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Organization of the  
United Nations

**HOW TO USE**  
antibiotics *effectively*  
and *responsibly*  
in  
**PIG**

**PRODUCTION –**

*for the sake of human and animal health*



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**HOW TO USE  
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by  
Ulf Magnusson  
Swedish University of Agricultural Sciences

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Food and Agriculture Organization of the United Nations  
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 animals individually.



## Introduction

Antibiotics are a revolutionary discovery for curing infections in animals and humans. However, during the last few 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 has 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 by 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.

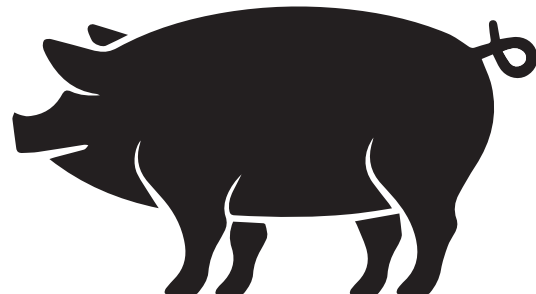
### BOX 1

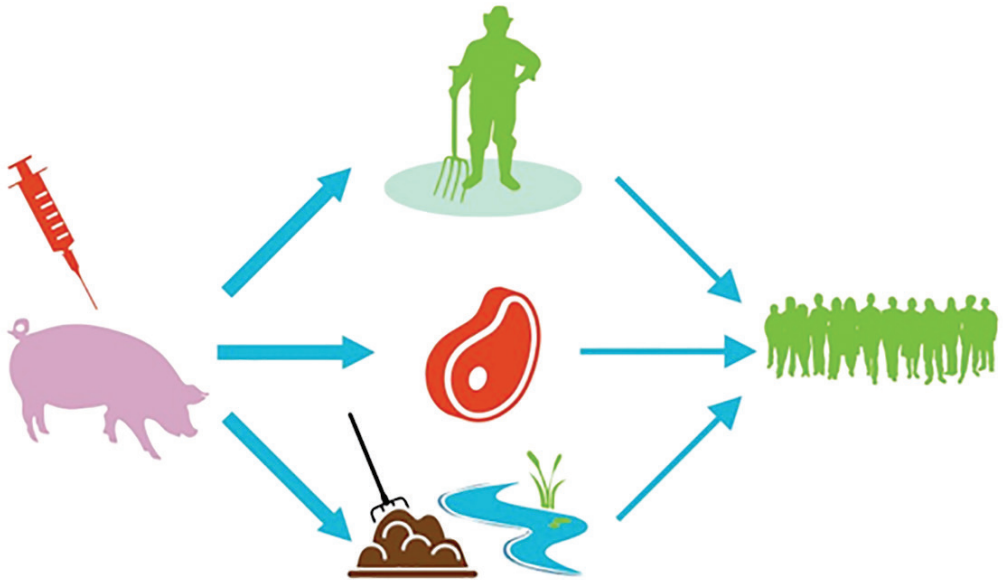
There are many different disease-causing bacteria, and different drugs (antibiotics) have been developed to kill them. Thus, there is a specific matching between disease-causing bacteria and kind of antibiotics. However, some bacteria develop resistance to the drug that originally would have killed them. 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, particularly in pig and poultry production. These practices are not seen in human medicine. However, in many countries, such as those in 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, there are options for farmers to contribute to reducing the amount of antibiotics used in the world 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 and how to use antibiotics in a responsible and efficient way when needed. Pig producers in some countries have taken this approach and proven it to be successful without hampering productivity. The advice is directed to you if you have 10 sows or more.

