Impact matrix analysis and cost-benefit calculations to improve management practices regarding health status in organic dairy farming

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D2.4 – Report on health plans

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Executive Summary

This document describes the process for deriving health plans applied at each farm participating in IMPRO. The plans were developed in a participatory approach and based on impact matrix and cost-benefit analyses.

Dissemination Level		
PU	Public	PU
PP	Restricted to other program participants (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including Commission Services)	

SEVENTH FRAMEWORK PROGRAMME

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1 Background

One of the major aims of the IMPRO project is to apply a systemic approach to elaborate farm-specific animal health plans. The systemic approach relies on the basic idea that many phenomena and processes cannot be explained adequately by searching only for classical mono-causal relationships which is particularly inappropriate and proves to be insufficient in dairy farm systems. There is a growing understanding within the scientific community that it is necessary to develop more comprehensive concepts in animal science which simultaneously consider a larger number of causal relationships. The key feature of the systemic approach is that it captures the dynamics and interactions between the various elements of the farm system.

Improving animal health status at herd level relies on the identification of the most effective and efficient control measures considering the complexity of farm specific conditions. Understanding the farm specific situation is needed to reduce farm complexity and elaborate the right diagnostics. An appropriate diagnostic procedure considering the farm specific animal health status as an emergent property of the farm system is an essential precondition to identify those measures that are most likely to improve animal health status. IMPRO makes use of the Impact Matrix as a tool for estimating the interconnectedness of variables which represent farm specific characteristics in relation to health management. It provides a structure to support a participatory process and to organise and evaluate complex ideas and information generated by relevant stakeholders (farmer, veterinarian, advisor and researcher) and facilitate their participation in the assessment and decision process.

A collection of relevant variables affecting animal health was identified in an earlier task within IMPRO (Deliverable D2.2). These, applied in an Impact Matrix and combined with information on the structural characteristics of the participating farms (Deliverable D2.3), forms the basis for the identification of potentially effective measures to improve animal health in a specific farm situation.

The objectives of the current document are to describe the process applied on the farms, to review the outcomes of the farm visits and to summarize the feedback from the various participants.

2 Process

Organic dairy farms in Germany (DE), Spain (ES), France (FR) and Sweden (SE) were selected to participate in WP2 of IMPRO. The selection of farms was based on the overall project requirements:

- availability of test-day milk records since January 2012
- organic for at least one year
- expected to be in operation at least for the immediate future
- “common” herd size (not too small).

In addition, differences in infrastructure and other characteristics in the participating countries have also been taken into account in the selection. In brief:

- DE: Seven organic dairy advisors belonging to public advisory services (regional authorities) as well as private institutions (Organic Farmers Associations, advisory cooperatives) and veterinary practices were asked to pre-select the most suitable of their clients (according to the IMPRO requirements stated above) and to conduct an initial enquiry. Of all 102 farms that were first-contacted by the advisors, veterinarians, and scientists involved in IMPRO 68 were willing to participate. A representative sample of 60 German organic dairy farms was then selected to take part in the project.

- ES: All organic dairy farms in Spain were first-contacted by phone by the researchers. The inclusion criteria for the selection of farms (see above), resulted in a substantial reduction in the eligible farms. A majority of the eligible farms were willing to participate. The surveyed farms comprised approximately 35% of the total official census of organic dairy farms in Spain.
- FR: To catch the variation in organic dairy farming in France, two regions affected by different climate and soil quality were chosen. For each administrative area (Morbihan, Loire-Atlantique, and Lorraine) the local organic advisor was asked to pre-select farms corresponding to the criteria (size, breed, regular somatic cell count). The resulting list of farmers who had already agreed to take part in the project was sometimes completed with veterinary's clients due to last minute impediments of the farmers.
- SE: An invitation letter was sent to 300 organic dairy farms geographically located within "driving distance" and within the "milk-belt", i.e. in an area of Sweden with relatively many dairy farms. Fifty-seven of the 150 farms that answered were purposively selected to reflect Swedish farms in structure and herd size.

The first visit took place on a total number of 218 farms, with 60, 28, 73 and 57 in DE, ES, FR and SE, respectively. Information was collected as a baseline and to be used during the second visit, and the information is summarized in deliverable D2.3.

