



Project No.: 817591

Start date: January 2019

Duration: 3 years

Deliverable 11/4.1—Draft Model for Multi-Actor Farm Health Teams

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Due Date	30/April/2020
Version, date	Final version 29/April/2020
Date of Delivery to the EC	30/April/2020
Work Package	4
Task Number	T 4.1
Task Lead	EV ILVO
Dissemination level	Public



Executive summary

The proliferation of antibiotic resistance (ABR) in human and animal pathogenic bacteria urges for more prudent use of antibiotics to preserve its efficacy in safeguarding the health and welfare of both humans and animals. Considering the link between use and rise in ABR, a reduction of the use of antibiotics is needed in the livestock industry. This reduction in antibiotic use can be challenging for farms since antibiotics have been part of farm animal health management tools for decades and every farm faces a specific context with specific health challenges and thus requiring a farm-specific approach to improving the farms' animal health management practices and organization to improve the biosecurity status, disease prevention and come to a more targeted and prudent use of antibiotics. The farm-specific improvement process can benefit from the collaborative team effort of the livestock farmer, his/her herd veterinarian and other farm advisors such as feed, genetics or technical advisors. Benefits come from the synergy and knowledge and experience from different backgrounds together in one meeting, more streamlined and coherent advice for the farmer, accountability of each team member and support for the farmer in implementing and sustaining the changes in the working routines and management.

To promote this Multi-actor Farm Health Planning (MAFHP) approach, 42 case studies are being executed in the H2020 thematic network DISARM across the pig, broiler, dairy cow and dairy sheep sector in the different countries in the consortium. This report presents the model for step by step execution of the MAFHP approach and coaching and facilitating the collaboration between these different actors in these case studies.

The case study process would start with recruiting 5 farms in a sector with varying antibiotic use so high using farmers could learn from the best practices of low using farmers. Every farm would get a baseline assessment of its biosecurity status, animal health and performance indicators and level and drivers for antibiotic use. The first meeting of the multi-actor farm health team (MAFHT) would be prepared based on a self-assessment questionnaire for farmers and farm advisors to list strong and weak points of the farm, potential points of improvement and corresponding actions and their perspective on the biosecurity status and level of antibiotic use. During the first MAFHT meeting, smart action points would be defined and documented in a template farm action plan. This farm-specific action plan will then be monitored, evaluated and adapted in recurring frequent meetings of the FHT.

The aim is to have self-reliant and independent FHTs that proceed beyond the projects' duration so we actively promote the establishment of self-steering teams in the case study groups and apply the livestock-adapted ADKAR coaching model for promoting awareness, desire, knowledge, action and reinforcement for improving the farm and lowering its antibiotic use.





Since farmers have proven to effectively learn from peer-to-peer learning in DISARM (inter)national cross visits to the participating will be organized so that farmers in farms in a specific livestock sector can learn from the experience and knowledge of their (inter)national colleagues face similar challenges in the same production sector but within their specific context. The report also presents our guidelines for an adapted stable schools methodology to be used in the DISARM MAFHP cross visits.

We hope this report may inspire and assist other professionals involved in livestock farming in adopting and promoting this multi-actor farm health planning approach for healthy livestock farming with reduced need for antibiotic treatments.





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1. Introduction

This report presents the model for establishing multi-actor farm health teams and structural farm animal health planning adopted in the case studies of the H2020 thematic network DISARM (“Disseminating Innovative Solutions for Antibiotic Resistance Management”). It describes the procedures and tools used in the different steps of engaging livestock farmers, their herd veterinarian and (feed, management, health, ..) advisors into a collaborative effort to improve the livestock farms’ practices and organization towards better general animal health with the ultimate aim of reducing the need for antibiotics on the farm and consequently reducing the proliferation of antibiotic resistance. The focus in these MAFHT’s lies on strategies and actions to install better biosecurity measures, improved disease prevention, alternatives to antibiotics and targeted use of antibiotics. Indeed, DISARM is a H2020 thematic network, whereby the focus is not in producing new knowledge but rather on creating and demonstrating approaches for a better use of existing knowledge.

First some background and motivation for promoting this MAFHT-approach is presented. Second, detailed step by step explanations will be presented for the procedures and tools that are adopted in the DISARM case studies. These procedures eventually will evolve into a practical toolbox for hands-on on-farm health planning. Third some theory about necessary general coaching and facilitation skills is described and we explain and motivate the choice for the livestock-adapted ADKAR coaching model that is adopted in the case studies. Last, the procedures for national and international knowledge exchange between the piloting MAFHT’s are explained.

We hope this report may inspire and assist other professionals active or involved in livestock farming, either farmers, veterinarians, feed and other farm advisors and action researchers in adopting and promoting this multi-actor farm health planning approach for healthy livestock farming with reduced need for antibiotic treatments.



2. Background to Multi-Actor Farm Health Planning

The proliferation of antibiotic resistance poses severe concerns for both human and animal health. Without proper action to mitigate and reduce antibiotic resistance, both human and animal health professionals will lose an effective tool to safeguard and maintain both human and animal health and welfare.

Given the clear link between levels of antibiotic use (ABU) and development of antibiotic resistance (ABR) in livestock farming (Schwarz et al, 2001), the preferential strategy to reduce ABR is through reducing the ABU to the lowest level possible whilst still safeguarding animal welfare and respecting the need for treating sick animals.

This reduced ABU needs to result from sustained changes in the everyday decisions and working habits by animal health professionals (i.e., livestock farmers, veterinarians and farm advisors). While a vast majority of technical knowledge and innovations that can assist the transition to a lower ABU are yet available, the cultural aspect of antibiotics being embedded in the design of the farming system as a routine tool for decades needs to be addressed. Moving away from the trusted and familiar routine management supported by ABU, needs building trust and confidence by the farmer in a farming system focused on improved animal health, biosecurity, disease prevention and alternatives to using antibiotics and limited and targeted use of antibiotics. Such a makeover is not done overnight but needs incremental changes to the existing farm following the principle of first checking and evaluating the farms' practices and improving these followed by assessing its beneficial effects and sustained adoption before (drastically) reducing the antibiotic treatments (Postma et al., 2017).

Moreover, the available technical knowledge and innovations to lower ABU need a valid farm-specific embedding into the management and organisation of the farm and its practices to respond to and solve its specific health challenges and problems (Postma et al., 2017).

Such a farm-specific improvement process is very knowledge intensive and can benefit of the synergy within a solid and structural collaboration of the main animal health professionals that affect the farm, being the livestock farmer, his/her herd veterinarian the feed advisor and other farm advisor(s) (Speksnijder et al., 2017). This structural collaboration within a farm health team has benefits over the separate and individual consultation of the different farm advisors by the farmer:

- Establishing a common goal and strategy to reach the goals makes every member of the farm health team buying into the farm improvement process.
- Moreover, the different farm advisors are aware of each other's advice and can discuss and clarify their suggestions which facilitates developing a coherent and streamlined advice and support to the farmer.



- The team-collaboration makes the members accountable for their own contribution and keep each other accountable for their contribution to the farm improvement.
- Team members can provide support and encouragement for the farmer who is the final responsible person to realize the action plan in sustained daily management practices.



3. Step-by- step procedures for multi-actor animal health planning

In Figure 1 below the different steps for adopting the MAFHT are outlined. In the following paragraphs detailed information for the procedures in each step will be provided.

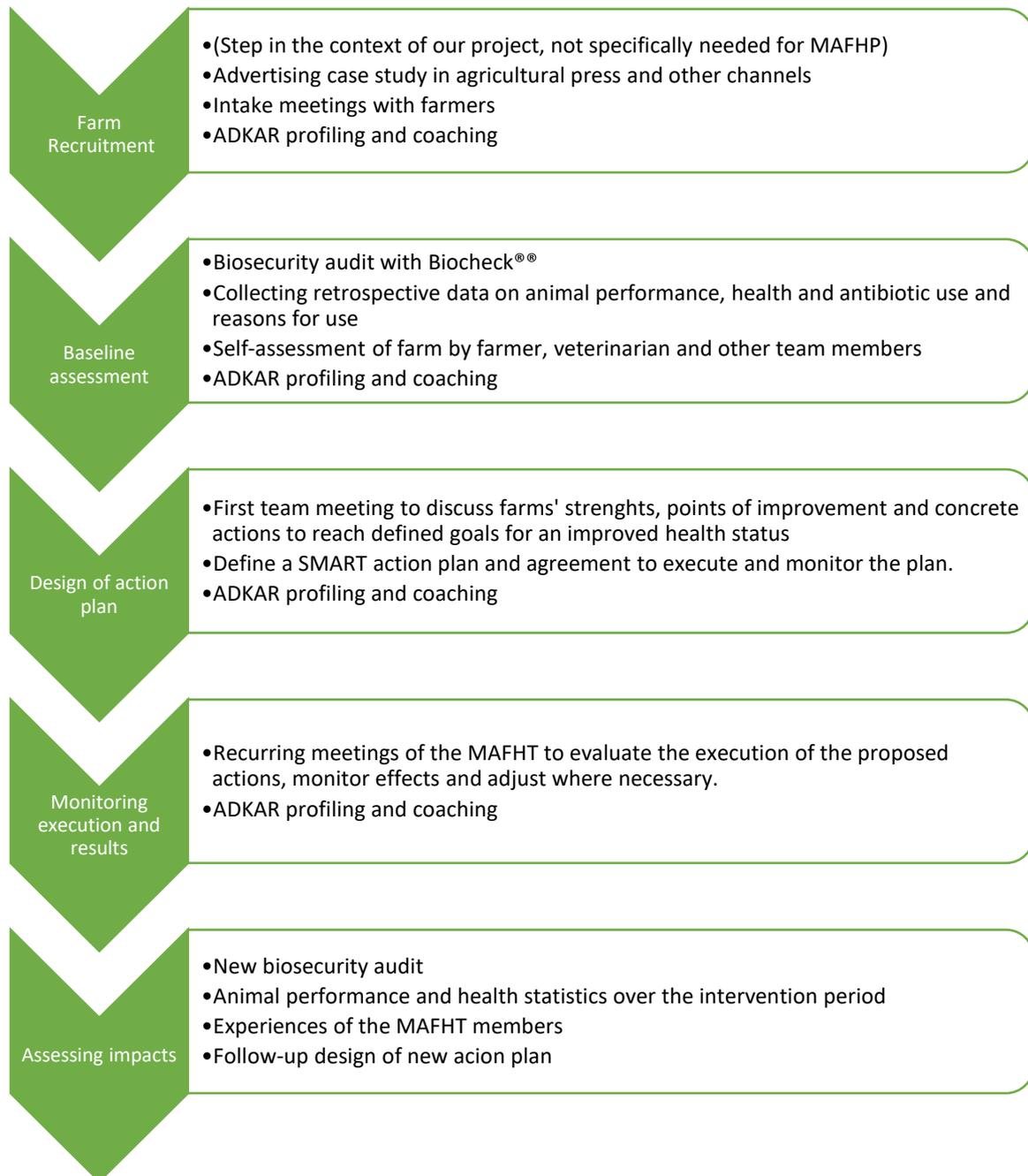


Figure 1 Overview of steps in multi-actor farm health planning

Farm recruitment and intake

The farm recruitment step is of course related to the context of starting up an action research project, while it might not be the first step in executing the MAFHP with an existent client base. However we list here the steps taken in farm recruitment for the DISARM case studies for the sake of clarity and transparency on our case study execution.

To recruit farmers, veterinarians and advisors for the Multi-actor Farm Health Teams, an advertising article was published to describe the goals and mission, typical trajectory of the case studies and benefits of participation. The advertising article is included in Annex I of this report. The consortium was instructed to exploit the most efficient medium for their country and sector (i.e. federations, vets and other stakeholders) to announce and advertise the case studies.

The selection criteria for participating farms were in order of importance:

1. Motivation and willingness to participate in all activities related to the case study as well as approval of using the collected results in dissemination and promotional items and activities by the DISARM consortium and to take on the role of farmer-ambassador for DISARM in their country and sector in promoting the MAFH-planning, testifying about their experiences in workshops or events (potentially organized on their farm), shooting a video on their farm about their best and improved practices.
2. Good data recording procedures for animal performance indicators, health indicators and recording of antibiotic use, to enable the DISARM consortium to assess the impact of the interventions coming from the action plan.
3. Having some variability in the degree of antibiotic use amongst the participating farms in each country in order to have some low, medium and higher antibiotic consuming farms in the national sample. This way the participating farms can learn the most of each other and should allow the consortium to observe effective progress stemming from the MAFH planning on the high and medium using farms.

Recruitment of farms was continued with telephone calls or a farm visit to provide detailed information on participation in the case study to clarify the information in the information and informed consent forms that needed to be signed by the case study participants.

Separate information and informed consents sheets were designed for on the one hand farmers and farm workers and on the other hand veterinarians and (feed-) advisors to be compliant with GDPR and with our ethics guidelines for the project. This difference was needed to specify for farmers the procedures and usage of data collected in the case study and its processing and use by the DISARM consortium in articles and case study reports. Furthermore, the list of activities for farmers included their participation in national and international knowledge exchange meetings.

Baseline farm assessment

The following paragraphs present the guidelines for conducting baseline measurements during the MAFHT case studies. The aim of conducting this baseline assessment is twofold:

- It is part of collecting the necessary information to assess the farms' current practices regarding biosecurity, disease prevention, animal health management and antibiotic use. This information is required to objectively identify points of improvement in the farms' functioning towards improved animal health and lower ABU.
- It provides the necessary reference on current performance that can be compared after interventions in the farms' management have been performed, based on the FHT's farm specific action plan. This information needs to enable the assessment or estimation of the progress that has been realized by the implementation of the action plan.

Cross-comparisons between countries and sectors are out of the main scope. However, it was advised to collect the data as uniformly as possible within each country and within each production sector for the sake of comparing data during the national and international knowledge exchange.

Overview of steps in the baseline data collection

1. Make an appointment with the farmer, notifying him/her that you would need 2 to 3 hours of his/her time
2. Ask him/her to prepare for the visit by collecting the necessary info in advance to save on time during the visit. Data that can be prepared in advance:
 - i. Current and retrospective animal performance data
 - ii. Animal health indicators: mortality, disease monitoring data
 - iii. Current and retrospective antibiotic use data: (both quantity and type)
3. Start the farm visit and baseline recording with a guided tour around the farm letting the farmer present his/her farm and animal management practices. This already provides you with necessary info for the Biocheck® questionnaire.
4. Proceed the baseline recording in the office and go through and finalize the Biocheck® questionnaire.
5. Collect the requested additional, necessary data on animal performance and health, disease incidence and antibiotic use
6. Optional: take the preparatory qualitative survey with the farmer for the self-assessment of his/her farm. Otherwise give instructions and the link to the survey for the farmer to complete.
7. Distribute the link to the preparatory survey to the other team members.
 - i. There are different surveys for farmers, farm workers and farm advisors and veterinarians (See Annex II and III for the surveys).

8. Explain and plan the subsequent step in the case study: i.e. the first FHT-meeting.

Assessing biosecurity with Biocheck®

The Biocheck® is a risk-based objective scoring system developed by the faculty of veterinary medicine from Ghent University (Gelaude et al., 2014). The questionnaire allows to assess both external and internal biosecurity. It provides a general biosecurity score and detailed scoring on different subdomains within external and internal biosecurity, based on weighting factors per domain and per individual question.

The Biocheck® questionnaires, detailed information, links and publications on the use of Biocheck® are available at the website: www.Biocheck.ugent.be

The printable pdf versions of the different questionnaires for pigs, poultry (broilers and layers), dairy and beef can be found in different languages: [with this link](#) .

On 25 September 2019, an on-line training on the main principles of biosecurity and performing a biosecurity audit with Biocheck® was organized for the consortium in which Prof. Dewulf gave detailed instructions and guidance for the application of Biocheck®. The slideshow on principles of biosecurity and use of Biocheck® is available on the DISARM's project website under the resource space on biosecurity.

Main guidelines in the use of the Biocheck® are:

- Notify the farmer to provide sufficient time for the farm visit and completing the survey
- Start with a tour on the farm during which the farmer shows you around following his/her usual walking routes on the farm and presents his/her farm, while you observe and follow his/her directions on biosecurity measures. (Experience whether you are requested to shower, or change clothes, register, etc.) You don't give advice at this point. This tour lets you experience the farm's practices and provides already a lot of objective information to complete the Biocheck® questionnaire.
- Complete the questionnaire with the farmer in his/her office, where additional information can be collected (e.g., water quality reports)
- At home you can complete the Biocheck® questionnaire in the on-line application and finalize it into a report that can be used during the first FHT-meeting to diagnose the farm.
- The outcome of the Biocheck® questionnaire will be presented to the farm health team during the first farm visit to brainstorm about improvements to the current biosecurity measures.

