotics for viral diseases is a waste of money and only contributes to the development of antibiotic resistance. Obviously, a proper diagnosis of the cause of the disease is crucial for choosing the right treatment. An experienced veterinarian may make a tentative diagnosis distinguishing a viral from a bacterial disease. But this can be difficult without proper laboratory diagnosis.

When your veterinarian has decided which antibiotics to use, stay with the assigned dose and treatment period. If the poultry's health doesn't improve within about 10 hours, contact the

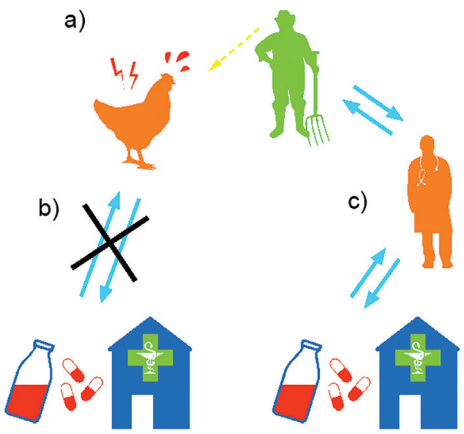

Figure 6. When hens or broilers are sick (a), do not buy antibiotics and start treatment without consulting a veterinarian (b). Instead, always ask a veterinarian for a proper diagnosis and advice on whether antibiotics should be used (c). And if so, what kind, what dose and for how long.

vet so the antibiotics can be changed or adjusted, ideally after laboratory testing. The lack of improvement may be due to resistance of the bacteria to the first choice of antibiotics.

Only treat the sick group of birds

To keep the use of antibiotics as low as possible in order to prevent the development of resistance, you should strive to treat as few birds as possible. This means that you shouldn't treat all poultry on the farm, rather only those in the barn/compartment where they are sick or in direct contact with those that are sick. It is better to mix antibiotics in water than in feed as you then can regulate the distribution faster and better than if you mix it in the feed.

Acknowledgements

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Further reading

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