In the second visit the farmer, an advisor and a veterinarian and the researcher were present to perform the participatory and farm-centric approach. The visits were conducted according to a plan that was agreed upon by the IMPRO-team prior to the visits in order to make the procedure as equal as possible in each visit, although with some variations. The second visit was performed on only 192 farms, because some farms ceased milk production, some declined to continue to participate and some farms in France were included in the first visit as control farms and were not targeted for the second visit

A sociological and an economic questionnaire had been sent out to the farmers 1 - 2 weeks before the visit. A similar sociological questionnaire was also provided to the advisor and veterinarian. The questionnaires were collected at the beginning of the visit. If possible, each visit started with a short farm walk focussing on the dairy herd, feed, and buildings. After this brief familiarisation with the current farm situation the participants went inside. There, baseline data on animal health and welfare collected in the previous visit and retrieved from farm and milk records was presented by the researcher and used as a source of input for the first part of the discussion. After reviewing the baseline data, an Impact Matrix was filled by the farmer, the veterinarian and the advisor in a participatory process moderated by the researcher. The Impact Matrix analysis was performed to identify the farm-specific key variables which are expected to have a strong impact on the behavior of the individual farm system, the knowledge of whom may support decision-making concerning animal husbandry and consequently animal health. A prototype version of the IMPRO software tool was used to perform the Impact Matrix analysis. The output diagram of the Impact Matrix was presented by the researcher and discussed with farmer, veterinarian, and advisor. Beside the identification of core driving factors, the approach contains a mediation capacity and enhances the participatory process, integrating the different perspectives and expertise of the farmer, the farm veterinarian and the farm advisor. During the next step the farmer, veterinarian and advisor were asked to fill out a perceived cost questionnaire. At the same time an economic tool for cost calculations related to animal health was fed with data from the specific farm by the researcher. The outcome of the economic tool, which was developed in WP5 of the IMPRO project, provides an indication of the costs

caused by a number of production diseases on the specific farm. The calculated costs were compared with the previously made cost estimations and were also used as background information for the following discussion.

After looking at the data reflecting the animal health status, the farm systems' interrelationships and the calculated costs of diseases, the farmer was given the opportunity to express his/her view on the current animal health situation. The advisor and veterinarian were asked to comment on the farmer's statement. For each of the four production disease complexes 'metabolism', 'reproduction', 'claws and limbs', and 'udder', and for 'calf health' (all countries except DE) the participants were asked to identify if they were (a) to be improved, (b) to be stabilised, or (c) in no need for action. If areas with the need for stabilisation or improvement were identified, all participants were encouraged to make suggestions for potential management measures that contribute to the achievement of these goals, keeping in mind the systemic roles of related variables. Proposed and discussed measures were documented by the researcher. Those measures which the farmer could imagine to implement in the near future were merged into an action plan.The action plan is a common agreement on a farm-specific set of measures identified to be the most effective and tailored to the specific health problems, the possibilities and resources as well as limitations and constraints on the individual farm.

See Selle et al. (2013) for a more comprehensive description of definitions and of the process.

3 Outcome

The process on each farm was documented in a "recording booklet" (see Appendix 1) where the researcher noted interim results and key observations. In addition, different passages of the process were tape-recorded, which provided possibilities for double checking of records. The booklet served as a basis for a written report that was subsequently sent to all farmers. The main outcomes from the farmer perspective were the identification of the farm-specific key variables, the identification of areas with room for improvements and the farm-individual health plans.

A plan for the second farm visit, that identified participants, relevant steps to be taken and observations to be recorded, was defined before the visits started. However, factual conditions in each country lead to modifications of the general approach. Ideally, all participants in a participatory process should be well acquainted with the situation at hand, but the participants in the second farm visit varied somewhat in that respect. Thus, in Germany there were five advisors participating, attending 2 – 16 visits each, but the veterinarian was usually a different one for each farm, with three exceptions attending 2, 2, and 6 visits, respectively. In Spain a majority of the veterinarians only participated in one farm, as part of their routine work, although three veterinarians participated in two or three visits. The situation was similar for the advisors, where only four advisors performed more than one visit. In France eight different advisors took part, each with several visits, while 38 different veterinarians participated, thus some performed 2 or 3 visits. Finally, in Sweden the veterinarians and advisors were present in 1 – 6 farm visits each, with the majority of them participating in 1 farm, and all were involved in the farms in their ordinary work.

Thus, the participants' level of experience and acquaintance with the farmer and the farms varied between visits and between countries. However, a maximum of two researchers per country performed the farm visits in order to ensure consistency in the methodology of the process. Nevertheless, it cannot be excluded that the level of experience acquired by the researchers during the process played a role in the conduct of the visit.

3.1 Identified farm-specific key-variables

Integral to the impact matrix process is the evaluation of all influences occurring within a set of 13 system-relevant variables on farm level. The variables (Table 1) were ascertained in regional workshops in France, Germany, Spain and Sweden. The workshops were organised within a multidisciplinary framework and attended by a total of 80 experts in animal health on organic dairy farms, comprising farmers, advisors, veterinarians, researchers as well as members of dairy associations and the dairy industry. Factors in relation to animal health at farm level were initially collected in a moderated process, subsequently structured by the participants and finally reduced to a set of essential components. Special attention was paid to eliciting variables that are specific to farm management in the context of organic production, and implications in terms of options or constraints.