Management aspects

During the farm tour and the collection of animal performance data in the office you can ask the farmer additional information about his/her housing, feeding strategy and animal management in general. Such questions can concern practices that are risk factors for inducing stress, or impaired animal health.

Some examples:

- Do you check ventilations schemes or settings regularly ?
- Do you provide toys or suitable rooting material for pigs?
- Which method do you use and what is the age at dehorning of calves?
- How often do you mix litters or pens of suckling and weaned piglets?

Animal performance and health records

Animal performance data should be collected as detailed as possible in the different production stages of the farm. This should enable the assessment of specific actions to be taken in, for instance, the young stock department of the farm. For example, if an intervention is done to lower weaned calve, piglet, lamb or kid mortality this figure should be recorded at this level to be able to monitor progress. The following list of performance indicators is not exhaustive. Considering the partners' expertise on the specific livestock sector of their case study, it was advised to organize bilateral discussions with the partnering country studying the same livestock sector to decide on which indicators to collect and how these should be recorded uniformly.

Table 1 Animal performance and health indicators in pig production

Sows	Suckling piglets	Weaned piglets	Fattening pigs
Live-born piglets per gestation	Piglet mortality before weaning	Average daily gain	Average daily gain
Weaned piglets per sow	Average daily gain	Feed conversion ratio	Feed conversion ratio
Replacement rate sows	Specific health problems or disease outbreaks	Specific health problems or disease outbreaks	Barn turnover
Interval between first and last insemination	Issues with suckling piglets requiring (a lot of) use of antibiotics	Issues with weaned piglets requiring (a lot of) use of antibiotics (e.g. post-weaning diarrhoea	Slaughterhouse feedback on carcass and organ condemnations: lesions, lungs,...



or streptococcus infections)

Percentage repeated inseminations	Mortality	Delivery weight
Specific health problems or disease outbreaks with sows		Mortality
Issues with sows requiring (a lot of) use of antibiotics		Specific health issues with growing-finishing pigs requiring (a lot of) antibiotics

Table 2 Animal performance and health indicators for dairy cows and ewes

Dairy cows	Dairy calves
Average milk yield	Average daily gain
Fat and protein yield	Mortality
Annual/monthly cases of mastitis	Incidence of diarrhoea
Somatic cell count	Incidence of pneumonia
Feed efficiency	Specific health problems with calves requiring (a lot of) antibiotics
Mortality	
Replacement rate	
Calving interval	
Age at first calving	
Specific health problems with lactating or dry cows requiring (a lot of) antibiotics	
Dairy ewes	Dairy lambs
Average milk yield	Average daily gain
Fat and protein yield	Mortality
Annual/monthly cases of mastitis	Incidence of diarrhoea





Somatic cell count	Incidence of enteroxemia
Feed efficiency	Specific health problems with lambs requiring (a lot of) antibiotics
Mortality	
Replacement rate	
Lambing interval	
Age at first lambing	
Specific health problems with lactating or dry ewes requiring (a lot of) antibiotics	

Table 3 Animal performance indicators for broiler production

Broilers

Average daily gain
Feed conversion ratio
Overall mortality
First week mortality
Specific health problems with broilers requiring (a lot of) antibiotics.
Coccidiosis pressure

Recording Antibiotic Use

Additional to the questions on which health problems or disease outbreaks drive the use and need for antibiotics on the farm, we requested to ask the farmer or his/her herd veterinarian about which types of antibiotics are being used to treat these problems.

Livestock sectors with well-established antibiotic use monitoring systems could use the available information from these systems to analyse the antibiotic use of the farm. However, if these systems only record ABU at farm level and do not specify the antibiotic use at the animal category level of your interest, you might need to calculate the treatment incidences yourself.

To calculate the antibiotic treatment incidence, the calculation method by Timmerman et al. (2006)¹ with a standardisation to a period at risk of 100 days, was recommended:



$$TI100 = \frac{\text{amount of antibiotic used (mg)}}{DDD_{\text{animal}} \times \text{mass of animals at risk (kg)} \times \text{amount of days at risk}} \times LA \times 100$$

With:

DDD_{animal}: The defined daily dose defined by the European Medicines Agency (EMA) in the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC)¹ as the defined average maintenance dose per day per kg of animal of a drug used for its main indication.

Amount of days at risk: the observation period over which you want to evaluate the treatment incidence

LA: A long acting factor, to correct the treatment incidence for single doses of long acting antibiotics.

Mass of animals at risk: the estimated amount of animals present multiplied with the average expected weight of the animals at dosing with the antibiotic defined by ESVAC².

Table 4 Animal species and weight groups/production type for which data should be provided to ESVAC

Species	Weight group/Production type	Weight group (kg)
Pigs	Suckling pigs	4
	Weaners	12
	Sows/boars	220
	Growing-finishers	50
Cattle	Veal calves	80
	Dairy cattle	500
	Beef cattle	500
Poultry	Broilers	1
	Turkeys	6

¹ Defined daily doses for animals (DDDvet) and defined course doses for animals (DCDvet), ESVAC, EMA/223665/2016: https://www.ema.europa.eu/en/documents/other/defined-daily-doses-animals-dddvet-defined-course-doses-animals-dcdvet-european-surveillance_en.pdf

² Revised ESVAC reflection paper on collecting data on consumption of antimicrobial agents per animal species, on technical units of measurement and indicators for reporting consumption of antimicrobial agents in animals, EMA/286416/2012-Rev.1, EMA Veterinary Medicine Division, 10 October 2013

To obtain the overall treatment incidence for a farm over a certain observation period (e.g. a production cycle or an entire year), the sum of TI_{100} for the separate treatments with antibiotics during this observation period needs to be calculated. An antibiotic treatment incidence calculator in an Excel spreadsheet has been prepared for the consortium to facilitate these calculations.

Since there were no ESVAC conventions both for the expected average weight at treatment and defined daily doses for dairy sheep production, it was advised to the French and Greek partners to discuss and choose a convention for these parameters based on the national defined parameters or to define the DDD parameters themselves based on the framework by Postma et al. (2015).

Self-assessment questionnaire for farmers, veterinarians and advisors in preparation of 1st team meeting.

In line with the approach of Speksnijder (2017) to structural farm health planning in teams of farmers, veterinarians and feed- or other advisors, a preparatory survey was designed to be completed by the team members in advance of the first actual team meeting. The purpose of these questionnaires is multiple:

- It allows the team members to reflect on their own about the current strengths, weaknesses, points of improvement and potential concrete actions to take on the farm.
- It provides insight for the facilitator of the team into whether the opinions of the different team members align or whether considerable effort and discussion needs to be done in order to get the team to agree on a common vision on the farms' need for improvement and actions to reach the defined goals.
- Based on the commitment to complete the survey, the facilitator can sense the team members' willingness or general commitment to the case study participation.
- The answers to the questionnaire provide a solid basis for a structured and efficient discussion during the first farm health team meeting in which the action plan for the farm is designed.

In cases where the questionnaire was not completed in advance of the first team meeting, the questions of the self-assessment were successfully used as a guidance for the discussion ad hoc.

Both questionnaires for the farmers and for the veterinarians and (feed advisors) are included in annex II and III of this report.



Summary reporting of baseline assessment



The consortium partners executing the case studies were requested to summarize the collected baseline data into a comprehensive overview for the FHT members based on a general report template. The aim is to send out these reports to the FHT members together with the invitation for the first FHT meeting to diagnose and establish the action plan for the farm.

A completed example of a summary report for a broiler farm is included in annex IV.

Design of the Multi-Actor Farm Health action plan

The next step in the MAFHT approach is the team meeting to diagnose the farms main points of improvement that will elevate the farms' health status and lead to incremental improvement that can result in lower use of antibiotics and lower potential for antibiotic resistance on the farm. The following paragraphs hold the guidelines that were provided to the DISARM consortium to assist them in organizing the first actual and physical meeting with the Farm Health Team. This first meeting is an important one and has several goals to attain:

- To build a team with the farmer, his/her veterinarian and advisors, based on trust, commitment and motivation
- Set rules and agreements for collaborating with each other
- To find agreement in the team on the farm's diagnosis: i.e. the priorities in points of improvement for the specific farm.
- If possible to achieve in the same meeting: translate the diagnosis into a concrete farm action plan with SMART defined action points.

These guidelines describe the different steps to take in the process and provide advice on how to guide the process to make it successful. In addition some participatory tools that can be used to structure and facilitate the meeting are presented as well.

Steps and elements in the first FHT meeting: diagnosis and design of the action plan

1. Make an appointment with the farmer and the other team members for the first FHT-meeting on the farm and notify them that you would need 3 hours of their time.
2. Make sure you have collected all the completed surveys from the team members
3. Analyse and structure the different perspectives on strengths, weaknesses, points of action, biosecurity status and antibiotic use in the templates in annex V, by putting the different answers from the team members in the corresponding boxes, based on agreement between all members, pairs of team members or answers mentioned only by one team member. You can make this visual in a powerpoint or on a large paper and use post-it's with different colours to put the answers on. The latter method allows for more dynamics by moving items during the group work, if perspectives change or agreement is found on new items.





4. You can also provide the team members in advance with a comprehensive and concise overview of the baseline data collected on health, performance, biosecurity and antibiotic use.
5. Start the FHT-diagnosis meeting with a short icebreaker and team organisation:
 - i. As an icebreaker you can choose to make pairs in your group and let the pairs present each other: for example: Why they have become farmer, vet, or advisor and what they hope and expect from participating in this FHT.
 - ii. Proceed with a short overview of the project and the case study trajectory as a reminder for the team.
 - iii. Proceed with setting rules and principles of a self-steering team (see further)
6. Then do a short (30 minute) farm tour, where team members can already point out their perspectives on strengths and points of improvement.
7. Diagnosis: Proceed with a structured meeting around the table presenting the schematic overviews of the different answers to the self-assessment survey. Start with the strengths and evaluate the matches and mismatches between the answers. Proceed with the weaknesses, status of biosecurity and AB use to end with the specific points of improvement.
 - i. Optional if the team is struggling to come to a common problem understanding: try to use the elements from the survey to perform a problem tree analysis see further under the explanation of the participatory tools.
 - ii. Build consensus around the points to improve and their priority. Let the team members put the points of improvement in the different boxes of the Covey Quadrant (see section on participatory tools), to rank the items on urgency and importance (Urgent and Important, Urgent but not Important, Not urgent but important, Not urgent and not important)
8. Brainstorm for or discuss specific actions to take for the points of improvement
 - i. Brainstorming can be done by collecting individual ideas for the specific points of improvement
 - ii. Use suggested actions from the preparatory surveys
9. Discuss the suggested action points
 - i. In case the team struggles to find agreement on which actions to list in the action plan there is the option of executing a decision matrix analysis ranking the proposed action with marks on different criteria such as feasibility or practicality, investments needed, potential progress,...





10. Make a short list of at least 5 to maximal 10 points of improvement to design objectives and action points.
11. Discuss point by point the objectives and realistic achievable corresponding targets.
12. Proceed by writing SMART-defined actions for each point in the list. The action points need to be specific, measurable, acceptable/achievable, relevant, time-bound. And every team member should now from the plan, what needs to be done by who by when.
14. Summarize the action plan in the designed action plan template. A completed example for a broiler farm has been added to annex VI.
15. Explain and plan the subsequent step in the case study: i.e. the first FHT-meeting. Make agreements on the interval of monitoring by coach and by which medium (physical or on-line meeting, telephone, e-mail),...
15. After the meeting: report on the meeting and distribute the action plan and meeting schedule of the team to the members.

Participatory tools to use in the 1st FHT meeting

In this paragraph guidance and information on the potential auxiliary and participatory tools for the group work in the FHT is collected. These tools can assist in problem assessment, brainstorming and searching for potential solutions, collectively deciding on and ranking which options to take up in the farms’ action plan.

Covey Quadrant

The Covey quadrant provides a framework to discuss upon which action points are important or not to achieve real progress on the farm and which of them should be focused on first based on their urgency.

	Urgent	Not Urgent
Important	1	2
Not Important	3	4

Figure 2 Example of a Covey quadrant



Problem tree analysis: analysing problems to find solutions

A problem tree analysis is a pictorial representation of a problem, its causes and its consequences. This analysis tool helps the team get a quick glance of how a range of complex issues contribute toward a problem and how this problem branches out into a set of consequences. Both causes and consequences are fitted into the diagram on a hierarchical preference basis.

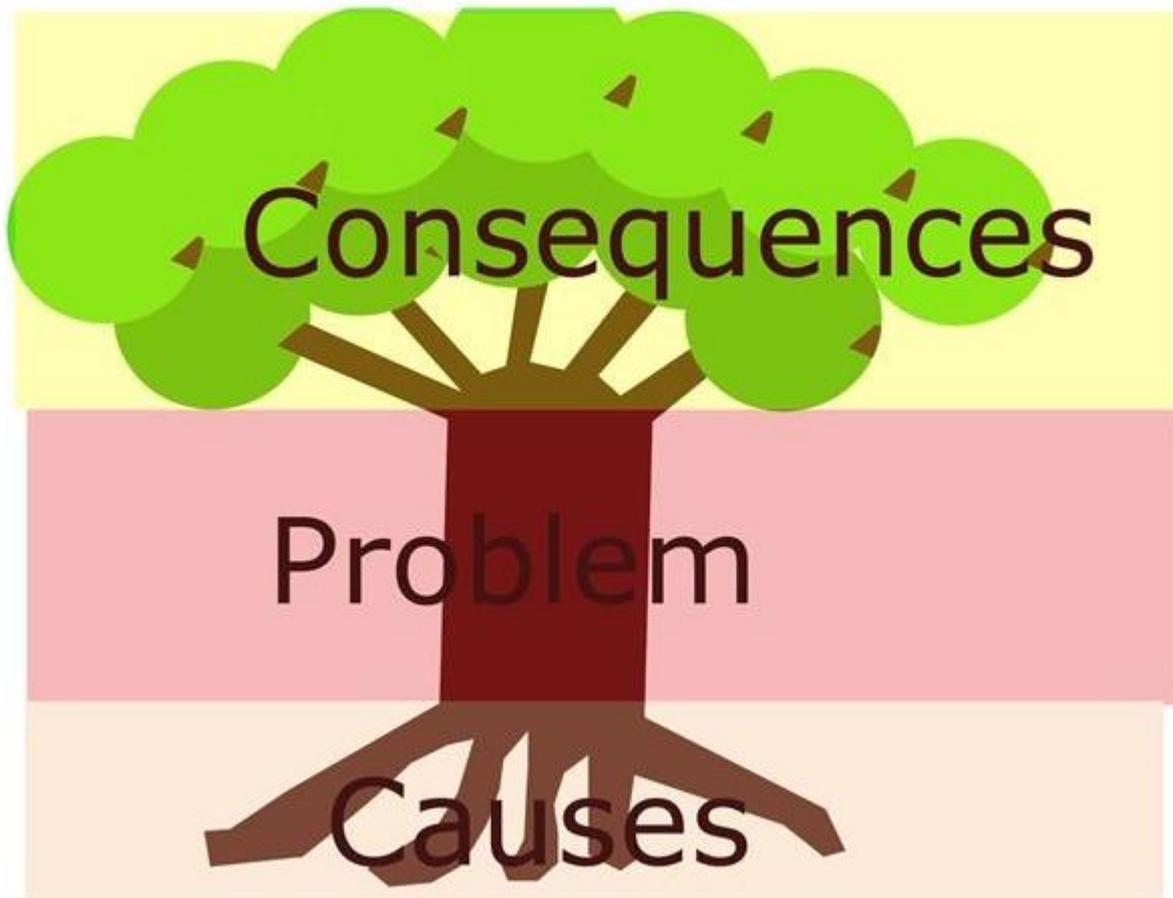


Figure 3 Diagram of a problem tree analysis

Like any other problem analysis technique, this technique requires a collaborative effort from the entire team.

Begin with a [brainstorming session to identify the major problems](#) affecting the project. For each problem you will have to carry out a separate problem tree analysis.

Divide your whiteboard or the paper you're using to record the analysis into three vertical sections, and write the problem in the middle section. The left side can be reserved for the causes and the right side for the consequences.

Table 5 Problem tree analysis listing (in)direct causes and consequences for problems on the farm

Grass root causes	Direct Causes	Problems	Direct Consequences	Subsequent Consequences

Discuss with the team the possible causes that can be held responsible for the problem situation. From this, list and identify the ones which have a direct relationship with the problem. These direct causes can be listed on the left hand side of the section reserved for the causes (blue). The causes which lead to these direct causes can be listed to the left of this list (orange). Relational arrows can also be used to demonstrate the cause and effect relationship among the causes.

