

Biosecurity as an aid to reducing the use of antibiotics

Antimicrobial resistance (AMR) is a well-known worldwide problem, both in human and veterinary medicine. It is the ability of bacteria to withstand an antibiotic treatment. AMR might occur in nature, however it is strongly selected for by using antibiotics. As a result, classical therapies are becoming lesser effective and infectious diseases can persist.

by **Bo Vanbeselaere and Jeroen Dewulf**, Ghent University, Faculty of Veterinary Medicine, Department of Obstetrics, Reproduction and Herd Health, Veterinary Epidemiology Unit and CID Lines NV, Ieper, Belgium. www.cidlines.com

On the other hand, our world population is growing very fast and the livestock industry has made huge changes all over the world. The animal husbandry has expanded in a very professional way to meet all our demands.

Unfortunately, alongside this evolution the use of antibiotics has also substantially increased to prevent animals from diseases and to cure them if needed. Next to that, in a number of countries, antibiotics are still applied for growth promotion.

Global health threat

As antimicrobial resistance has become a global health threat, it is important to reduce the antibiotic usage in order to avoid further selection and spread of this resistance. Moreover, as we all live together very closely, we have to focus on all aspects of our society (one health: people – animal – environment).

It has been shown repeatedly that using less antibiotics results in less resistance selection. Therefore, in every sector, we have to find a way to deal with this demand for using less antibiotics and in the end, for our livestock industry, we have to look for effective and feasible solutions at farm level to replace these antibiotics.

One of the most promising ways to do so in animal husbandry is by limiting the need for antibiotics through disease prevention,

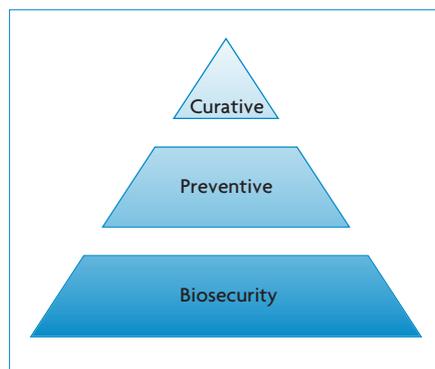


Fig. 1. Disease management in our livestock industry: biosecurity as a strong basis for every disease prevention and control programme.

especially with biosecurity. Disease prevention includes two major entities: biosecurity and preventive management (the use of vaccines, feed additives, acidification of the drinking water etc).

Biosecurity can be defined as the combination of all measures taken to reduce the risk of introduction and spread of infectious diseases at farm level, throughout the region, country or even worldwide. It is (should be) the basics of every disease prevention and control programme.

By having an effective biosecurity programme, all the other preventive measures, such as vaccines or drinking water treatment, will definitely give better results

on disease prevention within our farms and in the end the need for curative treatments (treatments to cure a disease) will decrease substantially (see Fig. 1).

Biosecurity can be divided into external biosecurity and internal biosecurity. External biosecurity consist of all procedures designed to protect the farm against infectious diseases from outside the flock and it also prohibits the spread of diseases to other farms.

All measures, which are taken to prevent the spread of any disease within the farm, are part of the internal biosecurity.

General principles

All biosecurity measures are based on some general principles.

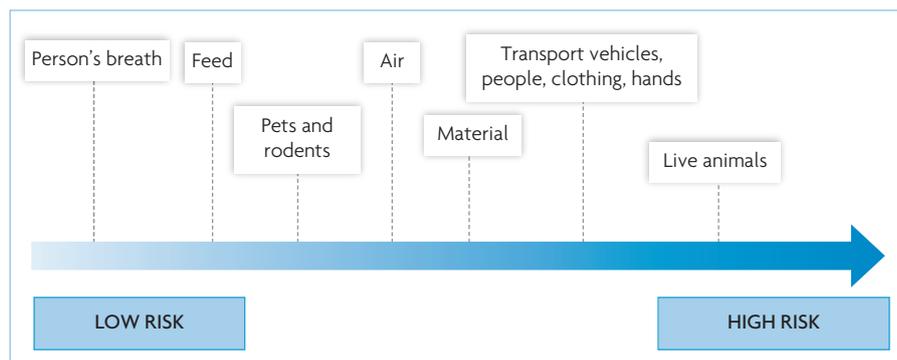
First of all, it is important to have a good separation between high and low risk animals or areas on the farm. When you want to avoid the spread of infectious diseases, you must ensure that possible sources of infection (for example wild birds) cannot reach the sensitive population.

At the same time, it is recommended to have a clear separation between the clean (internal movements at the farm) and dirty (all inbound and outbound traffic) sections or areas at the farm to limit any contamination.

Second, it is essential to lower the general infection pressure at the farm to the level that the immune system of the animals can

Continued on page 23

Fig. 2. Ranking of the different transmission routes of infectious diseases (adapted from Boklund, 2008).