Table 1. List of system-relevant variables describing the organic dairy farming system

	Variable	Definition
1	Milk performance	Level of milk production (considering quality and quantity).
2	Production diseases	Health status of the herd related to production diseases including udder diseases, lameness, and reproductive and metabolic disorders.
3	Financial resources	Economical results, financial resources of the farm to modify and improve suboptimal conditions.
4	Labour capacity	Ratio between available labour time and work to do.
5	Feeding	Degree of meeting the feeding requirement of individual animals in their actual life stage (energy nutrients, structure, water etc.); influenced by feeding management and the availability of feed.
6	Keeping conditions	Attributes of the cow environment (housing and pastures) that have a potential effect on animal health and welfare.
7	Reproduction management	Ensuring fertility in heifers and dairy cows meets the objectives of the farmer.
8	Dry cow management	Ensuring optimal conditions (regarding, nutrition, housing, hygiene, welfare) for dry cows to be able to start healthy into the next lactation.
9	Calf and heifer management	Ensuring optimal conditions (regarding nutrition, housing, hygiene, welfare) for the development of calves and heifers.
10	Herd health monitoring	Quality of the perception and documentation of herd health and production at individual cow and at herd level.
11	Hygiene	To what extent are hygiene standards met/hygienic measures taken with respect to housing, milking, and the risk of transmitting infectious diseases through internal or external contact.
12	Treatment	Degree of meeting the need of an individual (sick) animal by using remedies and palliative measures; needs-related = appropriate (made-to-measure therapy) and in time (early/timely treatment).
13	Knowledge and skills on the farm	Knowledge and skills that can be accessed for the benefit of the farm. This includes knowledge and skills of the farmer and of external persons, which can be involved if necessary.

In the on-farm process of the 2nd farm visits the impact matrix was filled by quantifying the relationships between each two variables in a pair-wise comparison. Thereby the underlying question for each pair is: “If variable A changes, will variable B change on this farm? If so, how strongly will variable B react?” Only changes as a result of direct influence are taken into account, irrespective of the direction of the anticipated shift. The strength of influence is scored with 0 (no obvious influence), 1 (weak change), 2 (proportional change), or 3 (strong change). The scoring of factors in the impact

matrix is done by the farmer, veterinarian, and advisor in a moderated discussion resulting in one consensual impact matrix as depicted in Figure 1.

	01 MilkPerf	02 ProdDis	03 Finance	04 Labour	05 Feed	06 Keep	07 Repro	08 DryCow	09 CaldHeif	10 Monitor	11 Hyg	12 Treat	13 KnSkill
01: Milk performance	X	1	2	0	2	0	1	0	0	0	0	0	0
02: Production diseases	2	X	3	3	1	0	0	0	1	1	0	1	1
03: Financial resources	0	0	X	1	0	0	0	0	0	0	0	0	0
04: Labour capacity	2	1	0	X	0	0	1	0	0	0	1	1	0
05: Feeding	3	2	2	0	X	0	0	0	0	0	0	0	0
06: Keeping conditions	1	1	0	0	0	X	0	0	0	0	1	0	0
07: Reproduction management	2	1	1	0	1	0	X	0	0	0	0	1	0
08: Dry cow management	1	1	1	1	0	0	1	X	0	0	1	1	0
09: Calf and heifer management	1	1	1	0	0	0	1	0	X	0	0	0	0
10: Herd health monitoring	1	2	1	1	1	0	1	0	0	X	1	1	1
11: Hygiene	2	2	1	1	0	0	0	0	2	0	X	1	1
12: Treatment	1	2	2	2	0	0	0	0	0	1	1	X	1
13: Knowledge and skills on the farm	1	2	1	1	2	1	2	1	1	1	1	1	X

Figure 1. Example of an impact matrix created at one farm where the relationships between the 13 system-relevant variables are identified

Using the impact matrix it is possible to assess the interconnected effects of these variables and hence the role they play from the standpoint of dominance (active), susceptibility to influence (reactive), and the part they play in events (from buffering to critical).

The role of each variable in the farm system is presented in a two-dimensional diagram during the participatory process, i.e. one unique diagram for each participating farm; The position of each variable in the two-dimensional output diagram is determined by its active sum (AS: sum of a variable's outgoing influences) and its passive sum (PS: sum of a variable's incoming influences). The role of each variable in the system can be allocated using a grid of nine sectors developed by Schianetz & Kavanagh (2008). The boundaries of these sectors are approximate; their outer limits are determined by the absolute maximum sum of weights given to the variables (ASmax or PSmax). Figure 2 provides one example of such a diagram from a farm.

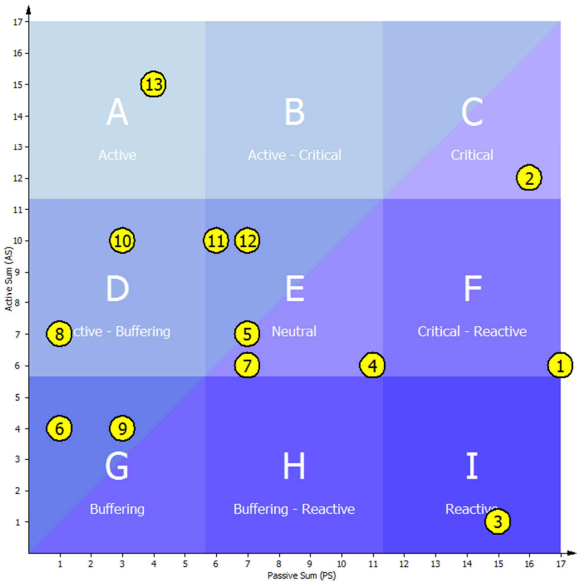

Figure 2. Example of a two-dimensional output diagram created at one farm where the role of the 13 system-relevant variables are identified.