When you’re done with the causes, move on to the consequences. When listing the consequences, list the direct ones on the right of the problem section (green). The consequences that result from these direct consequences can be listed to right of this list (purple).

Finally when a comprehensive list of causes and consequences have been developed and the related causes and consequences have been linked respectively, you’re ready to display the information pictorially. For this you can use a sketch of a tree (like shown in the image above) and write down the problem on the tree trunk, the causes along the roots and the consequences along the branches. Alternatively, a bock diagram, like the one shown in figure 4 below, can be used to present the problem tree analysis in a more organized manner.

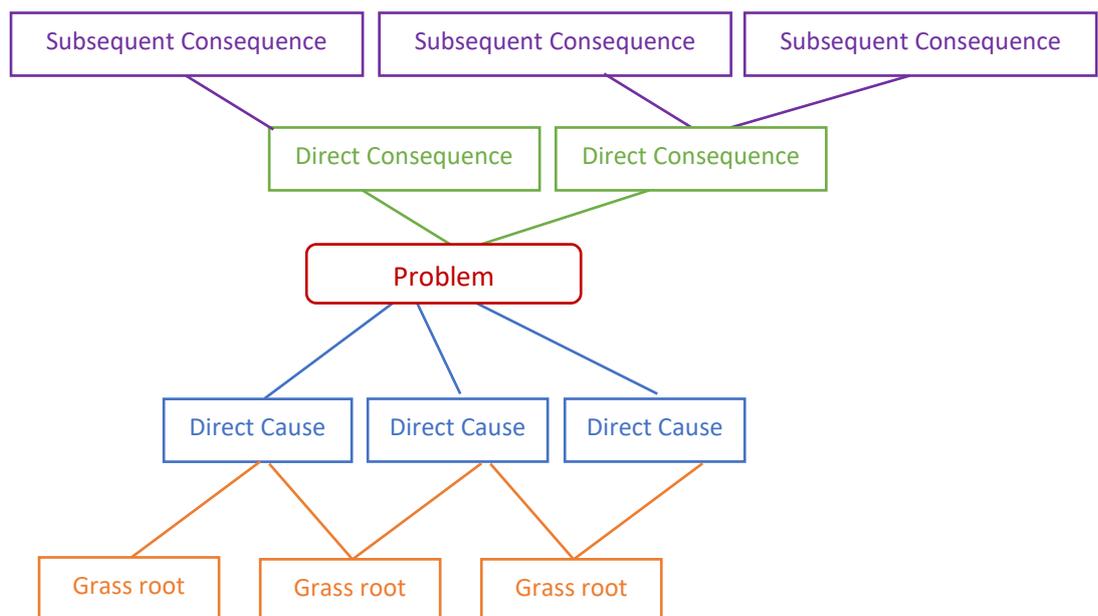


Figure 4 Pictoral representation of a problem tree analysis

Advantages of the problem tree analysis are:

- Provides in-depth information on the problem in question, leading to a better understanding of all the interconnected issues, and providing a solid platform for strategizing and initiating problem solving measures.
- The analysis helps closely examine the problem by dissecting it into manageable pieces and establishing links between these pieces. With a clear idea of how and how much each cause contributes toward the problem and what and how severe will be the consequences, the team is in a better capacity to organize and prioritize the remedial actions.
- It can help in developing a multi-pronged strategy to deal with the different aspects of the problem and thus ensure absolute success.
- The shared technique, used to generate information during a problem tree analysis, ensures that every aspect of the problem is taken into consideration, irrespective of its relative importance. This means the chances of the problem solving plan falling back are nearly negligible.

The following [video](#) shows a simple example of problem tree analysis from minute 6:56 onwards and shows also how you can turn the problem tree into an objectives tree to set goals to resolve the problem.

Pairwise comparison of problems or potential solutions to problems

Problem/Preference Ranking is a participatory technique that allows analysing and identifying problems or preferences stakeholder share in order to implement adequate improvements and solutions in their context. First, the stakeholders have to decide which are the most important problems they face. Afterwards, the participants have to rank these problems/preferences in regards to their importance. The result of this method provides the starting base for discussions on possible solutions to the priority problems.

Advantages of this method are:

- Preference/Problem ranking method helps to quickly get a good idea of what people think are the priority problem or preferences
- Preference/Problem ranking is probably the easiest method to use and to learn more about commonly shared problems and priorities
- The criteria developed out of the ranking can be used for the action plan of the farm

Disadvantages can be:

- It requires time in order to rank the preferences and problems
- It may not be possible to react to all the problems discussed



Cards can be used to represent the different problems. The facilitator shows the “problem cards”, two at a time, each time asking, “Which is the bigger problem?” As the participants make the comparisons, the results are recorded in a matrix.

The final result is obtained by counting the number of times that each problem was judged to be the larger problem over the others and arranging them in appropriate order.

There are usually more problems to solve, needs to provide for or opportunities to exploit compared to the resources available. Under such circumstances there is need for instruments that assist the team as a heterogeneous group to get as close to their priorities as possible. These priorities are the ones that receive preference. Ranking provides information on both the choices people make and reasons for their choices.

Preference/Problem ranking helps to quickly get a good idea of what people think about the priority problem or preferences. Moreover, the criteria the members consider in making their choices, e.g. labour requirements, investments, effectiveness, can be used to consider in the farm health action plan. Individuals vote on the items from most important to least important item. Pairwise ranking is rather universal and can also easily be used in the next step to rank and determine preferences in different alternative solutions to the identified problems. Ranking can be combined with exploring the reasons why people consider a problem to be larger than another one, or prefer one possibility to another.

Power matrix for evaluating and prioritizing alternatives and actions

A power matrix can be used to rank and prioritize between alternative options scoring these for a specific set of criteria. First you start by drawing a matrix listing the alternatives on separate rows in the matrix. Next you list the set of criteria for which you will evaluate the alternatives on the column headings. The criteria for which actions of improvement regarding animal health, biosecurity and disease prevention could be evaluated can be the following:

- Ease of implementation, practicality, feasibility
- Investment costs
- Effectiveness

For each suggested action you can ask the group members to draw a power ball in the boxes representing the value they adhere to this alternative for the different criteria. An empty ball represent for example an infeasible action or an action with little effectiveness. A full coloured ball represents a very feasible or very effective or very costly option. You can chose whether you use a three step (empty-half- full) or five step (based on quarters). The following example can illustrate the power matrix:

	Feasibility	Effectiveness	Investment costs	Total
Replace ventilation system				



Different boots for different compartments				
More vaccines				

Figure 1 Example of a power ball matrix to prioritize and evaluate different action points

Next you can if wanted translate the balls into numerical scores and see the total score and ranking of each alternative. You can ask the team members to individually come up with balls of different colour or come to a group consensus for every alternative and criteria.

The following [video](#) shows instructions on how to perform the power ball analysis.

Monitoring execution and results from the action plan

In the first FHT meeting, the team has to make agreements on the structural follow-up of the execution and results from the action plan. Depending on the livestock sector this can be based on the production cycles (broilers and farrowing pig farms) or a fixed time frame, e.g. bimonthly for dairy cows and dairy sheep. The idea is that the FHT meets regularly whether or not together with the coach to monitor the execution of the different tasks and action points and to evaluate potential results on animal health and performance. Moreover, at these meetings action points can be redefined or adapted based on the past experience or new actions can be proposed and listed in the action plan. The template action plan (Annex VI) allows for this dynamic with the specific monitoring tables that need to be addressed in the monitoring meetings. For this reason it is also advised to store and share this action plan through a cloud-based depository, in order to enable the team members to work together in this document and to always dispose of the most up to date version of the action plan.

Further the facilitator/coach has to question the team members and especially the farmer about his experience in executing the action plan. Whether he is succeeding in taking action or not? If not what is keeping him from doing so and what issue needs to be resolved or what support is needed for him to take action? A guiding list of questions to ask during the follow-up meeting is included in Annex VII.

These questions related both to the execution of the action plan as well as the experience of working with the MAFHT. Additionally, we suggest the option to exploit the DISARM Community of Practice to ask for external stakeholders' opinions or advise to solve issues on the farm.

Assessing impacts

In order to publish 30 case study reports about the MAFHT case studies, a final assessment of the impact of the action plan's execution will be performed. This final analysis will be similar to the collection of data for the baseline assessment of the farm and will include:

- A follow-up biosecurity audit with Biocheck® to investigate potential progress in the farms' biosecurity measures.
- Collection and analysis of the evolution in animal health and performance statistics over the intervention period during which the action plan was designed, executed and adapted along the way.
- Collection and analysis of the antibiotics usage data and treatment incidence over the intervention period.
- A qualitative assessment of the team members' experience in the FHT processes and collaboration.

4. Development of a self-steering team

In the paragraph describing the different steps in the first FHT meeting, it was mentioned to start the meeting with setting the rules and creating an environment for a self-steering team. This chapter provides an overview of crucial elements to be taken into account in order to establish a self-steering team. This is relevant for our FHT case studies, since we want the FHT's to eventually function successfully without the support or intervention of a DISARM-facilitator/coach. These elements were discussed during the DISARM-workshop on the 2nd of December 2019 on the livestock adapted ADKAR coaching model and general coaching and facilitation skills.

- **Safety and trust:** is there a culture where people feel safe to take risks? This proved to be far and away the most important success factors for successful and effective self-steering teams. Members have to feel comfortable in the group and dare to express their opinions and perspectives. This is the only way the team can move forward. Your job as a coach is to make sure the discussions proceed in an orderly and respectful way.
- **Reliability:** can team members count on each other when they're under a lot of pressure to deliver a certain quality in a certain amount of time? Is there a culture to help each other?.
- **Clarity and structure:** are the goals, tasks, roles, and plans clear to everyone within the team? This requires good communication and frequent efficient meetings. Agreements, appointments and task need to be centrally documented so that everybody knows what to do by when. For this reason, the template action plan should be used and actions point have to be defined SMART.

- **The meaning of your work:** is there room to work on things that are important to the individual?
- **The impact of your work:** do the team members believe that their work matters? When evaluating the progress and execution of the action plan, you as coach can clearly point out every team members' contribution and its importance for the farms' achievements. Acknowledge every member's contributions.

The five dysfunctions of a team.

During the workshop on general coaching and facilitation skills we also zoomed in on the five potential dysfunctions in a team following the pyramid of Lencioni.

The dysfunctions are linked to each other and start in a fundamental lack of trust between the members of a team. If the team members lack trust in each other this might result in fear for and avoidance of healthy conflicts. These healthy conflicts are needed to have real and effective discussions on the teams' plan

In its turn the fear for interpersonal conflict of the team members can result in low commitment to the team. Because team members might not agree on the teams's plan or course of action and they do not dare to question the proposed plan.

In case the team members are not really committing to the teams' plan, they will not be likely to hold each other accountable for their results and the collective result of the team as well.

Following the lack of keeping each other accountable, the team members will loose sight on the collective team results. Finally, you end up with a team in which the people are only focused on their own results rather than the collective results of the team.

To prevent these dysfunctions, you have to:

- **Establish vulnerability-based trust:** This can be achieved through a trust building exercise in which you take turns and share a personal weakness that might affect the team and a strength that can help the team moving forward. Go first and show the team that it is no problem to be honest and vulnerable. The transparency regarding your faults takes away the perception of the team members need to be perfect.
- **Encourage healthy conflicts:** You can stimulate and promote healthy conflict and resolution in the team with a team agreement or charter. This can list the agreement to sort out disagreement with passionate debate in which no commentary is withheld but still with respectful communication.
- **Earn commitment:** All team member should buy-in to the teams' decisions by allowing everybody to participate and share their opinion. It is more important to make people feel their opinion matters and their ideas are heard, understood and acknowledged in the context of the team decision than that their ideas are being adopted as such.

- **Foster peer-to-peer accountability** :Build on the culture in which every team member knows it is ok to keep each other accountable for their contribution to the teams' performance. This can be obtained by rotating the lead of status update meetings of the teams, in which every team member take the lead in his/her turn.
- **Focus on teams results** :Try focussing on the feeling that the team performance and results are more important than individual performances.

5. Group Work Facilitation, Coaching and Livestock-adapted ADKAR coaching model

As stated in the introduction and the background to the MAFHT approach, working on incremental improvement of the farms' health status can be challenging for the livestock farmer. The actions points defined for improving the animals health and management and lowering the use of antibiotics on the farm can request fundamental changes to the farm's organization, the farmer's working habits and routines and management practices. This means that the farmer has to go through a behaviour change processes which can be challenging to go through and to sustain the changes instead of relapsing to the old working routines and habits. Therefore ideally, the farmer should be supported by a coach that assists and guides him/her through this behavioural change process.

Additionally, the benefits of the collaborative team effort were mentioned in the section on background. The success of the MAFHT is however conditional on effective team collaboration which can be promoted by the guidance of a facilitator/coach assisting the MAFHT in its collaboration.

In order to produce the most successful case studies, a workshop was organized on the 2nd December 2019 , for the DISARM partners taking on the role of facilitator/coach to experience general basic skills needed for group-facilitation and coaching and some specific skills for the livestock adapted-ADKAR coaching model to assist farmers in the behavioural change process.

General skills for coaching and facilitation

First the difference between therapy, coaching, mentoring and consulting has to be clear. Coaching serves a change-process with the coachee. In that process the coachee is self-reliant and in control over the decisions and the direction of the process. Coaching is solution-oriented and focused on the future improved performance. Therapy on the other hand is more problem oriented and focusses more on past experiences. The great distinction between coaching and mentoring and consulting is the clear focus on self-exploration and self-discovery of solutions by the team in a coaching context.

The task of the coach is to stimulate and ask the right questions to get the coachee out of his/her comfort zone so (s)he can learn and develop. As a coach you need to take a position or attitude to :

- Discover, clarify, and align with what the farmer, vet, feed stock representative want to achieve.
- Encourage self-discovery (strengths, talents, values, etc...).
- Elicit solutions and strategies generated by the farm health team
- Hold the farm health team responsible and accountable
- Focus is on the future and opportunities rather than on the past and problems

Listening, summarizing , deepening

A first crucial skill in coaching is being able to ask questions from a sincere curiosity and interest in the coachee and his/her problems. The focus does not need to be on asking the correct questions but more on the sincere curious attitude. Asking good questions then follows naturally. It helps however to ask questions that make the coachee really think through situations and problems; i.e. open exploratory and observatory questions.

Similarly, from relaxed listening you will be able to do good paraphrasing and summarizing to proceed the conversation. You don't have to worry about not paraphrasing or summarizing everything correctly because the coachee is there to correct you. Keep in mind that you can summarize on different levels: both on the content level as well as on the experience level by looking at the non-verbal communication of the coachee.

To practice listening and summarizing we practiced the LSD technique (Listen, Summarize and Deepen)

Asking opening questions

Facilitation means to make easy. Your job as a facilitator is to take the right attitude and ask good questions to make the group work easy for the team members.

A good way to open the discussion and to provoke brainstorming in the team members minds is to ask questions that provoke images in the minds of the team members. This way their answers become visualized in their mind and easy for them to explain. The ideal way of opening the brainstorm is to:

- Start with an image building phrase: ("Think about", Image..., Consider..., If...)
- Extend the image to the answers with at least two phrases
- End with asking the direct question you want to get the information for.



For example you might ask the farmer: Think about the last time you were evaluating animal health and performance on your farm. What were problems that occurred or frustrated you? Are there points to improve to prevent these problems and frustrations?

Questions for goal setting, problem identification, solution finding, starting action

A successful coaching trajectory can be guided by the GROW coaching model. Grow stands for Goal, Reality, Options, Will

The idea behind this model is to go through phases of identifying the goals that one wants to achieve. Followed by an assessment of the current situation or problem. The moment the goal and the current situation or problem is clear you can start looking for options to work on to reach the goals set and solve the current problems. The last step is creating the will and first small action to undertake to get the process going to achieving the goals defined.

To each of these different steps sets of particular open questions can be listed to help the person or group in effectively finding answers to foster the change process.

Example questions for Goal setting:

- What is the problem you are facing and you would like to improve?
- What do you want to achieve?
- How does the ideal situation look like ?
- What does the situation would look like when the problem has been solved?
- What are the consequences if the current situation does not change / the problems does not get solved?
- What is your long term goal in this situation for this problem?
- What does your time frame look like?
- Which intermediate steps do you foresee?

Example questions for assessing the current situation/ problem

- What does the current situation/problem look like? Be as specific as possible?
- What did you do ? What did you wanted to accomplish with it?
- What is the most important element or aspect in this challenge?
- Which actions have you already taken up to now?
- What concerns you? To what extent?
- What stops you of doing more or try more?
- Which obstacles are yet to be resolved?



