



disarm

Disseminating Innovative Solutions for Antibiotic Resistance Management

Best Practice Guides

External Biosecurity



PROLOGUE



CATTLE



PIGS



POULTRY



SHEEP

This guide is written as part of the DISARM project 'Disseminating Innovative Solutions for Antibiotic Resistance Management', funded by the European Union's Horizon 2020 research and innovation programme under grant agreement 817591.

The DISARM project aims to reduce antibiotic resistance through a focus on disease prevention and animal health, thereby reducing the need for antibiotic use. DISARM has a wide range of resources available via our [website](#) and [YouTube channel](#). We also have a vibrant and knowledgeable community within our [Facebook discussion group](#) (we welcome you to join, simply click this link and answer some short questions to gain access), and wider social media channels: [Twitter](#), [Facebook](#), [LinkedIn](#).

DISARM also promotes the multi-actor approach – different people (farmers, veterinarians, nutritionists and other advisors) working together towards improved animal health and farm performance. If you want to find out more about this, check out [our toolbox](#) to get started!

This guide was based on the information that was gathered during the DISARM project; it should not be considered as a complete reference book. It gives a useful overview with links to practical videos, abstracts, articles, testimonies etc., to facilitate good practices. Not all recommendations will be applicable or suitable for your farm and any interventions should be discussed with your farm advisor(s).

This guide is one of the 10 Best Practice guides made during the DISARM project. The 10 guides all have the goal to inform you about a specific topic in order to reduce the antimicrobial use in the livestock industry. The other DISARM Best Practice guides [can be found here](#).

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EXTERNAL BIOSECURITY

This guide aims to inform farmers about best practices regarding external biosecurity, how to keep your animals protected from pathogens entering the farm, and thereby improve animal health and welfare, and reduce the use of antibiotics.

This Best Practice guide is one of the 10 guides which are made in project DISARM. The 10 guides all have the goal to inform farmers about a specific topic in order to reduce the antimicrobial use in the livestock industry. These guides are covering information gathered in the DISARM project. It is a selection of information and therefore the guide does not provide a complete overview of all existing best practices regarding biosecurity. The other DISARM Best Practice guides [can be found here](#).

What is external biosecurity?

Biosecurity measures help to prevent the entry and spread of infectious diseases on and between farms, thereby reducing disease incidence and the need for veterinary antibiotic treatments. External biosecurity aims to prevent the introduction of pathogens onto the farm through¹, for example, controlling movement of animals and people onto and off farms, including wildlife vectors, and the use of quarantine when buying in stock. Internal biosecurity concerns the transmission of pathogens within the farm boundaries, with stocking density, hygiene and disease transmission mechanisms being important considerations.

Why is external biosecurity important and how does it help reduce antimicrobial use (AMU) and antimicrobial resistance (AMR)?

External biosecurity can help prevent disease, thus reduce the stress associated with disease and decrease the need for antibiotic treatments.

Antibiotics are used as a cure for bacterial infections. The other main type of infectious disease is caused by viruses. Viral diseases may lead to increased antibiotic use due to the increased likelihood of secondary bacterial infections. One of the best ways to prevent viral disease is through vaccination. Therefore, biosecurity, in combination with other preventive medicine strategies such as vaccination, is the basis of any animal disease control program. When prevention fails, (more) curative action will be necessary, which often includes the use of antibiotics.

Improved external biosecurity has been shown to improve production performance. In a Facebook survey covering a range of countries, sectors and professions, biosecurity was recognised in the DISARM project⁵ as one of the most important prerequisites for animal health. Improved external biosecurity was also rated among the top 5 most effective measures by 111 pig experts from Belgium, Denmark, France, Germany, Sweden and Switzerland to reduce antimicrobial use (AMU). Prevention, of course, is better than cure.

The link between biosecurity, AMU reduction and improved animal welfare has been fairly well

established in pigs and dairy cattle, and more recently, on specialised beef farms too². Biosecurity is also important to reduce the risk for zoonoses and food poisoning, e.g., Salmonella in pig production.

Proper use of disinfectants did not seem to promote antibiotic (AB) resistance nor reduce E. coli disinfectant susceptibility (but please note that “proper use in agricultural environments” can be a challenge, and the use of disinfectants when cleaning pens has been associated with reduced lung function of farmers). A distinction should also be made between disinfection and cleaning. Cleaning implies the removal of visible dirt, whereas disinfection involves killing of (invisible) pathogens. When animals or manure are present, and esp. when animals live near their manure, disinfection cannot be the goal. Disinfection can only be accomplished in empty barns. When animals are present, cleaning mainly involves taking away the manure.

Important points of attention

- External biosecurity is the prevention of introducing pathogens, that may cause disease, from entering the farm.
- Aspects of external biosecurity include special attention to disease entry via visitors, animals, wildlife, animal products like semen, equipment, materials like bedding, and via the air.
- A so-called hygiene lock may be one of the most important measures you can take to build external biosecurity.
- The BioCheck.UGent is a freely available checklist you can use to assess various aspects of biosecurity including external biosecurity (Biocheck.UGent.be).
- In order to improve, consult your local veterinarian to discuss the issue.

What is interesting & worthwhile knowing about external biosecurity?

What are the various aspects of external biosecurity?