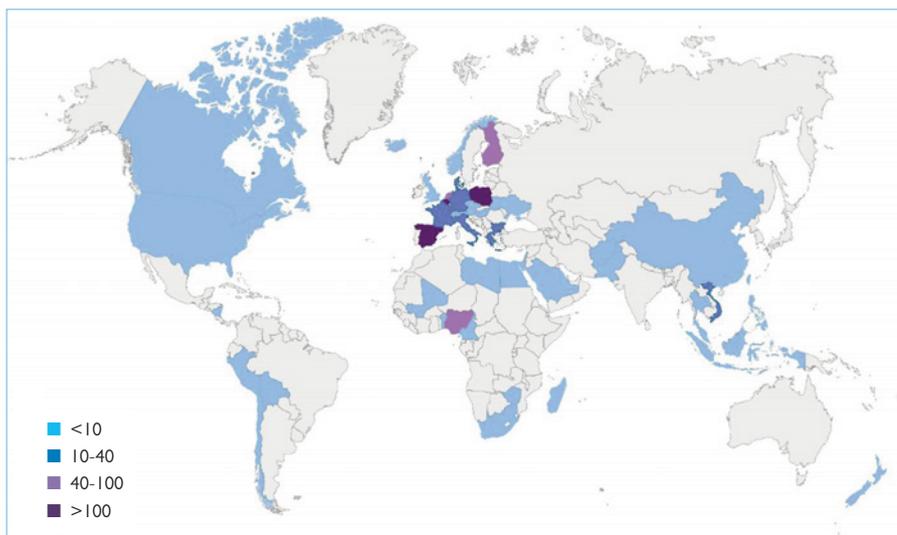


Fig. 3. Worldwide use of the Biocheck.UGent for broiler farms (last updated December 2017).

Continued from page 21

handle the infectious diseases without difficulty.

It is also important to consider the different transmission routes of the relevant diseases as not all transmission routes are equally important. Airborne transmission for example, is considered less risky than the purchase of living animals at the farm. Therefore, more measures are to be taken to control and reduce risk linked to the latter (see Fig. 2).

Finally, a good biosecurity programme needs to be adapted to the specific circumstances. Larger farms for instance need more biosecurity measures as they have higher risks of becoming infected.

This can be explained by the fact that larger farms have more external contacts and also often have multiple age groups present on the farm.

New tool developed

Having defined that there is a need for biosecurity as a strong basis to decrease the on-farm antibiotic usage, in 2012, the Biocheck.UGent for broiler farms was developed at the faculty of Veterinary Medicine, Ghent University.

The Biocheck.UGent is a freely available risk based scoring tool to measure and quantify the biosecurity at broiler farms (also existing for pig farms) and it can be used by any farmer, veterinarian or herd advisor.

This scoring tool is based on years of scientific research and field studies by many poultry experts from all over the world.

It is an online questionnaire which consists of 79 questions, mostly composed of multiple choice questions, subdivided into external (with eight subcategories: purchase of one day old chicks, exports of live animals, feed and water supply, removal of manure and dead animals, entrance of

visitors and personnel, supply of materials, infrastructure and biological vectors and location of the farm) and internal biosecurity (with three subcategories: disease management, cleaning and disinfection and materials and measures between compartments).

Every question has a score between zero (biosecurity measure is not applied at the farm) and one (biosecurity measure is fully applied at the farm). The final score for both external and internal biosecurity ranges from zero (indicating a total absence of the described biosecurity measures) to 100 (indicating the full application of the described biosecurity measures).

The Biocheck.UGent scoring tool is different from other biosecurity questionnaires as it takes into account the relative importance of the different transmission routes and puts all of this into a risk-based scoring system: depending on

Table 1. Results of the study on 13 broiler farms in Belgium: first audit to evaluate the current biosecurity status (before) – second audit after giving custom made advice on biosecurity (after).

	Before	After	Change
External biosecurity	64	69	+5
Internal biosecurity	73	77	+4
Mortality first week	1.08	1.27	+0.19%
Total mortality	3.54	3.05	-0.49%
Av. daily weight gain	57	57	0
Feed conversion	1.8	1.7	-0.1
Performance index	318	332	+14
Antimicrobial use (TI)	192	136	-29%

the importance of the biosecurity measure (according to the risk of the associated transmission route) the score per question is multiplied by a weight factor.

In addition, every subcategory gets a certain value and weight factor.

Objective report

After filling in the questionnaire, a report is created, which provides an objective and structural overview of the on-farm biosecurity. In this way, all critical points of the on-farm biosecurity are being detected and a perfect overview of the possible biosecurity improvements at the specific flock becomes available.

In this way, the Biocheck.UGent report allows producers to avoid generic advice and give specific counselling.

The report also provides the opportunity to compare the biosecurity level in time (evolution of the farm) and to compare the different biosecurity levels between farms (the report includes both a country average and a worldwide average score).

Since the launch of the Biocheck.UGent, the questionnaire has already been filled out more than 1,000 times for broiler farms (over 4,000 times for pig farms) in more than 40 countries all over the world (see Fig. 3).

The Biocheck.UGent tool was used in a study on 13 broiler farms in Belgium, where the on-farm biosecurity level was evaluated together with the relationship to the antibiotic use and the production results. There were two farm visits/audits for each broiler farm.

During the first audit, the biosecurity level was checked by using the Biocheck.UGent questionnaire.

Depending on the farm specific results, the researcher gave custom-made advice to improve the biosecurity level at the farm. During the second audit, the biosecurity level was checked again with the aid of the Biocheck.UGent scoring tool.

Results

The results of the study showed a wide variation in biosecurity levels on those broiler farms, which gave the opportunity for further enhancement of their biosecurity levels according to the priorities.

In addition, the study demonstrated that, by improving the biosecurity at the farms, it is possible to have a reduction in the on-farm antibiotic usage.

It was also clear that this reduction was feasible without negative effects on the technical performances of these broiler farms (see Table 1). ■

References are available from the authors on request