The process of allocating roles to variables provides improved information on the variable itself as well as on the system as a whole. The distribution of variables gives an immediate impression of the character of the system, which may turn out to be generally critical or particularly inert. The roles of

individual variables can be interpreted to emphasise their individual behaviour within the system. As shown in Figure 3 the same variable did occupy quite different positions in different farm systems.

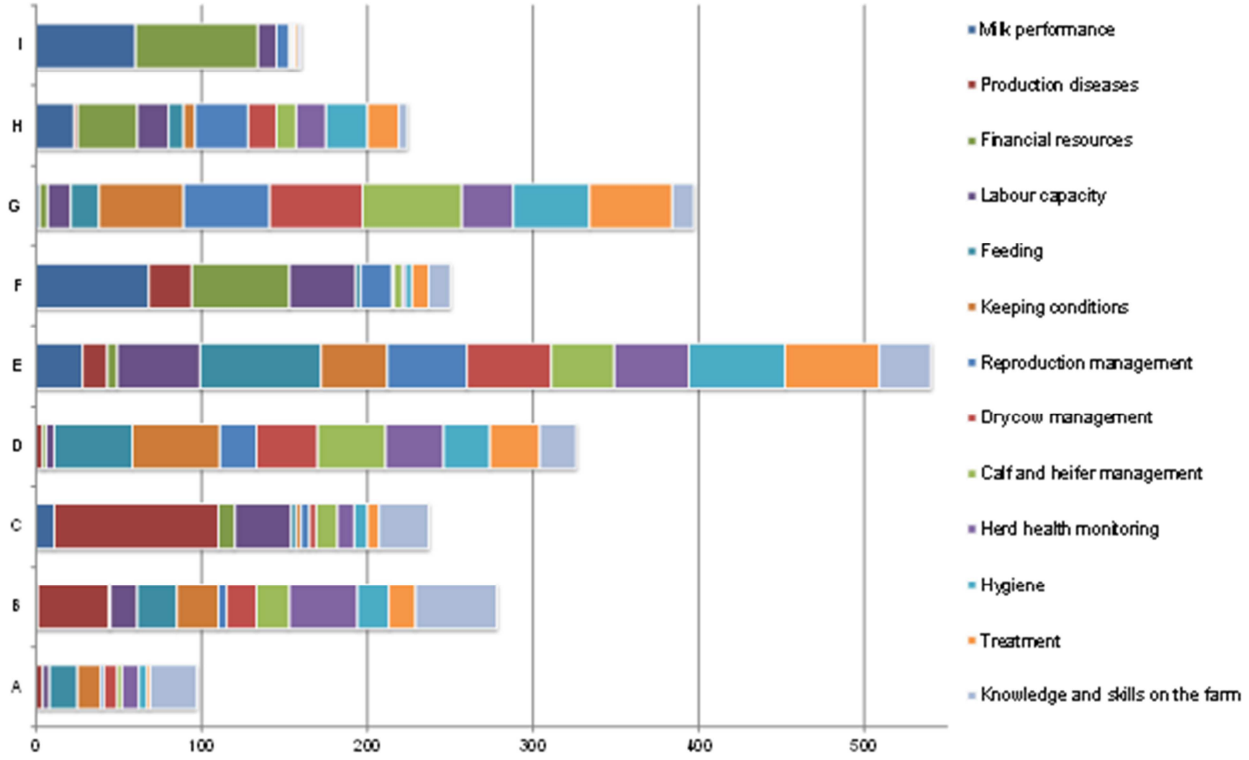

Figure 3. Frequency of the thirteen system variables across the nine sectors of the impact matrix output for all farms.

Across countries the distribution of the thirteen variables into the nine sectors of the impact matrix output graph is presented in Figure 4.