- Which resources do you dispose of already? (Time, money, skills, assistance, education, will, ...)

Example questions for finding options or solutions

- In which other way could you face this problem?
- Make a list of all options you can think of small or big, complete or partial solutions?
- What else can you do?
- What would you do if you were not limited by time, budget and you were in full charge?
- What would you do if you could start over completely?
- What are the advantages and disadvantages of all these alternatives?

Example questions for creating will, commitment and first actions

- Describe precisely the actions you will take to deal with the problem?
- When are you going to do it?
- What is the first action you can take right now?
- How can you check yourself whether the solutions works or not?
- Which obstacles might you encounter? How are you going to prevent or circumvent these in advance?
- Where do you need help or assistance? What do you need to do still to get it?
- On a scale from 0= Certainly not going to do it? 10= I'm sure to do it How likely are you going to take these actions?
- What stops you of ranking these alternatives with 10?
- What do you need to be more motivated?
- What do you need to put your ideas into practice?

Challenge : offering solutions

The attitude by which the coach/facilitator approaches the farm health team is important. His or her attitude should be to be distant and involved at the same time and focused on the responsibility over the process instead of the result. If the coachs feels responsible for the outcome/result of the task then (s)he cannot be distant and involved at the same time. As a coach you are responsible for the process of learning, not for the results. The team members are responsible for their own learning: this depends on their reflectivity, motivation, behaviour. The coach's intention should be that the members of the farm health team learn from discussing with each other, that they create solutions by combining their knowledge

(practical and scientific knowledge) and that the coach stimulates them to change perspectives, explore other ideas.

It does not mean that the coach is not allowed to offer a solution, but a lot depends on how this solution is offered to the team. The solution should be offered in such a manner that it stimulates a further thought process with the coachee or the team.

After offering the potential solutions you can ask : what can you do with this ? In any case try to keep the thought process as long and as much as possible with the coachee or the team. The sense of self-discovery and ownership over the solution motivates to better execute the solutions in practice.

Livestock-adapted ADKAR coaching model

ADKAR stands for Awareness, Desire, Knowledge, Ability, Reinforcement. In a process of change these different elements need to be addressed to result in successful change. It is a business change management model originally developed by Jeff Hiatt in 2006 and focuses on the individual change process employees go through when organizational changes in their company are being implemented. The ADKAR model has been adapted to the livestock context of changing farmers attitudes and habits to antibiotic use and resistance, by Drs. DVM Manon Houben from PorQ and Royal GD Animal Health in the Netherlands. Together with a consortium of animal health researchers this model has been successfully applied in the EU Interreg project I-4-One Health to study and raise the awareness and desire to take action on lowering ABU and AMR with Dutch and Flemish pig and poultry farmers. The results in this project showed difference both between countries and sectors in the level of awareness, desire and knowledge for taking action to mitigate antibiotic resistance. Moreover the ADKAR methodology showed promising results to improve these critical elements for a successful and sustainable behavior or attitude change with the farmers. During the workshop on coaching and facilitating Ms. Houben provided training to adopt this adapted coaching model.

Awareness

In the workshop Ms. Houben addressed ways to promote awareness with farmers about the need to act on antibiotic resistance and to lower the use of antibiotics. This basically comes down to training yourself in determining to which aspects a specific farmer is responsive to. These aspects can include:

- Feelings of responsibility to act on the resistance problem.
- Personal or family experience with antibiotic resistance.
- Personal risks of acquiring a resistant infection.
- Economic incentives: to improve the productivity of the farm based on better performance and cutting on costs for antibiotics.
- Motivation to overachieve compared to colleagues.
- Motivation to be an ambassador or front runner setting the good example.



As coach you can use the following concrete tools to work on awareness:

- Benchmarking reports on ABU and figures on the consequences of ABR.
- Labels of producer organisations or retailers.
- Explain the One health concept.
- Stories of successful reductions of antibiotics by other farmers!
- Data and explanation of the link between use of AB and development of resistance.
- Economic risks of residues in products or Economic advantages from premiums.

Desire

In general a personal experience is important to establish a real desire to make a change. You should try to achieve an internalization by the farmer about feelings (s)he is responsive to.

After creating awareness comes the step to create a real desire with the farmer to act and make a change. This step from awareness to desire and have the farmer really commit to the change process is the hardest of all. If people have had experiences of negative reinforcement, taking away the belief in successful change, these need to be resolved first. This can be difficult.

Resistance to change is often times based on fear, mostly fear of the unknown. This fear should be resolved. You can start by proposing smaller steps and small actions to build confidence. Also try to replace the antibiotics by some other tool or substance like a feed additive to give the farmer comfort, that there is still some element or tool safeguarding the health of his/her animals.

Be sure to follow the assess, improve, check, reduce approach: So before stopping the use of antibiotics, make sure that the farm practices have been improved to the level that antibiotics can be put away safely.

Have a plan ready for potential problems that can occur after reducing the use of antibiotics.

You can notice from his/her speech when a farmer is really motivated. A motivated person will use the first person: I will, I need, I... while a non-motivated person will mostly speak using the third person. (Them, They,..)

Knowledge and Ability

From the moment the farmer is aware and motivated you can proceed in the more classical way to give him/her advice and knowledge on how to implement changes to his/her farm and its (management) practices. Be aware that you really tailor the advice and knowledge to the context of the farm, so that it is relevant and effective to the farmer.

Make sure in the advice you provide to take into account the abilities of the farmer in terms of time, resources, capital and skills as manager. Ideally you can provide him/her with alternative choices from which (s)he can make his/her own preferred choice. This way the





farmer (her)himself can evaluate the different alternatives for his/her own preferred criteria: for example time available, ease of implementation, effectiveness and investments needed. Be sure to assist the farmer in making these assessments of alternatives.

Further be present for support when the farmer is executing the potential actions and solutions. This can be challenging and stressful since, the farmer is out of his/her comfort zone. Be there to encourage and provide explanation if needed.

Reinforcement

The final step of reinforcing the farmer is very important for sustainable and successful change. As a coach, make sure to notice all the small successes and put emphasis on them. Celebrate every small achievement: Too often the focus goes directly and predominantly on the aspects that need to be improved. Be sure to collect and dispose of good data to monitor and really track progress on the farm.

Assessing the Farmers' position in the ADKAR framework

The livestock adapted ADKAR model uses a scale of 1 to 5 to score people for the different aspects Awareness, Desire, Knowledge and Ability. For the coaches the task is to have a conversation with the farmer and assess from the conversation which category the person adheres to.

Awareness

Represents the awareness that AMU in livestock production should be reduced while this is a risk for introduction of antimicrobial resistant bacteria in animals and humans. Ask the farmer why (s)he thinks AMU and AMR are problems and why AMU should be reduced. Ask frankly whether (s)he knows about the link between AMU and AMR?

1. Missed all information regarding use of antimicrobials and (the link with) antimicrobial resistance. Is not aware there are reduction goals nor is aware that AMU is a risk for AMR
2. Is aware that AMU should be reduced, but denying the problems related to AMU (Denies link between AMU and AMR)
3. Is aware that AMU should be reduced, but contests the role of AMU in the (own) livestock sector. Mentions the role of AMU in humane medicine or in companion animal medicine.
4. Is aware that AMU should be reduced, and accepts the reduction goals
5. Is fully aware that AMU should be reduced, as (s)he accepts the risks and opportunities for livestock production. He takes responsibility for the AMU on the farm and embraces the reduction goals for the farm.





Desire

Desire should reflect the internalization of the awareness with the farmer. “Does the farmer (her)himself wants to reduce the AMU on his/her farm?” Pay attention to the way the farmer speaks about the problem and the relation to his/her farm. Does (s)he use change language: I will, I have to, I want to, ... For me it is important that,...Pay attention to statements as the following indicating the score for desire:

1. This is not my problem. It does not concern me.
2. I will reduce but I’m not the first adaptor. My “ neighbour” or colleague should also reduce
3. I want to reduce but slowly. The goal is not to reach the lowest use possible, just enough is also ok.
4. My goal or the goal is to reach the lowest AMU possible but not at all costs.
5. The goal is to reach the lowest AMU possible , even if there are considerable costs related to the reduction.

Knowledge (To be assessed in the design process for the action plan)

This concerns specifically the knowledge and skills the farmer and the veterinarian possess to implement management actions to improve the animal health and to reduce the need for antibiotic treatment

1. It is not clear what is causing the health problems on the farm. It is not possible to draw up an action plan. The farmer and veterinarian really do not know where to start.
2. Low level of knowledge, skill or experience which are needed for the execution of the action plan.
3. Information on health problems is available, action plan can be drawn up, but resources are needed to implement, like training or money
4. Information is available, some discussion about the implementation and some support is needed.
5. Information is available, the action plan is accepted and the knowledge and skills are sufficiently available with the farmer the veterinarian and the personnel of the farm.

Ability (to be assessed only after the action plan has been designed and executed)

Represents the implementation phase of the change. Will or is the farmer implementing changes in management, working methods and infrastructure. (Topics for change are: Feed, management, climate, working routines, etc.) Reflecting commitment to the execution of the action plan.

1. Execution of the plan is absent. Does not want to change anything within the farm or anything regarding working methods.



2. Farmer takes the easy way out. Implements 1 or 2 things, which are easy to do. The selection of these actions is not based on expected effect or outcome but on requested input.
3. Some changes are accepted and implemented. Or implementation is exclusively for the modernized or new farm stables and not in the old ones. Or waiting to adopt the practice in the next new stable.
4. Is implementing changes systematically, but money or time is blocking implementation of some suggested actions or changes
5. Is investing time, money and effort to systematically adopts changes and adopt full action plan.

6. National and International knowledge exchange

Another dimension of the DISARM work package on multi-actor farm health planning is fostering a national knowledge exchange and peer-to-peer learning between the participating pilot farmers. The aim of this task is to create a common vision and goal for these farmers: i.e. to improve animal health on their farm and work towards producing with a lower need for antibiotics. This common vision and goal should allow to create enthusiasm and motivation with the farmers to put effort into the farm visits and knowledge exchange. This process has to ensure farmers to learn from each other during the farm visits and advising moments. For these national knowledge exchange meeting, the “Stable school” methodology described by Vaarst et al. (2007) will be adapted for application in DISARM. These authors used this method successfully with Danish organic Dairy Farmers aiming at production without antibiotics to ensure export possibilities to the USA.

Description of the Stable school methodology

In the «Stable school» by Vaarst et al. (2007) groups of 5 farmers participate. Each farmer is asked to host a farm visit twice during the cycle of the project. The farm visit consists of a tour around the farm of about an hour at max. followed by maximum 2 hours of brainstorm/advising.

The hosting farmer sets the agenda for the meeting at his/her farm. Together with the facilitator (s)he establishes the agenda on which the group will work. Typically, the farmers chooses 1 success case of the farm regarding the problem (in this case reducing AB use) and two challenges for the farm. The facilitator helps the farmer to precisely define the cases and makes sure the agenda is send to the group well in advance together with relevant guiding documents such as farm data or reports.

During the farm visit the hosting farmer shows his/her farm to the group. At this point (s)he can present the farms’ history, his/her values and vision for the future of the farm. Furthermore (s)he can show or illustrate the successes and challenges for his/her farm.

During the advisory round the other farmers in the group take turns in advising the hosting farmer both on his/her success case as well as the challenges ahead. One challenge is handled at a time starting with the farmers advising clockwise. For the second item the last farmer to speak, starts the second round of advice. This way everybody has the opportunity to speak and does not feel the need to overrule somebody. This way of working should prevent chaotic discussions or discussions dominated by a few persons.

The hosting farmer is last to react on all advice given by his/her colleagues. It is not allowed for him/her to go in direct discussion with the farmers while giving advice. If the hosting farmer starts defending him(her)self this might block the visiting farmers in providing advice.

After the round of advice the hosting farmer can react and comment on how (s)he appreciates the advice and what (s)he will do with it.

The role of the facilitator is solely facilitating. (S)he has to make sure the rules described above are being respected. Moreover (s)he has an important time keeping role. Next to that (s)he has to make minutes of the meeting and send these off to the group after the farm visits.

For technical advisors this sole focus on facilitation will require a shift in mindset, since they are used to give advice or might have the conviction that they should know the solution to the farmers' problems. Still, this approach is all about farmers learning from farmers, both while receiving advice on their own farm, but also during advising other farmers on their practices.

If (s)he must give advice, it must be done similarly to the way the other farmers need to offer their advice. (S)he must prevent putting (her)himself above the group. Also (s)he should be the last person to give advice in the group after all farmers have had their opportunity.

Normally, each farm is visited twice, so that in a second visit to the farm the group can see how the hosting farmer has put the advice into practice. The way of working at the second visit is the same to the first visit. However, discussing the success stories of the past will be replaced by the explanation of the hosting farmer on how (s)he has implemented the advice. Considering the project's budget, and geographical spread of the case study farms in each partner country; it needs to be evaluated whether such a follow-up cycle of farm visits is feasible in the DISARM case studies. An alternative solution can be to organize a closed on-line group in which these pilot farmer can meet and share more knowledge and insights related to the actions they undertook based on the advice of their colleagues.

International cross visits

The different livestock sectors of interest in DISARM are being studied in two countries, (except for dairy cows which is under study in Denmark as a third additional country). This twinning of activities across partnering countries offers options to organize international cross-visits for the case study farmers to visit their international colleagues focussing on the similar challenges and similar goals but in a different context. The idea is that reciprocal three day cross visits will be organized for the farmers to go abroad and meet the other farmer and



MFHT members. Where possible all 5 pilot farms could be visited or a general meeting with the pilot farmers shall be organized. Depending on the geographical spread of the pilot farms across the countries it might not be possible to visit all of them within the three-day time span foreseen for the cross visits. Moreover due to the current COVID-19 epidemic the prospects for international travel and cross visits have become uncertain in the short outlook.



7. References

European Medicines Agency Veterinary Medicines Division. (2013) Revised ESVAC reflection paper on collecting data on consumption of antimicrobial agents per animal species, on technical units of measurement and indicators for reporting consumption of antimicrobial agents in animals, EMA/286416/2012-Rev.1, London, UK

European Medicines Agency Veterinary Medicines Division. (2016) Defined daily doses for animals (DDDvet) and defined course doses for animals (DCDvet) European Surveillance of Veterinary Antimicrobial Consumption (ESVAC), EMA/223665/2016, London, UK

Gelaude, P., Schlepers, M., Verlinden, M., Laanen, M. and Dewulf, J. (2014). Biocheck. UGent: a quantitative tool to measure biosecurity at broiler farms and the relationship with technical performances and antimicrobial use. *Poultry science*, 93(11), 2740-2751.

Postma M., Sjölund M., Collineau L., Lösken S., Stärk K.D.C. and Dewulf J. (2015), Assigning defined daily doses animal: a European multi-country experience for antimicrobial products authorized for usage in pigs. *Journal of Antimicrobial Chemotherapy*, 70:294-302

Postma, M., Vanderhaeghen, W., Sarrazin, S., Maes, D. and Dewulf, J. (2017). Reducing antimicrobial usage in pig production without jeopardizing production parameters. *Zoonoses and public health*, 64(1), 63-74.

PROSCI ,Inc., The PROSCI ADKAR model: A goal oriented change management model to guide individual and organizational change. Retrieved from: <https://www.prosci.com/adkar/adkar-model>

Speksnijder, D. C., Graveland, H., Eijck, I. A., Schepers, R. W., Heederik, D. J., Verheij, T. J. and Wagenaar, J. A. (2017). Effect of structural animal health planning on antimicrobial use and animal health variables in conventional dairy farming in the Netherlands. *Journal of dairy science*, 100(6), 4903-4913.

Schwarz, S., Kehrenberg, C. and Walsh, T. R. (2001). Use of antimicrobial agents in veterinary medicine and food animal production. *International journal of antimicrobial agents*, 17(6), 431-437.

Timmerman, T., Dewulf, J., Catry, B., Feyen, B., Opsomer, G., de Kruif, A. and Maes, D. (2006). Quantification and evaluation of antimicrobial drug use in group treatments for fattening pigs in Belgium. *Preventive veterinary medicine*, 74(4), 251-263.

Vaarst, M., Nissen, T. B., Østergaard, S., Klaas, I. C., Bennedsgaard, T. W. and Christensen, J. (2007). Danish stable schools for experiential common learning in groups of organic dairy farmers. *Journal of dairy science*, 90(5), 2543-2554.

Annexes

Annex I : Advertising to promote participation in DISARM case studies

Farmers wanted to join a European project on antibiotic resistance. Join now and become one of our farmer-ambassadors in your country.