1





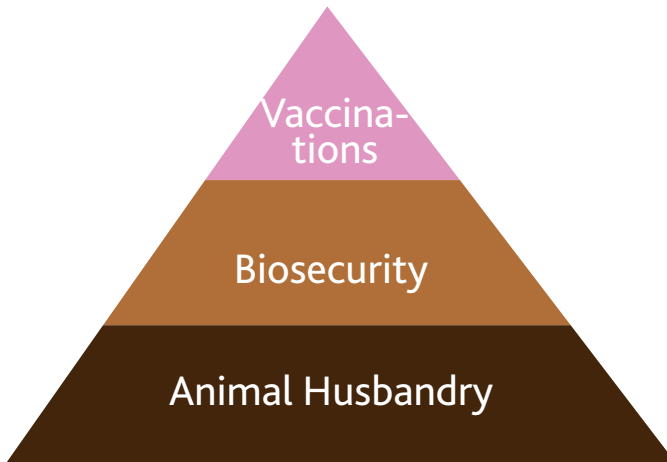
**Figure 1.** Resistant bacteria can move from pigs to humans: (i) via direct contact with the farmer; (ii) via food products; or (iii) via the environment. The routes via direct contact and food products are regarded as the most important. Also, note that resistant bacteria may be spread from the general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

## How to reduce the need for antibiotics

This section is about how to keep animals healthy and productive without the regular use of antibiotics. The number of countries where there are restrictions about the use of antibiotics in livestock is increasing every year.

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. The measures fall into three levels of disease prevention (*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; Effective biosecurity acts as a broad-range filter for keeping diseases out of your farm; Vaccinations protect your animals against specific disease.

## Good animal husbandry

This area of disease prevention is where you as a farmer can make the most difference to keep your pigs healthy and reduce the need for antibiotics. Good animal husbandry includes several elements, and most of them are applicable for most kinds of animal-rearing. Piglets are particularly vulnerable to infections and stressors that make them susceptible to infections that may increase the need for antibiotics and hamper their growth throughout life. Therefore, husbandry practices aiming at good piglet care are given special attention.

## Common good animal husbandry

In order to be able to breed robust and productive sows, piglets and growers, certain fundamental aspects at the farm must be fulfilled. Feed and water must be of good quality, in terms of both nutrition and hygiene. This also holds true for air quality in order to reduce the risk of respiratory infections. Poor air quality due to densely populated stables with inferior ventilation systems is a prevalent underlying factor in the common respiratory problems in growers. Providing bedding materials allows pigs to express their natural behaviour which, in turn, leads to less stress and better resistance to infections. Also, keeping fewer pigs in a compartment at the farm lowers infection pressure. Finally, it is important to not only keep track of your production but also to keep records on disease incidents and use of medicines. This will be important for you and your veterinarian when improving the overall health of your herd.

## Good piglet care

Very large litters of piglets makes it difficult for them to thrive. Such piglets are smaller and weaker and often some die. Also, some may starve to death if the number of piglets exceeds the number of teats of the sow. At farrowing, it is critical to have adequate space to avoid crushing of piglets, and to provide a dry, clean and warm (heat lamp) space for them (*Figure 3*). It is strongly recommended not to wean the piglets before the age of 28 days, as they will not be robust enough to survive without the sow or antibiotics. Previously, post-weaning diarrhoea was regarded as inevitable without routine use of antibiotics, but we now know that this can largely be prevented by a smooth transition in feeding regime. You may start giving feed twice a day to the piglets during their first week of life and then four times a day the week before weaning. The piglets must be exposed to feed gradually before weaning, and the feed texture and feeding interval must be adequately adjusted.

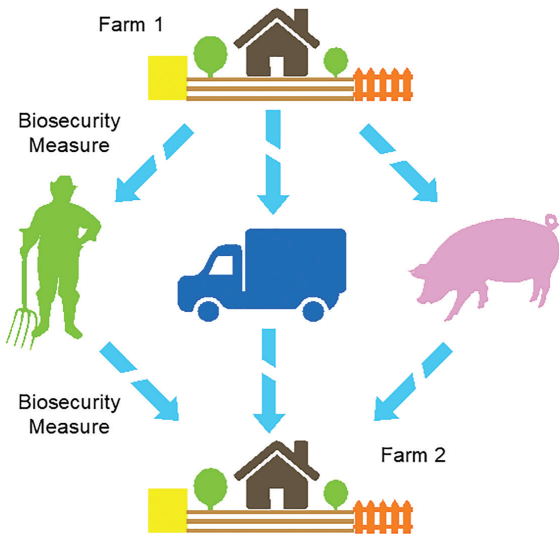
- Colostrum is crucial for the piglets' resistance to infections: If there are large and uneven litters or a lengthy farrowing, make sure that the smallest and latest-born piglets are also getting sufficient amounts.
- Straw or other bedding at farrowing is a must to keep the newborns warm. Add the extra straw/bedding for the sow two days before expected farrowing.
- A heat lamp throughout the nursing period is a good way to keep piglets at the right body temperature, making them strong and robust.