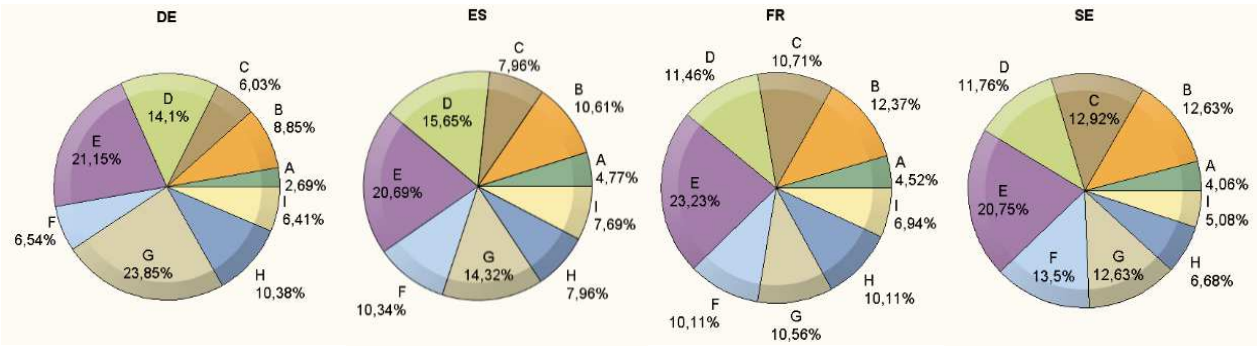

Figure 4. Proportion of the thirteen system-relevant variables in the impact matrix classified into the nine sectors in Germany (DE), Spain (ES), France (FR) and Sweden (SE).

The variables can also be identified as influencing (AS-PS>0) and influenced (AS-PS<0). The distribution of the variables according to this identification is shown in Figure 5. Variables, whose influence on others equals their influence by others (AS-PS=0) are not shown in the graphs.

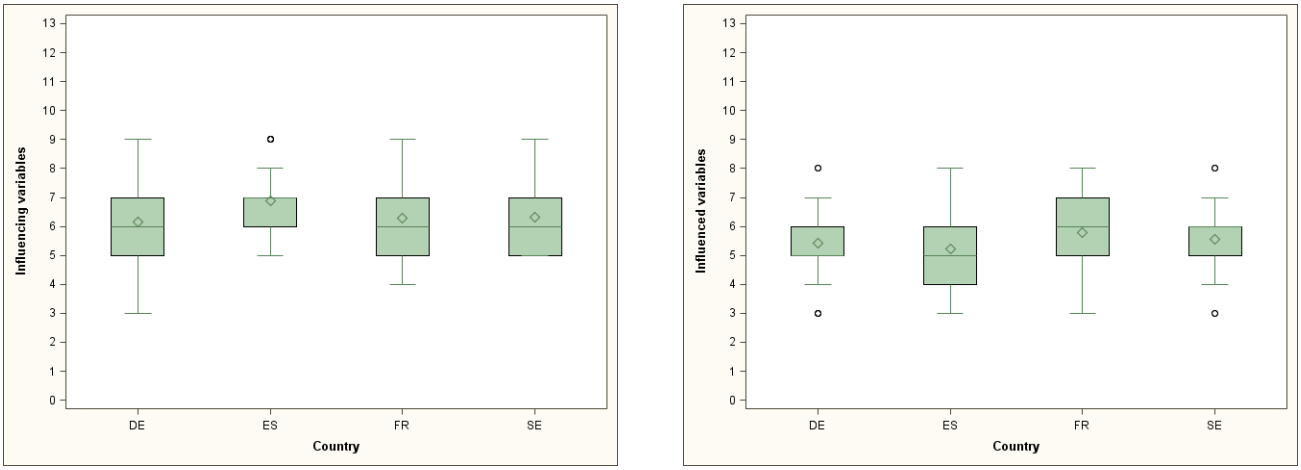

Figure 5. Distribution of number of variables within herd identified as mostly influencing and mostly influenced, respectively, in Germany (DE), Spain (ES), France (FR) and Sweden (SE).

It is obvious from figures 4 and 5 that no major differences in the distribution of the variables exists between the countries in this project. The proportion of A to C variables was slightly less in Germany than in the other countries, while the proportion of G-variables was slightly higher.

The maximum sum of weights given to the variables in one system (AS_{max} or PS_{max}), as understood by the participants of the 2nd farm visit, was distributed within countries as displayed in Figure 6.

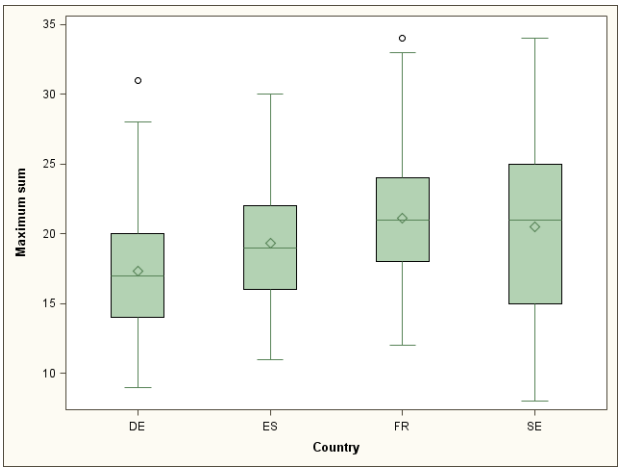

Figure 6. Distribution of maximum sum of weights (active or passive) given to variables in the impact matrix in Germany (DE), Spain (ES), France (FR) and Sweden (SE).