Is animal health important to you as a [*insert dairy, poultry, etc.*] farmer? Would you like to improve disease prevention and at the same time use antibiotics (more) responsibly? Are you interested in learning from us and from other farmers? Then DISARM is looking for you. Take part in our European project and you will receive free coaching to improve disease prevention and the responsible use of antibiotics and you will have the opportunity to learn from other farmers both in your own country and in another European country.

As a livestock farmer, improving and safeguarding the health of your animals and preventing diseases is one of your most important challenges. And it becomes even more important to do this with a responsible use of antibiotics. Not only for your farms' productivity, but also because of the increasing social pressure to lower the use of antibiotics in livestock farming. Less and more prudent use of antibiotics on your farm is important for many reasons:

- You prevent pathogenic bacteria from becoming resistant to antibiotics. As a result, you will be able to continue to use them when needed.
- You reduce the risk of you and your family members being exposed to resistant bacteria.
- You improve the image of your sector as one that is proactive, a sector that does not shy away from challenges and that takes into account the concerns of society.

What is DISARM?

DISARM is a European project with the aim to identify, share and promote, strategies and innovations that are effective for improving animal health and for reducing the need for antibiotics in European livestock farming. The focus is on setting up farm health teams (FHT) and a network of various stakeholders (farmers, veterinarians, feed advisers, other suppliers and researchers) who share experiences and knowledge. We, [*insert your institute's name*] as partner in DISARM are looking for 5 [*insert dairy, poultry, sheep, pig*] farmers who want to take part in our project and thus become farmer-ambassador in your country. **Participation means that you as a farmer, together with a coach from DISARM, set up a farm health team consisting of you, the DISARM coach and other people that are important for the management of animal health on your farm (veterinarian, farm worker, other advisors,...), and that this farm health team works together to improve the health and the responsible use of antibiotics on your farm.**

What's in it for you?

- You will receive free coaching to help you to improve disease prevention and animal health management while taking into account the productivity of your animals and the profitability of your farm;
- You will receive help to achieve this goal while at the same time improving the responsible use of antibiotics;
- You will get a chance to meet and learn from other farmers in your country;
- You will get a unique chance to go on a paid travel to another European country to learn from farmers' experiences there;
- You can become a farmer-ambassador in your own country.

What does it require from you?

One of the objectives of DISARM is to test and disseminate the Coaching Method to assist farmers to improve disease prevention and animal health, and reduce irresponsible use of antibiotics. The Coaching Method means that a person from the DISARM project will regularly meet with you and your herd veterinarian, farm workers and other advisors that you might have, to design and monitor



an intervention plan aimed at better disease prevention. Participants become farmer-ambassadors in their sector and the results at their farm are used as promotional material.

More specifically, participation as farmer-ambassador in DISARM involves

- Your participation starts between autumn 2019 and spring 2020 and takes between 1 and 2 years;
- You try to convince people that are important for the management of animal health on your farm (veterinarian, farm worker, feed advisor, ...) to participate as well as part of the farm health team.
- Regular (once every 3-4 months) meetings between a DISARM coach, you, your herd veterinarian and other advisors you may have, in order to design a plan for implementing changes on your farm and further monitor its impact;
- Your agreement to implement as good as possible the recommended changes on your farm, and to provide data about your farm so that we can monitor what the impact of these changes is;
- Short telephone calls or e-mail contact in between meetings;
- Two or three half-day demonstration events on your farm where you exchange experiences with other farmers that participate in the project and to demonstrate farmers that are not in the project how you are working. You will receive monetary compensation for these demonstration events on your farm
- One international travel to [fill in your partner country] to visit the farmers in that country that are also part of DISARM. We will help you to organize this travel and your expenses are covered by the project.
- Your agreement that we use your experience on your farm in information material such as videos, practice guides and brochures, with respect for the level of privacy and anonymity that you want.

Throughout this whole process, YOU remain in charge of everything that happens on your farm, and you have the right to end participation at any times. More detailed information about what participation involves can and will be provided by us. Don't hesitate to contact us for a meeting or telephone call, without any further obligations, and we will explain in more detail what it involves.

Are you already convinced that this is something for you? Or do you wish more information about what participation as farmer-ambassador involves? Then please contact us: Frederik Leen frederik.leen@ilvo.vlaanderen.be or + 09 272 23 82 [Provide here the contact details you want]

For more information about the project as a whole, visit our [website](#), or find us on [Twitter](#) or [Facebook](#)



Annex II: Preparatory survey to be completed by the farmer or farm workers.

Personal Details

Name:

Address:

Postal Code:

1. *Can you name 3 points of improvement (management or animal health related) for your farm over the last year compared to the previous year? (E.g. Certain health problems that have been solved successfully?)*

2. *Can you name specific measures or actions that have contributed to achieving the successes you mentioned under question 1. Try to be as specific as possible. (E.g. We started washing our sows with hot water and soap before having them entering the farrowing crates)*

1. *In the previous year, did you also implemented actions or measures that eventually did not seem to work? Do you have an idea why they did not work?*

4. *Were there actions or measures that you intended to implement, but which did not get implemented eventually? Do you have an idea why you did not succeed at implementing them?*

5. *What do you experience for your farm as strengths regarding animal health?*

6. *What do you experience as weaknesses regarding animal health for your farm?*

7. *Can you list 4 important points of improvement for your farm regarding animal health that you would like to tackle in the upcoming year? (Start with the most important point and end with the least important point. E.g.: Reduce piglet mortality after weaning, Reduce respiratory problems with my finisher pigs,...)*

8. *Which measures do you think of to achieve the first point of improvement under question 7 in the upcoming year?*

9. *Which measures do you think of to achieve the second point of improvement under question 7 in the upcoming year?*

10. *In your opinion, what do you think you need from your advisors to achieve these goals? (E.g. A more frequent guidance and supervision, more specific knowledge, supply of practical tools such as quick scans or scoring cards, frequent and structural discussions and meetings?)*



11. *What do you think about your current use of antibiotics on the farm? Is it higher than you want it to be? Or are you satisfied with it. What do you think could be done to lower you AB use or improve AB management in general?*

12. *Do you consider the current biosecurity measures to be adequate ? Both internally (preventing the spread of disease within the farm and Externally: preventing disease to enter the farm?) What could be done to improve biosecurity measures?*

13. *Rank the following reasons for participation (1= most applicable to 5=least applicable) to your personal situation: I volunteered for this case study because :*

- *I want to improve my animal health for better productivity and better economic performance of my farm*
- *Getting coherent advise from my veterinarian and feed advisor is important for me.*
- *I'm aware of the rising issue of antibiotic resistance and want to lower my antibiotic use on my farm*
- *I'm interested in exchanging knowledge and experience with other colleagues*
- *Other... (please specify)*



Annex III: Preparatory survey to be completed by the veterinarian and farm advisors.

Personal Details

Name:

Address:

Postal Code:

1. *Can you name 3 points of improvement (management or animal health related) for your clients' farm over the last year compared to the previous year? (E.g. Certain health problems that have been solved successfully?)*
2. *Can you name specific measures or actions that have contributed to achieving the successes you mentioned under question 1. Try to be as specific as possible.*
3. *In the previous year, did your client also implemented actions or measures that eventually did not seem to work ? Do you have an idea why they did not work?*
4. *What do you experience for your clients' farm as strengths regarding animal health?*
5. *What do you experience as weaknesses regarding animal health for your clients' farm?*
6. *Can you list 4 important points of improvement for the farm regarding animal health? (Start with the most important point and end with the least important point. E.g.: Reduce piglet mortality after weaning, Reduce respiratory problems with my finisher pigs,...)*
7. *Which measures or actions do you think of to achieve the first point of improvement under question 6 in the upcoming year?*
8. *Which measures or actions do you think of to achieve the second point of improvement under question 6 in the upcoming year?*
9. *In your opinion, what do you think you as veterinarian or advisor can do to support your client in achieving these goals? (E.g. A more frequent guidance and supervision, more specific knowledge, supply of practical tools such as quickscans or scoring cards, frequent and structural discussions and meetings ?)*
10. *What do you think about the current use of antibiotics on the farm? Is it higher than you think it should be? Or are you satisfied with it. What do you think could be done to lower you AB use or improve AB management in general?*
11. *Do you consider the current biosecurity measures to be adequate ? Both internally (preventing the spread of disease within the farm and Externally: preventing disease to enter the farm?) What could be done to improve biosecurity measures?*

Annex IV: Example baseline summary report for a broiler farm



Farm Health Team Farm X: Baseline data summary

Farm: Farm X

Farmer: Farmer X

Veterinarian: Veterinarian Y

(Feed) advisor(s): Feed advisor Z

Coach/Facilitator: Frederik Leen

Date:12/02/2020



Introduction

To make progress, you need to know the direction you want to go and what you want to achieve; i.e. set goals. You also need to know what your starting point is to see the effort needed to close the gap between your desired situation and the current state you find yourself in.

This summary report describes your farm's starting point at the beginning of the Farm Health Team's case study in the DISARM project. It provides insight into the baseline status for:

- Technical animal performance
- Animal health indicators
- Biosecurity
- Use of medicines and antibiotics

In addition, it summarises how the different team members perceive the strengths and weaknesses of the farms in terms of animal health, biosecurity, antibiotic use and possible actions to improve the farm in these areas.

Technical animal performance

Retrospective data on animal performance over the past 2 years (2018-2019) were requested in order to get an idea of the historical evolution and current animal performance on the farm. The following table and figures give an overview of the most important performance indicators for the broilers.



Table 1 Gross animal performance indicators

Cycle	Stocking date	Amount of broilers stocked	% delivered at first marketing	Average delivery weight	Average daily gain (g/d)	ADG before first marketing (g/d)	ADG after first marketing (g/d)	FCR	FCR 2500 ³	Mortality	Production index ⁴
1	30/11/2017	43000	18%	2.802	69.964	66.907	82.114	1.597	1.537	6.97	408
2	18/01/2018	43000	26%	2.667	67.403	60.65	101.33	1.549	1.515	3.86	418
3	08/03/2018	42500	26%	2.53	67.22	64.917	88.775	1.524	1.518	3.62	425
4	26/04/2018	42500	16%	2.653	67.76	64.235	97.45	1.552	1.521	3.69	421
5	21/06/2018	41500	31%	2.637	68.105	67.421	73.024	1.498	1.471	3.61	438
6	09/08/2018	42000	0%	2.786	66.345			1.633	1.575	2.9	395
7	27/09/2018	42800	15%	2.735	67.221	67.741	55.19	1.595	1.548	1.49	415
8	22/11/2018	42500	34%	2.839	68.341	62.5	99.62	1.576	1.508	2.21	424
9	14/01/2019	42500	26%	2.689	68.261	66.735	80.421	1.573	1.536	1.73	426
10	05/03/2019	85000	24%	2.774	68.898	65.822	89.371	1.572	1.517	2.14	429
11	23/04/2019	85000	25%	2.534	66.473	61.077	101.28	1.567	1.561	6.5	397
12	17/06/2019	85000	31%	2.595	66.313	62.795	96.102	1.55	1.531	1.88	420
13	05/08/2019	85000	27%	2.516	63.729	60.654	91.382	1.571	1.568	1.45	400
14	24/09/2019	86000	26%	2.71	71.152	67.501	94.862	1.48	1.438	4.24	460
15	15/11/2019	85000	24%	2.636	66.886	59.589	98.381	1.501	1.473	7.22	414
Gem				2.674	67.605	64.182	89.236	1.556	1.521	3.567	419.333

³ FCR 2500: Feed conversion ratio standardized to a delivery weight of 2500 gram correcting the gross FCR with 40 grams per Kg deviating from the standard of 2500 grams

⁴ Production index: a performance index taking into account the average daily gain, FCR and mortality into one index

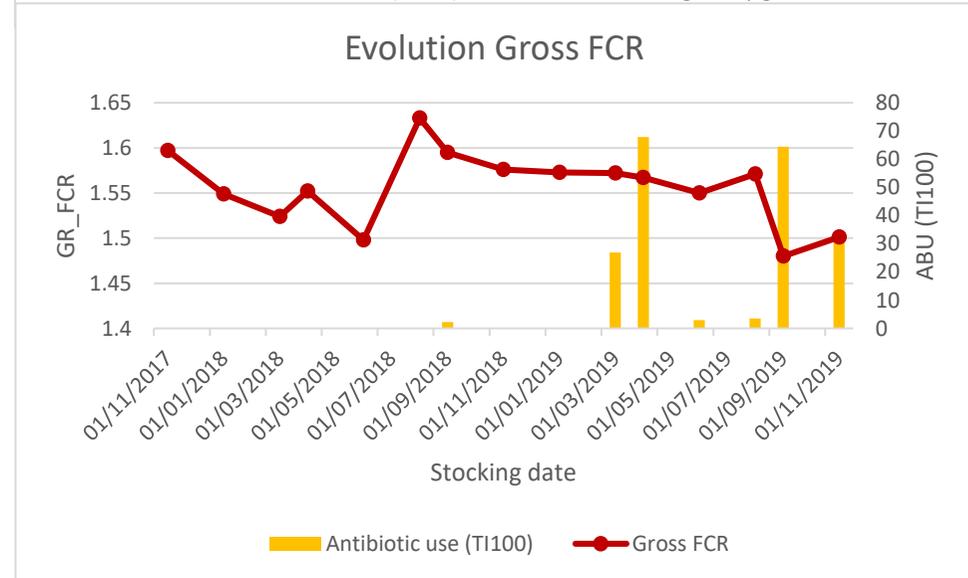
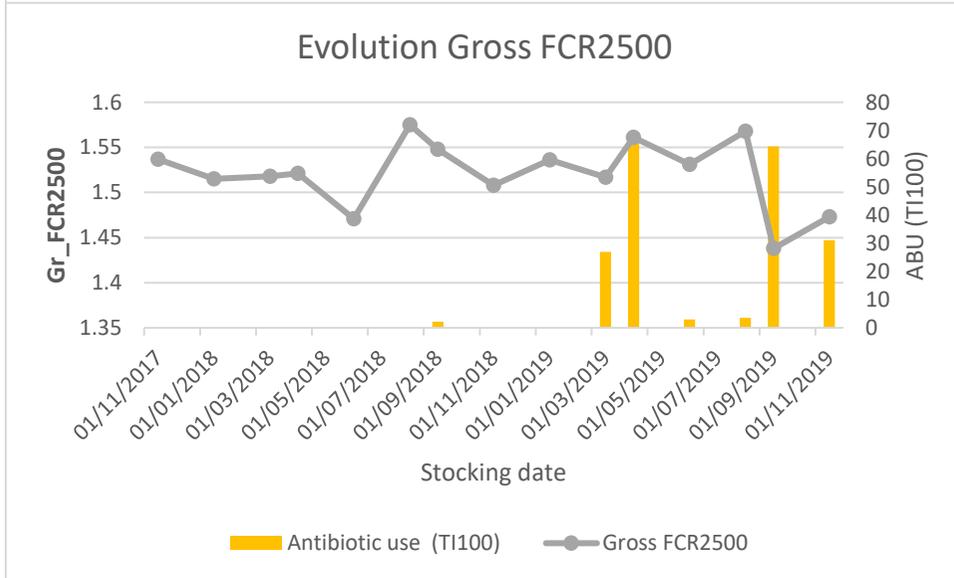
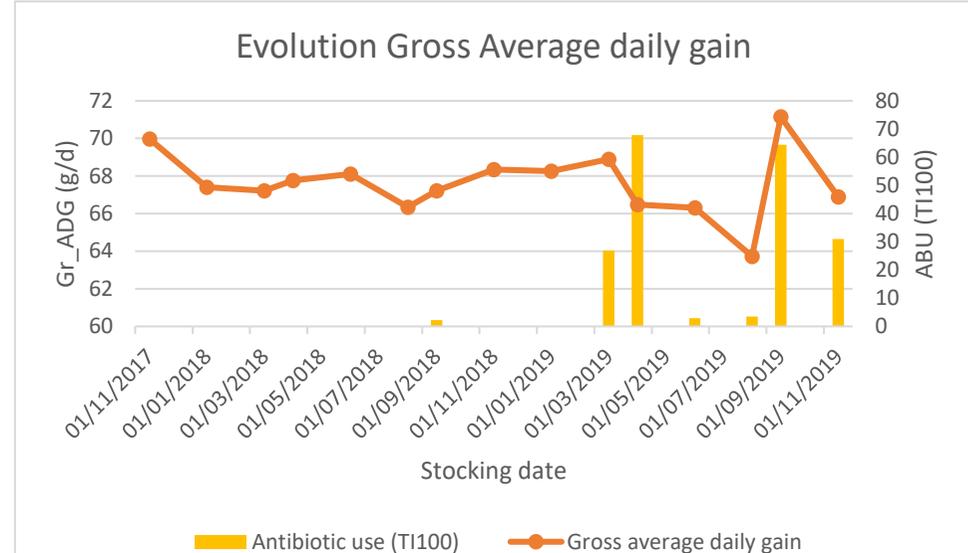
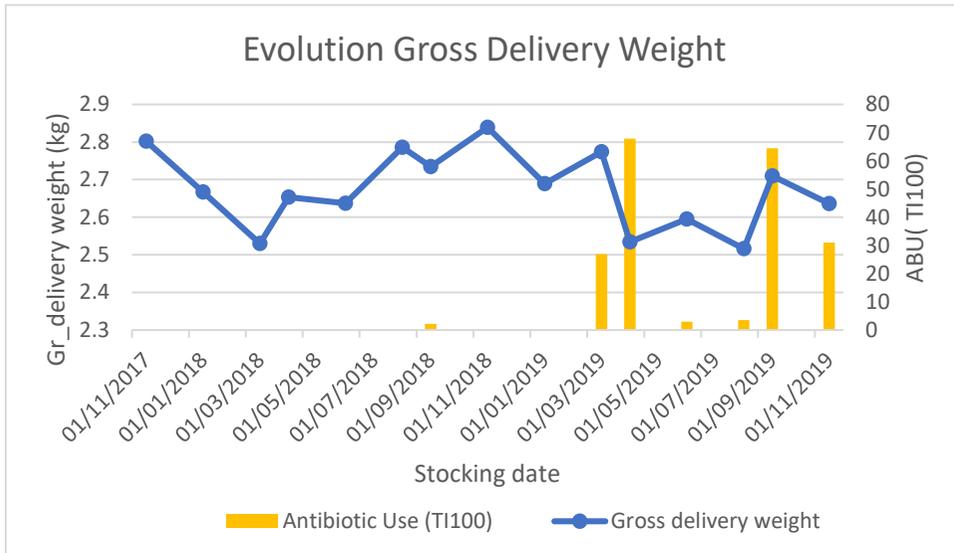
Table 2 Net animal performance indicators