**Figure 3.** A good start in life is crucial to reduce the susceptibility to infections that otherwise may hamper the pigs' growth throughout life.

## Biosecurity

Biosecurity is about stopping infections from entering the herd as well as protecting the individual animals within a herd if an infection does enter. Infections may enter the farm or herd in many ways (Figure 4). The most common way that an infection can spread into a farm is by pigs from another farm or by a breeding boar. Using artificial insemination is safer than taking the sow to a boar that is not part of the herd or vice versa. Another way to mitigate the risk of infections entering the farm is to keep newly arriving pigs in quarantine from the other animals for at least three weeks, and to monitor them for signs of disease on a daily basis. If you run an operation based on recruiting weaners as growers from other farms with unknown or poor health status and then mixing them, this is indeed a high-risk practice from a health perspective. It is best is to minimize the number of farms that you get pigs from and to try to get pigs from the same farms over time. In contrast, closed systems, where the pigs are kept at the farm from farrow to finish, reduce risk of infections entering the herd.



**Figure 4.** Biosecurity measures protect the farm from the introduction of infections. In this case, an infection in Farm 1 could be spread to Farm 2 if biosecurity measures are not applied to people, vehicles and, in particular, animals.

- i) Movement of people – for example, neighbours, animal health personnel, people delivering feed – into the farm should be restricted and they must wear protective clothing and wash their hands and boots before they come in contact with the herd.
- ii) Transport vehicles for animal feed and slaughter animals may spread infections, and drivers of these vehicles should not come in contact with the animals.
- iii) Make sure that new pigs entering the farm are free from disease.

In pig farming, the biosecurity within the farm is also important. If your farm is large and has several building compartments or groupings of pigs, you should avoid mixing and moving pigs, as this increases the risk of exposing them to new infections. This means that you should keep pigs of the same age together (age segregation). The “all-in/all-out” of batches of pigs (you empty a compartment or barn of all animals before you put new animals there) is an efficient way to avoid transmission of infections over time in the farm, provided that you thoroughly clean and disinfect the compartment between batches of pigs. However, to optimize the flow in a closed system with the all-in/all-out approach, about 15 to 20 percent of extra compartment space is needed to allow the compartment to be cleaned, disinfected and kept empty between batches. In

your daily routine (feeding, inspection of the animals), always start with the youngest piglets and finish with the oldest growers (Figure 5). It is also advisable to change clothes and boots as well as tools or instruments when moving from one compartment to another. Washing hands between compartments is also advisable.

- Keep pigs of the same age together in a building or compartment at the farm.
- In your daily routines, start with the youngest piglets and finish with the oldest growers.
- Change clothes, boots and tools/instruments and wash hands when moving from one building/compartment to the next.

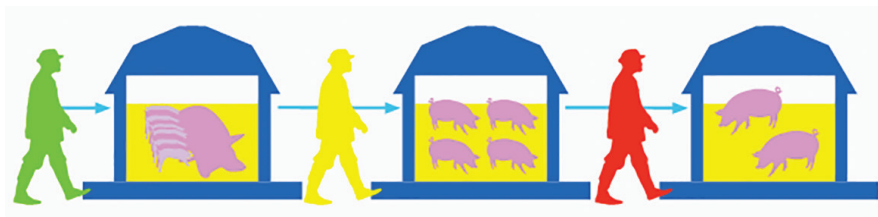


Figure 5. Do not spread disease within the farm!