The average in Germany was slightly lower than in the other countries indicating either that few of the 13 system-relevant variables were regarded as strongly influencing or strongly influenced within the overall farm system or that the participants in Germany scored the influences on a much lower scale.

Identified areas for improvement

Figure 7 presents the proportion of herds that identified a particular area as a target for improvement.

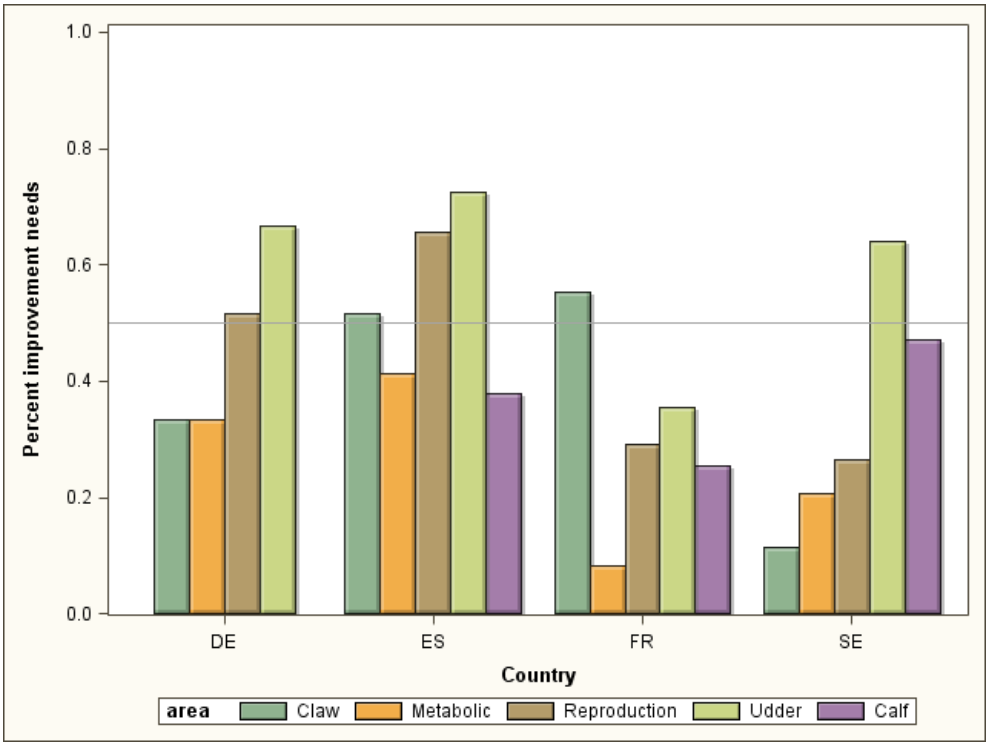

Figure 7. Proportion of herds identifying the respective area as a target for improvement in Germany (DE), Spain (ES), France (FR) and Sweden (SE).

With the exception of France, udder health was the most common area to be identified as in need for improvements. In France, claw disorders were the main focus whereas metabolic disorders were identified as in least need for improvements. Swedish herds were least inclined to improve claw health.

3.2 Health plans

The individual health plans were set up according to the particular conditions in each farm. The level of detail of these health plans varied considerably and ranged from a very detailed description of what should be done to a more superficial identification of areas that should be investigated further. The health plans were indeed very individual, reflecting the farm centric approach, and thus cannot be summarized within or across countries. Examples of health plans are provided in the appendix.

4 Discussion

4.1 Health plans

Based on the areas that have been identified as being in need for improvement (figure 7), there appear to be substantial differences in the priority of health concerns across the different countries. The underlying reasons for these differences needs to be further investigated. However, it was also apparent from the visits that there was a substantial difference between herds, which also became evident in devising the health plans. A proper health plan needs to rely on profound data of the cur-

rent health situation in the herd and should be based on an understanding of the casual processes responsible for health disorders before identifying specific actions to take, when they should be taken and how the actions and the effects should be monitored. However, in most cases the specific and detailed knowledge needed was only partly available to the participants, limiting the options to elaborate profound health plans. Advisors and veterinarians were therefore reluctant to propose corrective measures. In cases where specific recommendations were made these were often based on already existing working relationships between the farmer and their advisor/veterinarian. However, in several cases, at least in Sweden, the Impact Matrix analysis identified areas that were previously overlooked and therefore had an impact on the advices given.

In a number of cases the agreed plan was to implement additional analyses in order to gain more knowledge to identify specific health problems within the farm systems and correct diagnostics of the animal health status, rather than implement actions directly.

The farm-centric and participatory process of the Impact Matrix analysis provides a good foundation for developing farm-specific health plans, but needs to be supplemented with additional data and analyses in order to be able to define the actions, targets and checkpoints that are integral to a proper health plan.