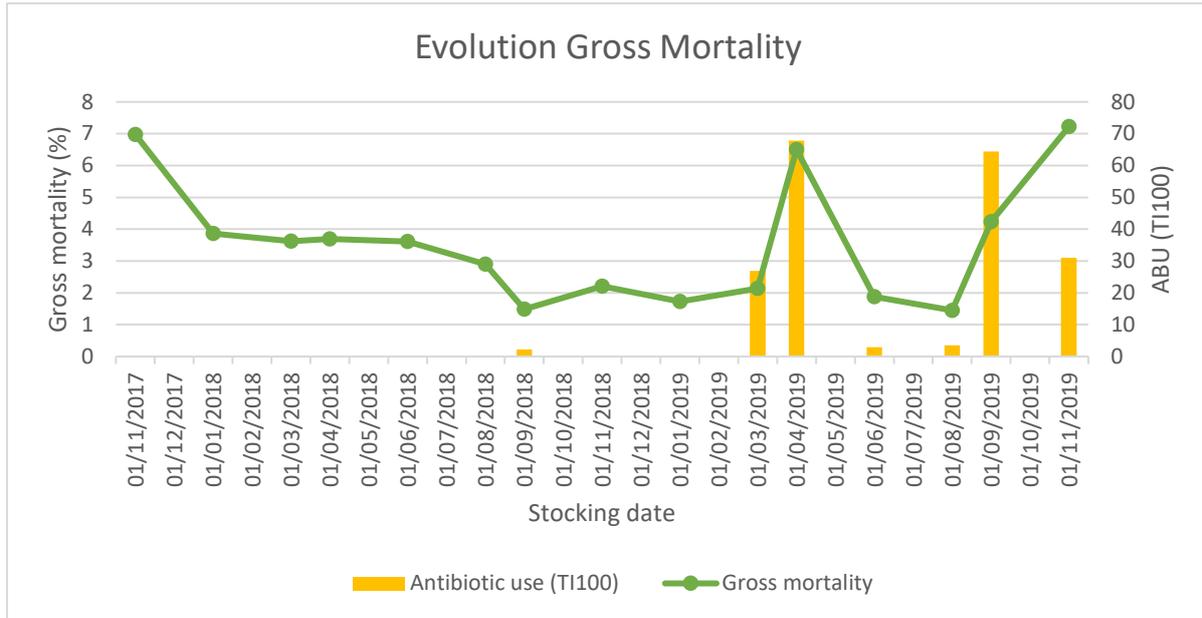
Cycle	Stocking date	Amount of broilers stocked	% delivered at first marketing	Average delivery weight	Average daily gain (g/d)	ADG before first marketing (g/d)	ADG after first marketing (g/d)	FCR	FCR 2500 ⁵	Mortality	Production -index ⁶
1	30/11/2017	43000	18%	2.746	68.564	65.569	80.472	1.63	1.58	6.97	391
2	18/01/2018	43000	26%	2.614	66.054	59.437	99.304	1.581	1.558	3.86	402
3	08/03/2018	42500	26%	2.479	65.876	61.619	86.999	1.555	1.559	3.62	408
4	26/04/2018	42500	16%	2.6	66.405	62.951	95.501	1.584	1.563	3.69	404
5	21/06/2018	41500	31%	2.585	66.742	66.072	71.564	1.529	1.512	3.61	421
6	09/08/2018	42000	0%	2.731	65.018			1.666	1.62	2.9	379
7	27/09/2018	42800	15%	2.68	65.877	66.386	54.086	1.627	1.591	1.49	399
8	22/11/2018	42500	34%	2.782	66.974	61.25	97.628	1.608	1.552	2.21	407
9	14/01/2019	42500	26%	2.635	66.896	65.401	78.812	1.606	1.578	1.73	409
10	05/03/2019	85000	24%	2.718	67.52	64.505	87.583	1.604	1.56	2.14	412
11	23/04/2019	85000	25%	2.483	65.144	59.855	99.254	1.599	1.603	6.5	381
12	17/06/2019	85000	31%	2.543	64.987	61.539	94.18	1.581	1.573	1.88	403
13	05/08/2019	85000	27%	2.466	52.454	59.441	89.555	1.603	1.61	1.45	384
14	24/09/2019	86000	26%	2.655	69.729	66.151	92.965	1.51	1.479	4.24	442
15	15/11/2019	85000	24%	2.583	65.548	58.398	96.413	1.531	1.515	7.22	397
Gem				2.62	65.586	62.755	87.451	1.588	1.564	3.567	403

5 FCR 2500: Feed conversion ratio standardized to a delivery weight of 2500 gram correcting the gross FCR with 40 grams per Kg deviating from the standard of 2500 grams

6 Production index: a performance index taking into account the average daily gain, FCR and mortality into one index







Biosecurity

The baseline biosecurity status of the farm was assessed using the Biocheck[®] developed by the Faculty of Veterinary Medicine of Ghent University. This is a risk-based scoring system that scored your farm for both aspects of external and internal biosecurity, taking into account the probabilities of different disease transmission routes. The biosecurity check provides you with a total overall biosecurity score (0: worst no biosecurity measures up to 100 Perfect Biosecurity) as well as scores for both internal and external biosecurity and for subcategories within these two main domains. For all provided scores you can benchmark yourself with the national average and with all Biocheck[®] scores reported for broilers around the world.

Table 6 Biocheck score

Code	Description	Score	Country average	Global average
External biosecurity		%	%	%
A	Purchase of day-old chicks	79	59	70
B	Depopulation of broilers	57	62	58
C	Feed and water	48	49	61
D	Removal of manure and carcasses	66	67	57
E	Visitors and farmworkers	76	70	68
F	Material supply	44	49	72
G	Infrastructure and biovectors	77	82	72
H	Location of the farm	100	64	65
Subtotal external biosecurity		69	64	66
Internal biosecurity				
I	Disease management	63	76	71
J	Cleaning and disinfection	58	57	67
K	Materials and measures between compartments	82	55	76
Subtotal internal biosecurity		65	63	71
Total biosecurity score		68	64	67

Table 7 Explanation and interpretation of Biocheck• score

Category	Explanation	Suggested actions
External biosecurity		.
A. Purchase of day-old chicks	+1 hatchery and full trucks that should have been decontaminated on arrival. - supply frequency >6	None, unless very strict on requirement of decontaminated trucks.
B. Depopulation of broilers	+ empty and decontaminated transport vehicles, + no contact of private individuals or traders with the animals - Currently only farm-specific footwear is provided and no farm specific clothing. - multi-staged marketing of the broilers - Marketing frequency >6 times	Provide farm-specific footwear as well as clothing for the loading crew, especially at first marketing of the broilers in order not to contaminate the remainders. Be strict on hand hygiene (washing hands + disinfection by loading crew)
C. Feed and water	+ neatly maintained silos + feed supplier has no direct contact with animals +regular control of water quality and good procedure -no separation between clean and dirty road -feed supply frequency	Investigate if it is possible to have feed suppliers deliver from public roads without having to drive onto the farms' premises.
D. Removal of manure and carcasses	+Well-equipped carcass area: refrigerated and locked.	Investigate effective separation between clean and dirty road

	<ul style="list-style-type: none"> +Regular cleaning and disinfection +Pickup from public road -no strict separation clean / dirty road -hand hygiene when handling carcasses 	<p>Disinfection of carcass storage after each collection</p> <p>Use disposable gloves when picking up and disposing of carcasses or definitely washing hands and disinfecting</p>
E. Visitors and farmworkers	<ul style="list-style-type: none"> +stables securely locked and register with farmer for access + visitors and staff wear farm footwear and clothing -hand hygiene 	<p>Strictly supervise hand washing and hanging disinfection dispenser on pen doors.</p> <p>Strict supervision of company clothing and footwear</p>
F. Material supply	<ul style="list-style-type: none"> - use of non-farm specific telescopic loader 	<p>Provide a farm-specific straw blower or thorough disinfection protocol for entering external machinery into the bird house</p> <p>Decontamination of other goods or materials entering the bird house</p>
G. Infrastructure and biovectors	<ul style="list-style-type: none"> + grilles on air inlets +pest control +no manure storage +no pets in the bird houses +no backyard poultry -farm yard not fully fenced -sideways of the farm not fully paved but clean +/- sometimes working at pig farm of parents 	<p>Control of air inlets to prevents rats of entering the bird house.</p> <p>Possibly pave the sideways of the farm to reduce no nesting possibilities for vermin.</p> <p>After working at the pig farm, be alert for changing clothes and footwear and hand hygiene.</p>
H. Location of the farm	<ul style="list-style-type: none"> + no nearby poultry farms +no meadows with farm-owned poultry manure 	

	+ infrequent animal transport through the street	
Internal biosecurity		
I. Disease management	<ul style="list-style-type: none"> + 1 age group + daily check-up rounds (2 times a day) + vaccination protocol -stocking density -no serological monitoring ? 	
J. Cleaning and disinfection	<ul style="list-style-type: none"> +cleaning and disinfection of stables, feeder lines and water lines between cycles +cleaning and disinfection of loading and unloading bay +compartment hygiene locks +control of cleaning and disinfection protocol with bacteriogram -no vehicle disinfection baths - no farm hygiene lock 	<ul style="list-style-type: none"> Build a farm hygiene lock to change footwear and clothing that only enters the farm's premises Boot washers in compartment locks More effective separation of clean and dirty areas in hygiene locks Cleaning insides of silos (propshots)
K. Materials and measures between compartements	<ul style="list-style-type: none"> + material per compartment +Clothing and footwear per compartment +Cleaning and disinfection of used materials 	<ul style="list-style-type: none"> Mark equipment (recognizable) specific for each compartment

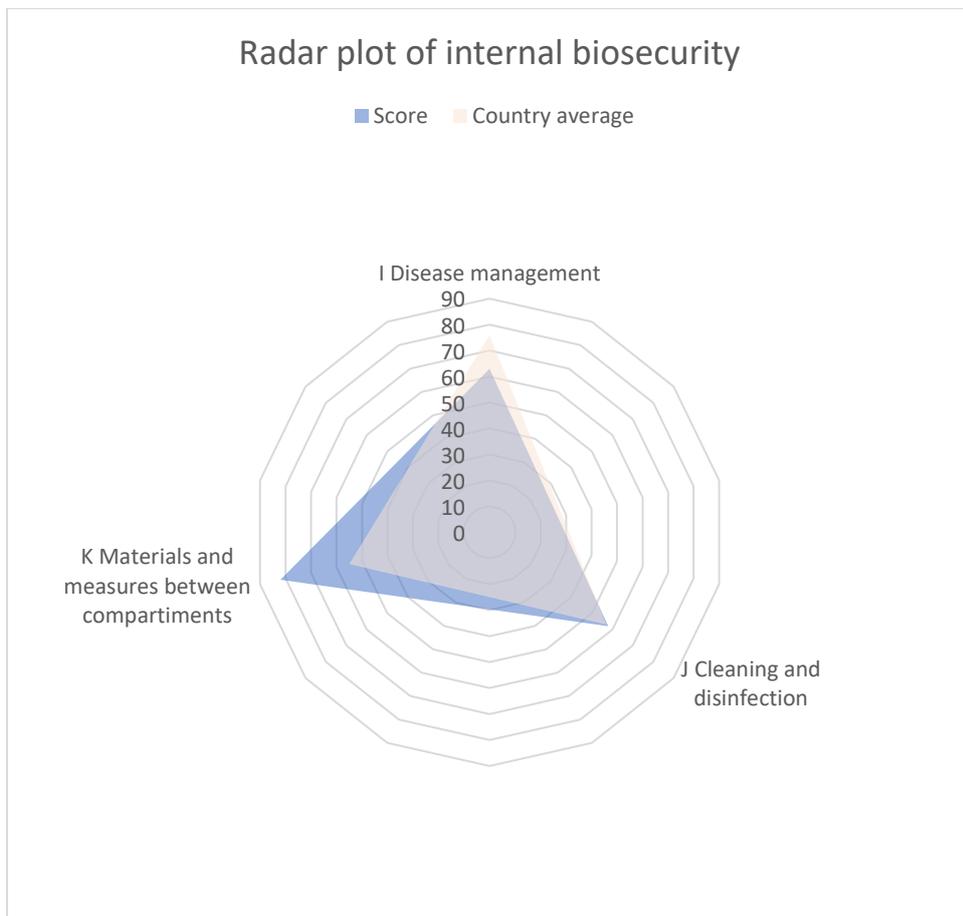
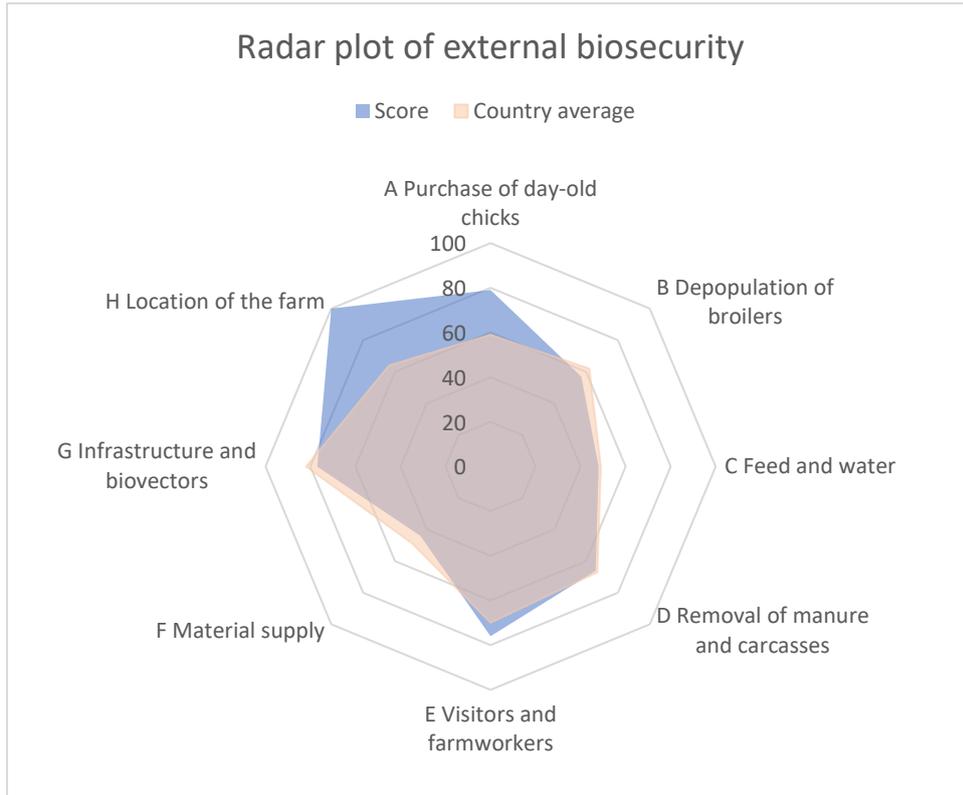