## Vaccinations

Using good vaccines in a systematic manner is an effective way to prevent specific infectious diseases. There are several effective vaccines available for pigs, for disease caused by viruses (e.g. parvovirus) and by bacteria (e.g. erysipelas). 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 (although there are some vaccines that function against more than one disease). Finally, it is critical that you stick to a vaccination scheme that includes an appropriate vaccination interval, a specification of which category of animal 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 manner may risk the immunity of the animals, 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 long term, farmers who maintain a low use of antibiotics may gain access to more high-quality markets with better pricing. Below is a schematic summary 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

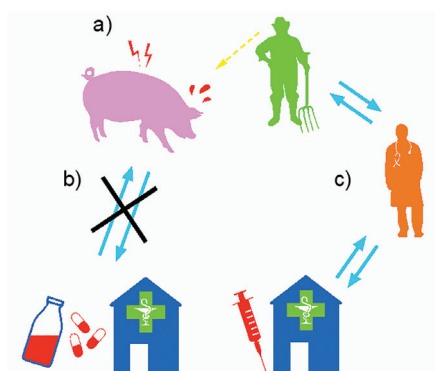
| COSTS   |                              |                            | BENEFITS                        |   |
|---|------------------------------|----------------------------|---------------------------------|---|
| Investment  | Running                      | Skills                     | Short term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

## How and when to use antibiotics

Antibiotics may be needed when a pig becomes sick despite the disease prevention measures described. Try to keep pigs that show disease symptoms separate from the herd during the entire treatment period. The following two principles are important when using antibiotics.

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

Only use antibiotics by prescription from a 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. Many respiratory diseases and some diarrhoeal ones are caused by viruses. Using antibiotics for such 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 it can be difficult.



**Figure 6.** When a pig is sick (a), do not buy antibiotics and start treatment (b) without consulting a veterinarian. 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.

When your veterinarian has decided which antibiotics to use, stay with the assigned dose and treatment period. If the animal's health doesn't improve in a few days, contact the veterinarian so the antibiotics can be changed or adjusted. The lack of improvement may be due to resistance of the bacteria to the first choice of antibiotics.

## Treat animals individually with antibiotics

To keep the use of antibiotics as low as possible in order to prevent the development of resistance, you should strive to treat animals individually. This means that you should avoid mixing antibiotics into the feed or water (Figure 7).

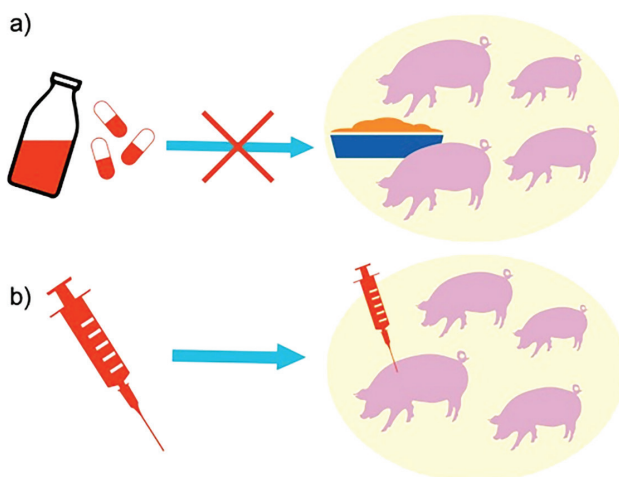


Figure 7. Do not add antibiotics to the feed or use prefabricated feed with antibiotics (a). Instead, always strive to treat a sick pig individually (b).

### Acknowledgements

The author would like to thank Swedish pig producers and Eran Raizman, FAO, for their valuable comments on the text and figures.

## Further reading

Magnusson, U., Sternberg, S., Eklund, G. & Rozstalnyy, A. 2019. *Prudent and efficient use of antimicrobials in pigs and poultry*. FAO Animal Production and Health Manual No. 23. Rome. FAO. <https://doi.org/10.4060/CA6729EN>

Магнуссон, У., Стернберг, С., Эклунд, Г. & Розстальный, А. 2019. *Рациональное и эффективное применение противомикробных препаратов в свиноводстве и птицеводстве*. Служба животноводства и здоровья животных FAO — Руководство 23. Рим. FAO. <https://doi.org/10.4060/CA6729RU>