4.2 Perceptions of the process

Different stakeholders, i.e. farmers, veterinarians and farm advisors, were involved in the process due to the participatory and multi-disciplinary approach of the IMPRO project. By capturing their perceptions we expect to identify points for improvement.

4.2.1 General aspects of the stakeholders

Prior experience in providing structured health advisory services varied considerably between countries and participants, as did also the actual composition of the participating stakeholders. The perceptions of the process therefore also varied somewhat between countries:

- DE: The initiative was appreciated by most of the participants. On many occasions veterinarians and advisors met for the first time, although they had been counselling the farm for years. In a few cases informal contacts were exchanged and participants showed the intention to arrange further meetings in the future. Farmers seemed the most active party in the process, being most present throughout the discussion (especially filling the impact matrix), talking openly and asking for opinions and advice. On 26 out of 60 farms (43.3%) more than one farmer participated (the other person attending being partner, children, siblings, herd manager, business partner, or even the whole family). The veterinarians were clearly the health specialists, expressing competent information when it came to specific health issues. Because of their regular visits they were in most farms more updated on current developments than the advisors. However, only some of them were involved in regular herd health care/advisory. The farm advisors generally had a broader approach than the veterinarians. They stood out when it came to management, practices and regulations within the organic sector. However, some of them had also a clear emphasis on certain aspects and were experts for instance in udder health or nutrition and feeding. There was a large variation in the previous intensity of cooperation between farmers and vets as well as between farmers and advisors.

Throughout the process some veterinarians who were at first reluctant to participate got quite interested in the project. On the other hand, there were also those that expected a lot from the visits and were rather disappointed by the fuzziness of the systemic approach.
Farmers' feedback was mostly positive, as they saw their herd in the centre of interest. They appreciated the process taking into account farm-individual goals and conditions as well as economic aspects when looking at the most suitable measures to improve animal health. Also, they wanted to know how well they fared compared to others and were therefore asking for benchmarking.
There appeared to be knowledge-exchange and collective learning in all stakeholder groups: Farmers usually wanted to understand why certain health problems occurred. Veterinarians inquired about organic farming and partly also about nutrition and actual farm management. Advisors got to know their clients better but also used the opportunity to address veterinarians about specific health issues.
The impact matrix analysis served several objectives: It structured the debate and mediated the process of looking at one farm from different perspectives. Also it helped to 'zoom out' and focus on the whole system instead of going into details straight away. It generated a different 'picture' of the farm that was received well by farmers, veterinarians, and advisors in most cases. Especially the latter reckoned after several visits that they did not only see the farm itself represented by the output diagram but in particularly the 'pattern of thought' of the people responsible on each farm.
The quality of the recommended measures varied between farms. On some farms, they were farm-specific and tailored to objectives, opportunities, and constraints of the farm. Most farms, however, lacked necessary information which is why on these farms the steps defined in the health plan focus mainly on diagnostic procedures. Also, farmers had only marginal experiences with health plans and therefore no routine in working with them. When asked during the 1st farm visit, only 11 out of 60 farmers (18.3%) said they are using a written health plan including defined health measures.

- ES: The general attitude towards the process was positive and helpful and put forward constructive ideas. It allowed sharing skills, information, knowledge and live interaction. At an aggregate level (for all the participants and accounting the impact matrix supported by the economic tool), the economic tool was favourably received and very supportive (both veterinarians and advisors were sometimes not aware of the economy of the farm). In terms of identifying and understanding areas of benefit the impact of different actions in their economic activities, the outputs of the economic tool were very illustrative and motivated the farmers to invest in animal health. The farmers liked the fact that the farm should be viewed holistically. The farmers appreciated the importance of networking because sometimes the veterinarian and advisor do not know each other. Under the economic context, farmers commented that the meeting is a reconfiguration of their business. For veterinarians the process provided useful updates on organic practice.
- FR: The process was regarded as positive by the advisors. The advisors identified that the fruitfulness and the depth of the discussion depended highly on the 'active' participation of the participants in the discussion (farmer, advisor and veterinarian). Important factors that influenced the level of participation were: the knowledge of the advisor/vet on the particular farm, the level of trust that existed prior to the visit between the participants, the open-mindedness towards the method and the personality of the person. The whole process was regarded as of interest for bringing together advisor and vet in discussing animal health of a farm, their expertise being complementary and providing the opportunity to 'correct' the other where necessary. Advisors showed a more comprehensive knowledge and approach of the

farm whilst the vets brought technical expertise with regard to animal health management. Besides, the visit was an opportunity to create informal contacts between advisors and vets which were rare until then in the French situation. Furthermore, all important domains were discussed and it left no room for taboos. For advisors or vets who did not know the farm situation well it was an occasion to learn a lot about the practices of the farmer. The method was seen as a discussion support tool by the advisors. Scoring the influence of a variable to another obliged to have this discussion and express an opinion. However, the score in itself was seen by the participants as subjective and not a repeatable result. It was also regarded by the participants as not being possible to check whether the score was a true reflection of the practices of a farmer.