Figure 2 Radar plots of external and internal biosecurity showing the score of the farm and the national benchmark

Animal health indicators and use of antibiotics

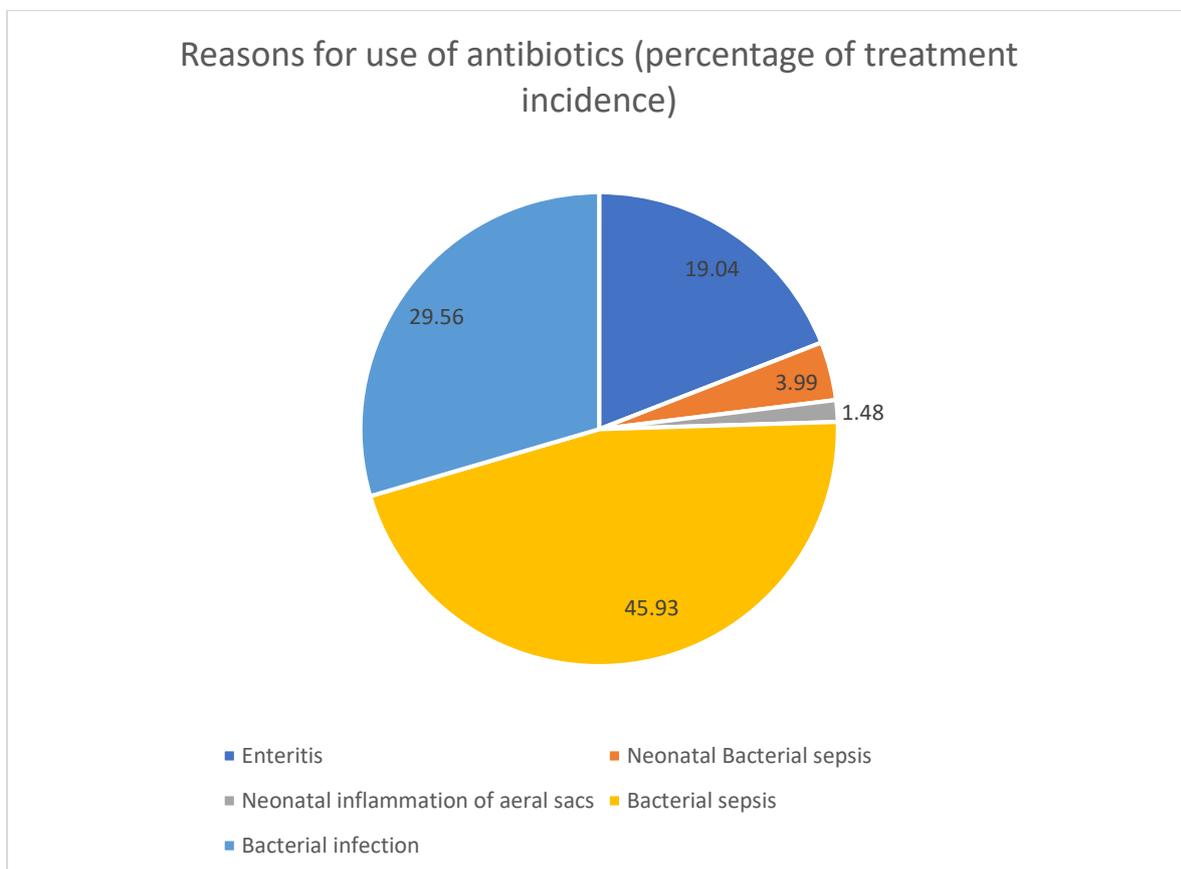
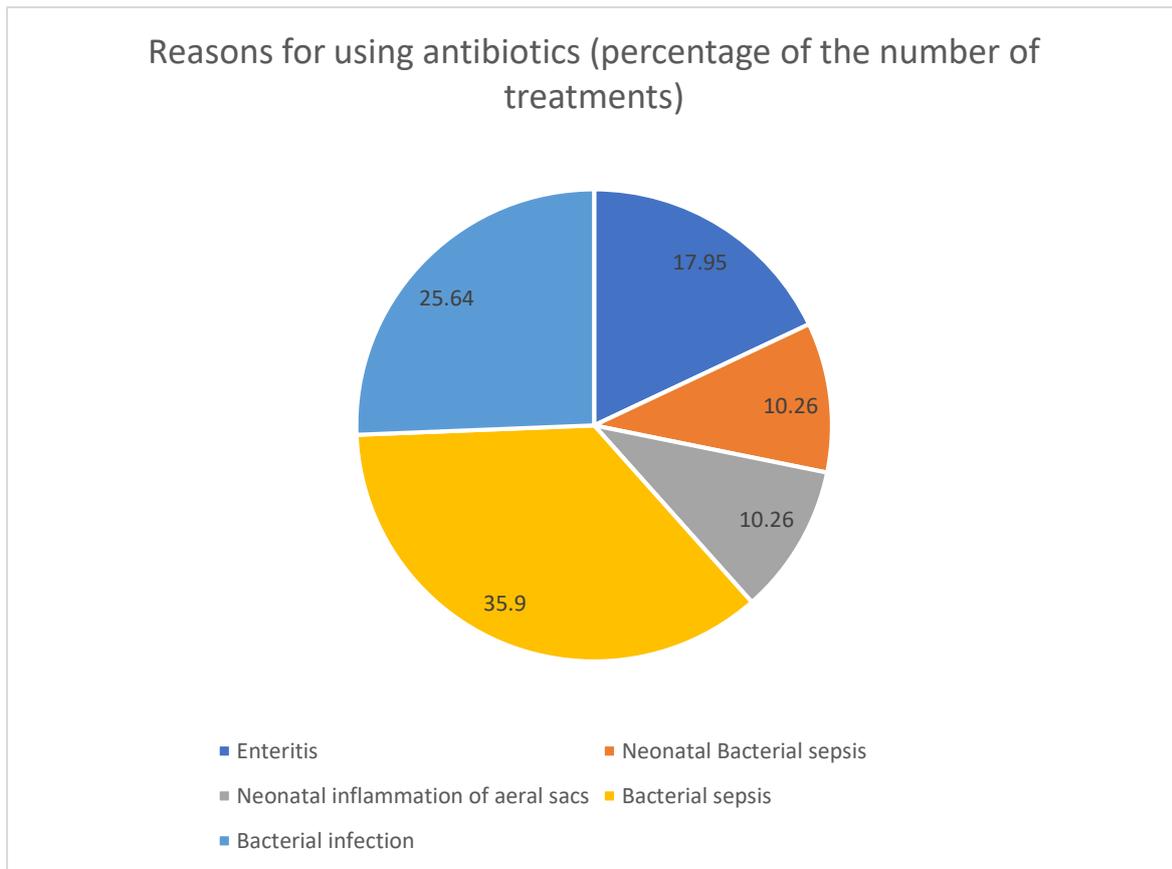
During the intake meeting, retrospective data were also requested for animal health indicators together with a list of the main animal health problems occurring on the farm. The aim of building the farm health team is to improve overall animal health on the farm in order to improve performance, biosecurity and disease prevention to reduce the need and use of antibiotics. Therefore, we have also requested data to assess the current use of antibiotics on the farm;

- What are the main reasons for using antibiotics?
- Which antibiotics are used and how many?

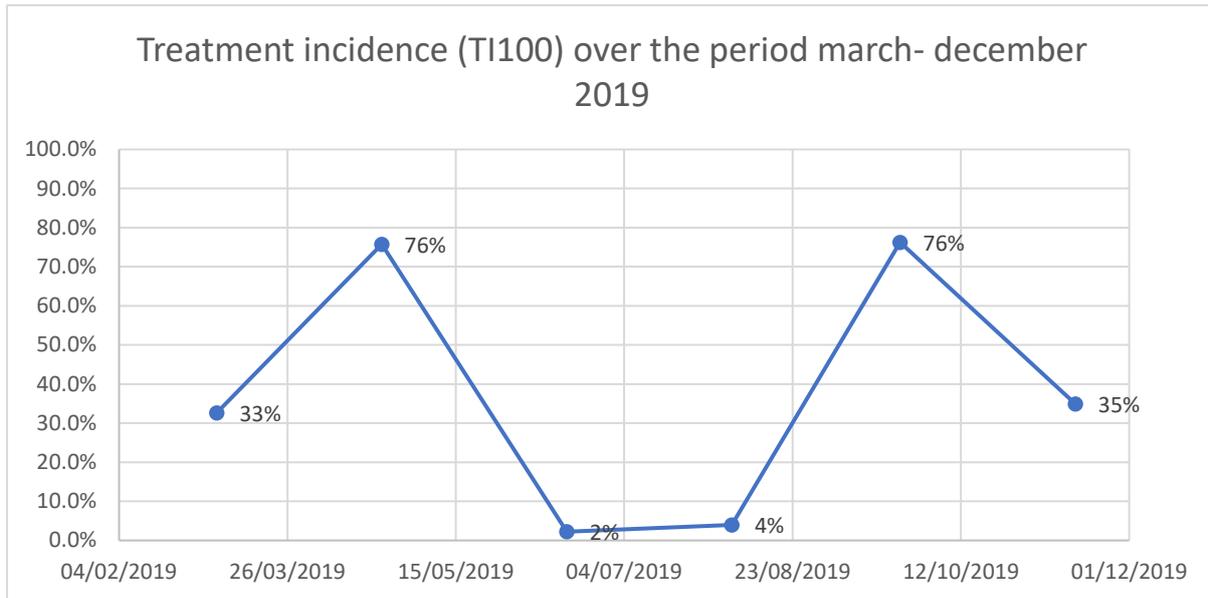
Main animal health problems

The medication usage data, questioning during the biocheck and the answers to the preparatory questionnaire showed that at the start up of the company there have been some respiratory problems in the birds due to sub-optimal ventilation. However, this problem was solved. The data on the use of medication from the XXXXX database shows that the most frequent problems that occur are sepsis followed by problems in the digestion (see next paragraph). The answers to the questionnaire by the advisors also shows that the coccidiosis pressure is a point of attention.

1.1 Reasons for antibiotic usage



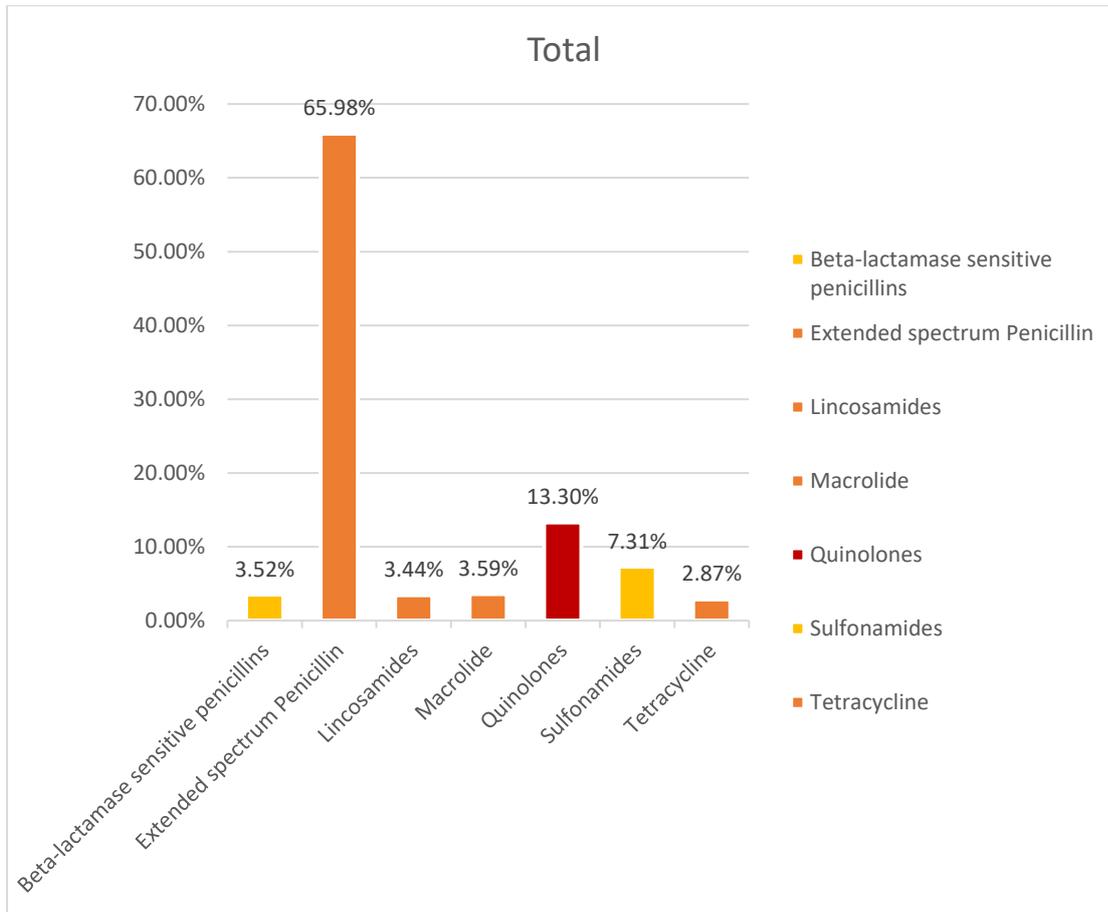
1.2 Evolution in the use of antibiotics per production cycle and average use of antibiotics.



The graph above shows the evolution in AB use expressed as treatment incidence per 100 days for each round in the period 5 March to 20 December 2019. Each data point represents the treatment incidence of a round. The treatment incidence expresses the percentage of time the chickens were treated with antibiotics.

The above evolution results in an average TI100 over the period 05 March to 20 December 2019 of 33%. So on average a broiler chick on is treated with antibiotics 33 percent of the time on the farm. In the national antibiotic use register over the period October 2018-September 2019 half of the broiler farmers had a TI100 of 22% (attention value) or less.

1.3 Categorization of used antibiotics corresponding to AMCRA colour codes for critical antibiotics for human medicine



The above graph provides insight into the proportion of critical antibiotics for human medicine according to the AMCRA colour codes in the use of antibiotics on the farm.

- Yellow antibiotics: 10.83%
- Orange antibiotics: 75.87%
- Red antibiotics: 13.30%

Results self-assessment questionnaire

1.4 Current Strengths

- Intensively working on farm improvement
- Quick contacts with veterinarian in case of problems
- Already good level of biosecurity and eager to learn

1.5 Already improved points with actions

- Enterococcal problems: through better start-up management and improved water quality by disinfecting water and water lines
- Coccidiosis pressure : Customized feeding schedule with customized anticox program, chemical rotation anticox agents, cracks in floors have been coated
- Better doser for medicines
- Vitamins and minerals supplement to support the chicks at startup

1.6 Points of attention or improvement mentioned

- A few things regarding ventilation and chemical water quality
- Risk of Salmonella introduction from pig branch
- Coccidiosis pressure
- Enterococcae pressure
- Mortality in the 1st week

1.7 Concrete suggestions for improvement

Coccidiosis pressure:

- Thoughtful choice of anti-cox agents. If necessary, vaccination can be used.
- Extra attention to idle period between cycles with regard to cleaning and disinfection. Warm cleaning / specific agents with anti-cox action, kenocox/ ammonia + lime scale / floor fires etc.

Enterococcen

- Further attention to water quality: performing laboratory analyses to see where adjustments can be made.

Dropout 1st week

- Chick quality outside the control of the farmer. Review start-up management.

Annex V: Template to visually structure answers from FHT members in self-assessment

 **Current strengths in animal health management**  

The form consists of a large rounded rectangle divided into three horizontal sections. The top section is a single wide box. The middle and bottom sections are each divided into two side-by-side boxes. The top-left corner of the top box contains a muscle icon. The top-right corner of the top box contains a tractor icon and the 'disarm' logo. The bottom-left corner of the middle box contains an icon of a person with a stethoscope. The bottom-right corner of the middle box contains an icon of a person with a microscope.



Current weaknesses in animal health management



A black silhouette of a person.			A black silhouette of a person next to a tractor.



Current perception of biosecurity



A black silhouette of a person.			A black silhouette of a person next to a tractor.





Current perception of antibiotic use



A black silhouette of a person's head and shoulders.			A black silhouette of a farm scene with a tractor and a barn.