External biosecurity concerns taking hygiene precautions to prevent people, newly purchased farm animals, wildlife/pests, air, equipment or materials (e.g. bedding) to carry pathogens onto the farm.

Elements to consider in external biosecurity include the structure of the farm (e.g. the separation of a clean and dirty area, e.g. via a hygiene lock), quarantine, purchase of semen and specific pathogen-free animals, purchase of materials and equipment, disposal of animals and materials, manure; storage of carcasses, supply of feed, water and goods, entrance control (e.g. visitor registration), changing footwear and clothing, a hygiene lock, hand washing, pest and wildlife (e.g. birds) control, location and surroundings.

For example, it has been found that wild animals foraging in the human-influenced environment are colonized by bacteria with clinically important antibiotic resistance. ESBL-E coli (extended-spectrum beta-lactamase producing Escherichia coli) positive pig farms also less often had improved biosecurity measures such as a hygiene lock or professional pest control.

Regarding external biosecurity, it is important to remember that infectious diseases are caused by mostly invisibly small pathogens like viruses, bacteria or parasites, that have various routes of transmission

by which they may enter your farm. Pathogens can travel through the air, e.g., in droplets or attached to small particles of dust. The main route, however, is transmission either attached to animals, people or objects, or inside animals that are newly introduced into the herd.

For this reason, pest animals like rodents, birds and insects must be kept out and otherwise controlled as much as possible, and new animals subjected to a quarantine period. Visitors may be asked to take a shower or change clothes before entering the barn. The use of a so-called hygiene lock will help to make visitors aware also of the need to attend to hygiene. Before using chemicals such as disinfectants, it is important to make sure they are allowed for the intended use.

The pictures below illustrate a number of these aspects.



Footwear with profile is more difficult to clean (though there may a trade-off with worker security, e.g. slippery surfaces)



▲ Entrance control



◀ Do not allow unwanted visitors; emphasis on disinfection is required



▲ Disposal of manure



▲ Make sure visitors register and know what the rules are

▼ Disposal of carcasses



▲ Taking a shower and washing hands



Biocheck UGent and other tools to assess external biosecurity

One of the best-studied tools to use on broiler, pig and cattle farms to determine the quality and scope for improvement regarding external biosecurity is the so-called Biocheck.UGent tool. Biocheck.UGent provides risk-based scores to assess on-farm (external and internal) biosecurity ranging from 0 (worst) to 100 (best).

Farm data can be filled in for free at www.Biocheck.UGent.be, which serves as a national benchmarking tool. Comparisons in a number of countries indicated there is considerable room for improvement. Danish, Irish and German pig farmers seem to have a relatively good external biosecurity.

Higher biosecurity scores have also been linked to improved performance, and reduced use of antimicrobials. Biosecurity was generally better in larger herds, in more modern facilities and by younger farmers.

The Biocheck.UGent tool for fattening pigs applied in 4 countries (Belgium, Poland, UK and Finland) showed poor external biosecurity scores for location and environment category in countries with reported outbreaks of ASF (African swine fever)³.

In cattle, the Biocheck.UGent tool applied as a survey on 20 veal, 50 beef and 50 dairy farms in Belgium, included a weighing of questions and (sub-) categories based on input from veterinary experts⁴. For all systems, both internal and external biosecurity were low (<50 points out of a maximum of 100 points). Internal biosecurity was generally lower than external biosecurity.

Veal farms scored significantly lower for “purchase” than beef and dairy, while scoring higher for the other subcategories of external biosecurity. In dairy and beef, “purchase and reproduction” was the highest scoring subcategory. With this tool, implementation of biosecurity on cattle farms can be assessed in a standardized and reproducible manner. This evaluation allows for benchmarking of farms and herd-specific advice.

A comparative study between 44 top farms and regular farms (total n=227), and an intervention study in 70 farrow-to-finish pig farms in Belgium, France, Germany and Sweden had shown that it is possible to control infectious diseases with low antimicrobial usage and that substantial AMU reduction was possible without negative impact on the technical performance and an overall positive effect on net farm profit.

Some solutions

In addition to using a tool like the BioCheck.UGent as described above to find solutions to improve external biosecurity and contacting your local veterinarian, below we mention a couple of potentially interesting solutions.

There are many checklists, factsheets and best practice guides, also on specific topics like the prevention of AI, FMD (Foot and Mouth Disease) or ASF (African Swine Fever) (see also [our state-of-the-art report](#) and the [Disarm database](#)).

Bokma et al. (2016) wrote a report (in Dutch) on how poultry farmers could deal with AI. One aspect was to use different colour for parts of the farm premises indicating different levels of contamination.

Where can you find more information?

The most obvious piece of advice here is to talk to your local vet and advisors to see what you can do to improve the level of external biosecurity on your farm.

In addition to the BioCheck.UGent tool, many sources, including factsheets, information booklets and videos were collected [in the database and website of the DISARM project](#). Below we mention just a few of these.

Videos

How to use a hygiene lock in poultry farms



How to use a hygiene lock in pig farms

Biosecurity measures on an existing farrow-to-finish farm

Optimization of working method in poultry, pig and dairy farms - Pest prevention in poultry, pig and dairy farms

More biosecurity resources on the DISARM website

Cited references & further reading

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Good Practices for Prudent Use of Antibiotics



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