Suggested actions to improve



A black silhouette of a person's head and shoulders.			A black silhouette of a farm scene with a tractor and a barn.



Annex VI: Example of MAFHT action plan in the DISARM template



Farm Health Action Plan and Logbook

Farm X

Farmer: Farmer X

Veterinarian: Herd Veterinarian Y

(Feed) advisor(s): Advisor Z

Facilitator/coach: Frederik Leen



Overview of goals

In order to improve animal health on the farm, actions are set up to identify and reduce the coccidiosis pressure and to further reduce the enterococcal problem.

For the issues with coccidiosis, the pressure on the farm will first be investigated and adjustments in the cleaning of the bird houses will be examined. Based on the coccidiosis pressure it will be decided in at a later stage whether and when chemical decox and vaccination will be carried out.

In order to further reduce the enterococcal problem, efforts will be made to further improve drinking water quality and reduce the stocking density by unloading the chickens at an earlier stage.

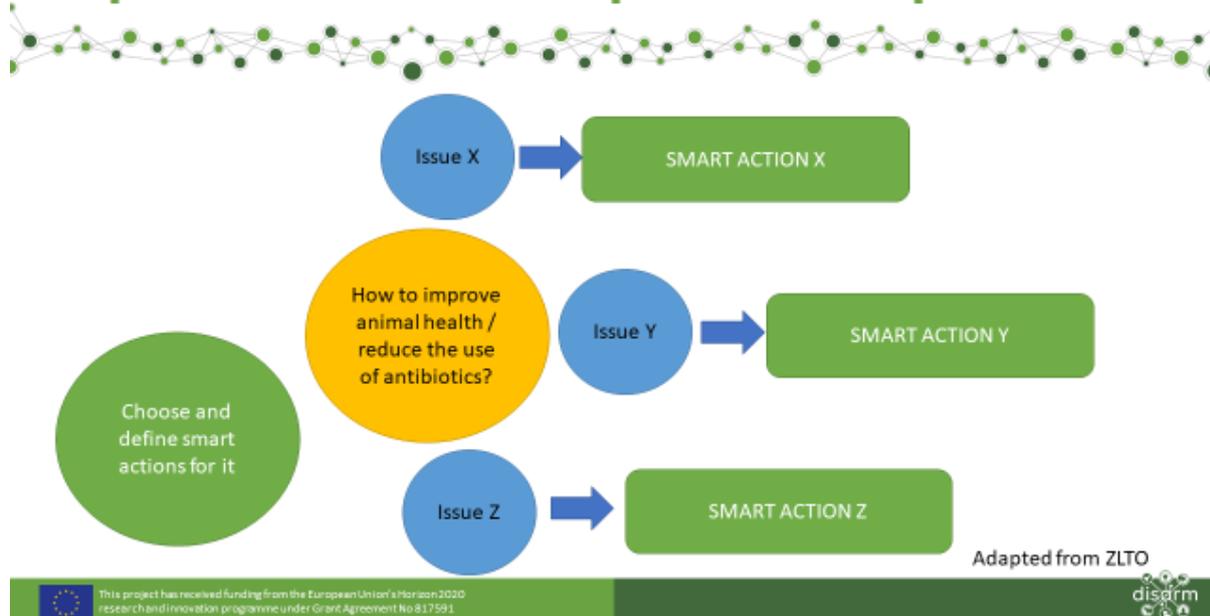
Next meeting: DD/MM/2020 om 10:00 H at Farm X

Goal	Description of action	Responsible	Executor	Deadline
Lower coccidiosis pressure	Determining coccidiosis pressure	Vet Y	Vet Y	27/04/2020
Lower coccidiosis pressure	Rinsing of stables with warm water instead of cold water during cleaning	Farmer X	Farmer X	
Lower coccidiosis pressure	Protocol for applying slaked lime to disinfect floors of the bird house	Farmer X	Vet Y	27/04/2020
Lower coccidiosis pressure	Deciding on plaster based on research	Farmer X	Vet Y/Farmer X	30/03/2020
Reducing enterococcal problems	Drain water reservoir in stables in idle period between cycles	Farmer X	Farmer X	
Reducing enterococcal problems	Disinfecting and rinsing water lines in the past	Farmer X	Farmer X	27/04/2020
Reducing enterococcal problems	After disinfecting, rinse water lines with tap water instead of well water.	Farmer X	Farmer X	27/04/2020
Reducing enterococcal problems	Decontaminating the Tubes and ball in water pressure meter	Farmer X	Farmer X	27/04/2020
Reducing enterococcal problems	Check bacterial and chemical water quality+ endoscope	Farmer X	Vet Y	27/04/2020
Reducing enterococcal problems	Reducing stocking density by advancing the first marketing one day	Advisor	Advisor/Farmer X	27/04/2020



Planning-Do-Check-Adjust (PDCA cycle)

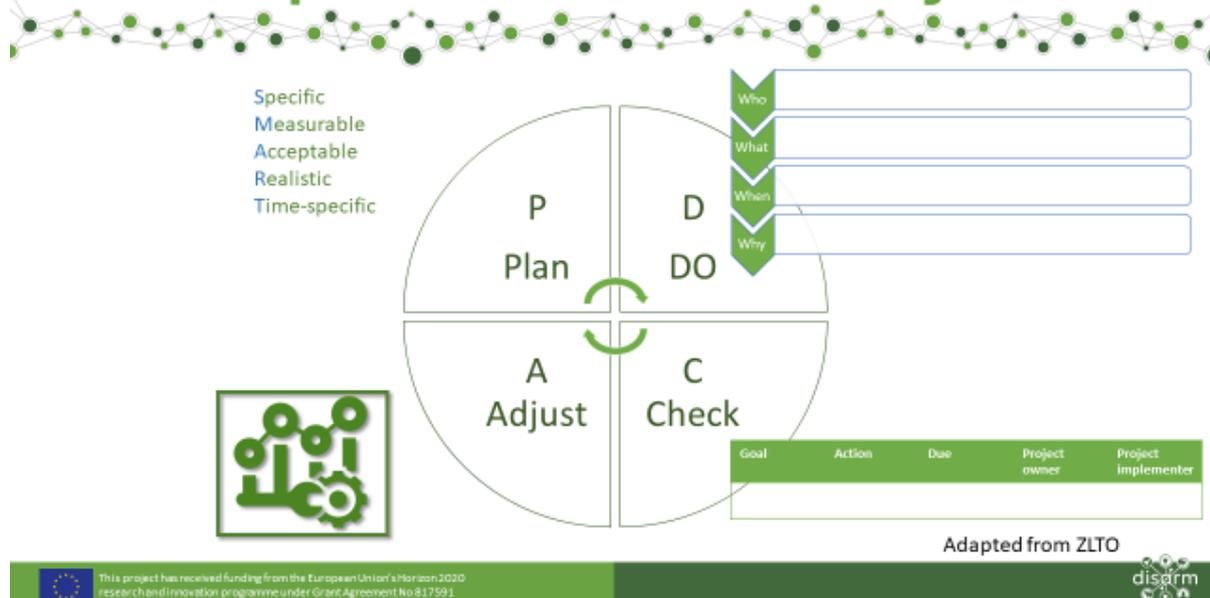
Step 1: Brainstorm for points of improvement



Goal 1: Reducing coccidiosis pressure

1. Listing and determining goals and points of improvement

Step 4: Plan-Do-Check-Adjust



2. SMART definition of goal 1

1	Objective: To reduce the coccidiosis pressure on the farm in order to improve the intestinal health of the chickens
Specific Measurable Acceptable Realistic Time-specific	<p>In order to reduce the coccidiosis pressure, the following two rounds on day 14, 21 and 28 feces will be sampled to determine the number of oocysts per gram of manure in combination with intestinal scores on the chickens. On that basis, it will be decided whether or not to proceed with liming the bird house floors in the next vacancy period to gypsum the oocysts.</p> <p>Rinsing with warm water instead of cold water during the cleaning of the houses will be continued.</p> <p>In addition, a chemical anticox treatment is planned from August onwards, possibly followed by vaccination of the chicks in the next round depending on the results from the fecal samples.</p> <p>Still to be discussed with the team: Target value for coccidiosis pressure?: How do we express this and which target value do we aim for? By when do we consider it realistic to reach the target value?</p>

3. Action plan to achieve goal 1

Action nr.	Description	Project owner	Project implementer	When	How and when monitoring execution/ monitoring results?
1.1	Determine coccidiosis pressure with manure research and intestinal scores on day 14, 21, 28 in current and next rounds	Vet Y	Vet Y: faeces examination/ intestinal scoring Advisor Z: intestinal scoring	During farm visits	First results to be discussed during next FHT meeting on 27/04/2020
1.2	Provide protocol for lime application on floor in vacancy period	Farmer X	Vet Y	Before the end of the current production cycle	Protocol at next FHT meeting on 27/04/2020
1.3	Deciding on liming in next vacancy based on results of OPG examination	Farmer X	Farmer X/Vet Y	Before the end of the current production cycle	Discuss and evaluate execution during the next FHT meeting and evaluate the OPG counts of the next production cycle.
1.4	Continue rinsing barn with plenty of warm water after cleaning	Farmer X	Farmer X	During vacancy period	How to monitor execution? How to evaluate coccidiosis pressure in next cycle? Based on OPG and feed intake reduction?

Need for specific, knowledge, materials, support?:





4. Monitoring execution of actions for goal 1

Date	Action Nr.	Status (not started, in progress, stopped early, finalized)	Results of monitoring/description of actions

5. Adjusting action plan and/or goal 1

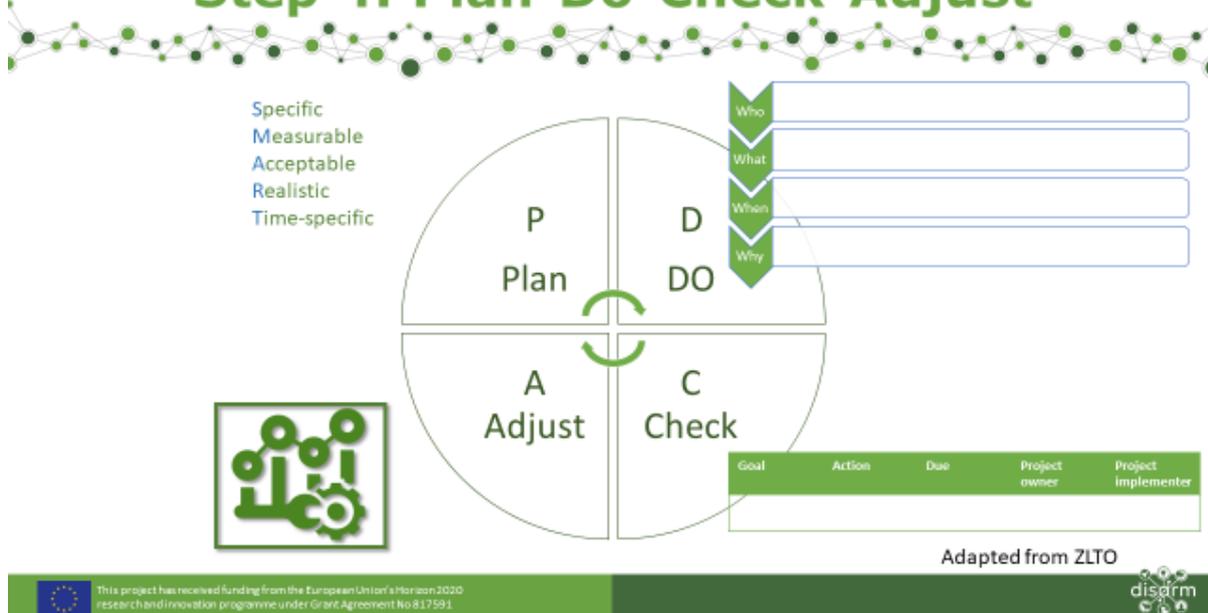
Date	Adjustments to goal or actions/ new actions



Goal 2: Reducing the enterococcosis problem

1. Listing and determining goals and points of improvement

Step 4: Plan-Do-Check-Adjust



The diagram illustrates the PDCA cycle with four quadrants: P (Plan), D (DO), C (Check), and A (Adjust). To the left of the cycle, the following criteria are listed: Specific, Measurable, Acceptable, Realistic, and Time-specific. To the right, a vertical stack of four boxes is labeled Who, What, When, and Why. Below the cycle is a table with the following structure:

Goal	Action	Due	Project owner	Project implementer

Adapted from ZLTO

2. Definitie van doel 2 : SMART

1	Objective: To reduce outbreaks of enterococci by focusing on improved water quality and lower stocking densities.
Specific Measurable Acceptable Realistic Time-specific	<p>In order to reduce the problems with enterococci, we start by focusing on further improving of drinking water quality. To this end, we start with scanning the water pipes with an endoscope camera and an additional bacteriological and chemical examination of the drinking water.</p> <p>The water reservoirs in the birdhouses will be drained during the vacancy period so that no stagnant water remains in the reservoir.</p> <p>The water pipes will be disinfected and rinsed earlier in the vacancy period so that the water can drain out at the end of the lines onto the stable floor in order to prevent any remaining residues in the flushing system.</p> <p>Rinsing of the water pipes after disinfection will be done from now onward with tap water and not with well water to prevent recontamination as much as possible, in the first week when water intake by the birds is low.</p> <p>In addition, it will be checked whether the first delivery of broilers from a production cycle can be advanced with at least a day in the delivery planning in order to reduce the stocking density of the broilers to a greater degree.</p> <p>To be discussed in the next meeting: What is the best way to monitor the effect on enterococci problems? Which target value is realistic and achievable in which timeframe?</p>

3. Action plan to achieve goal 2

Action nr.	Description	Project owner	Project implementer	When?	How and when monitoring execution/ monitoring results?
2.1.	Assessment of (bacteriological/chemical) water quality (before: end of this round and after interventions? 1st week next round?)	Farmer X	Vet Y	Current round	Discuss results during next meeting on 27/4/20
2.2.	Scanning water lines with endoscope	Farmer X	Vet Y	Current round	Discuss results during next meeting on 27/4/20
2.3.	Earlier disinfection and rinsing of water lines during vacancy and rinsing with tap water	Farmer X	Farmer X	In next vacancy	Discuss execution and results during next meeting on 27/4/20
2.4.	Drain water reservoirs in bird houses to avoid stagnant water in reservoirs	Farmer X	Farmer X	In next vacancy	Discuss execution and results during next meeting on 27/4/20
2.5	Decontamination of water pressure gauges	Farmer X	Farmer X	In next vacancy?	Discuss results during next meeting on 27/4/20
2.6	Reduce stocking density by trying to advance first delivery with 1 day	Advisor Z	Farmer X/Advisor Z	From current round onwards	Discuss technical figures at next meeting on 27/04/2020.





5. Monitoring execution of actions for goal 2

Date	Action Nr.	Status (not started, in progress, stopped early, finalized)	Results of monitoring/description of actions

6. Adjusting action plan and/or goal 2

Date	Adjustments to goal or actions/ new actions





Annex VII Guiding questions for periodical follow-up of the MAFHP execution and collaboration

General

Remember the crucial elements in the coaching training session especially on reinforcement. Be enthusiastic and praise every little accomplishment of the farmer. Start with asking positive aspects. What is working out and what is going good instead of directly diving into the improvements and review of progress.

Encourage the farmer when he has difficulties or struggling with the action point. Remind him of the ultimate goal: a healthier farm with healthy animals and less problems.

Intro/icebreaker

- How are you?

Checking of execution of the action plan

Go over the farm action plan point by point :

- How are you managing this action point ?
- Are you happy with the action point and its execution?
- What is working out for you ? Why ? What is not working out for you ? How come ?
- What is keeping you from getting started with it ?
- What are your plans for the action point in the next/near period ?
- What were your teams' suggestions of changes to the execution of the action point ?

Collaboration within the team

- How do you experience the team-work within your animal health team?
- What makes you feel (un)comfortable within the team?
- What do you like about it?
- What could be better or improved in the teams' functioning?

(Re)assessing ADKAR spectrum

Awareness :

- Did you find out something new about antimicrobial use in (your) livestock industry lately ?
- Did your insight or opinion on AMU and AMR change ?
- Share some interesting facts or info you found about AMU, Biosecurity ... in the sector of interest

Desire :





- How do you feel about your effort to improve your farm and trying to lower the use of Antibiotics ?

Do you have questions or issues to raise on the CoP ?

- Ask whether we can help him out by looking for specific knowledge or expertise within the CoP
- Can we help you out or support you in any other way with your action plan ?
- Is there something your team members could do to support you (even) more in your action plan ?