- SE: The process was regarded as positive by all participants. The farmers saw themselves as much involved and leaders of the decisions concerning their own farm. All the participants saw the opportunity to get a better overview of the farm and it became clear which areas to focus on and put the effort in.

4.2.2 Feedback on the Impact Matrix analysis

- **Time:** The analysis took quite some time to perform, ranging from just under 1 hour until almost 2 hours. The first lines of variables needed the most time of all lines to fill in. There are two reasons: On the one hand, the novel method of assessing the system's interrelationships needed getting used to. On the other hand, starting the matrix with 'milk performance' and 'production diseases' proved to be difficult, as they are usually more the results of processes on the farm than having a great impact on management areas. During the last part the participants became increasingly tired of the process and consequently filled in the matrix more rapidly, not willing to discuss every combination in detail anymore. Sufficient time was considered necessary to capture farm complexity, but was not always available. Researchers got the impression that some variables would have been interesting to discuss in more detail but this was unfeasible due to the time pressure. Some questions appeared of little relevance for the specific farm situation and were therefore quickly filled in.
- **Scoring:** The scoring was much influenced by the personality of the farmer and the other participants. The intensity of the discussion and consequently the scores depended to some degree on the eagerness of the participants to debate. The actual scores are therefore a result of the current situation and may not necessarily have been the same at another occasion. The knowledge exchange and collective learning during the process of filling-in changed the way participants looked at the system and its interrelationships. Moreover, the approach includes the participants as factors of the system as their perspectives are part of the farm system. If an influence received a low score, this can have several reasons: either there was no influence or it was simply not seen by the observers. Thus the assessment includes the 'pattern of thought', meaning the awareness of the participants with respect to which variables are changeable and which changes are effective. A third explanation for low scores may even be that an actor was generally hesitant to make decisions, which would also have an effect on the farm system.
- **Graphical representation:** By means of the two-dimensional output diagram the roles of individual variables can be interpreted to emphasise their individual behaviour within the system. Also the graph conveys an impression of the general characteristics of the farm system. The results presented in the graph do not give information on variables that affect animal health which means a variable might be active but not affecting health at all. However, the output indicates which variables have strong effects on others in the system and can thus be

used as levers for change. Thus, an active variable may affect others which again helps to shift the system into the desired direction. Some farmers recognized the graph of the impact matrix as a 'picture' of their own farm. Relating the farm system to the graph, according to some advisors, was even easier after attending a few farm visits, because then differences became more obvious.

- **Practical application:** The advisors in France and Germany did not expect that the Impact Matrix, in its current form, will have directly practical application in their work. This is partly due to the time requirements of the approach and to the fuzziness that is too unspecific to lead to concrete recommendations or actions. However, several advisors and veterinarians in Sweden and Germany thought that it can be useful as an "eye-opener" and as a basis for non-committing discussions with their farmer clients, and a way to clarify which areas of improvement to first focus on. This might be the case especially in farms where they see many areas that need improvements. Some veterinarians and advisors manifested their interest to perform the impact matrix as an annual exercise in their client farms. Quite a few farmers expressed that they did not learn much new about their farms although there were also those where reflecting on distinct management areas raised awareness for unconscious relationships and interactions. Advisors and veterinarians that work regularly with farmers were generally comforted in their knowledge whereas advisors and veterinarians that were new to the farms learned much about the practices and objectives of the farmers.

4.2.3 Feedback on the development of health plans

- DE: When forming a health strategy the leading question to each of the participants, starting with the farmer, was: "Where do you see room for improvement?" Thereby the conversation was steered towards possible objectives with respect to animal health. Proceeding this way enabled the participants to express their personal views and enter into a joint assessment of the health areas in question. Areas that were regarded as in need for stabilisation or improvement were discussed, whereby all participants were encouraged to make suggestions for potential management measures that contribute to the achievement of these goals. During the discussion, it proved beneficial to have the different actors involved, as this ensured the validity of the exchanged information. Those measures which the farmer could imagine to implement in the near future were merged into an action plan. As thorough diagnoses and comprehensive health records were often missing on the visited farms, these health plans, however, remained quite vague and, in addition, were lacking a time dimension and a concept for monitoring the progress.
- ES: Areas of improvement were evident in the majority of the farms and not substantial differences in priority areas of health improvement across the different stakeholders. This exercise was seen useful to identify future priorities. When the pattern of perception of the process was uneven it dealt with with the expertise of farm veterinarian and advisors to identify effective measures. Regarding the health plan, the highest variation in the details on the animal health plan was the expertise of the farm veterinarians and advisors. Some measure can never be identified with the current poor farm records. The intermediate objectives of identifying effective measures were highly dependent of the provision on more farm data and oriented analysis, indeed related to the expertise of farm veterinarian and advisor. Furthermore, these analyses were requested as part of the monitoring process.
- FR: The farmer gave his view on animal health areas where he or she considered there was still room for improvement. Sometimes advisors or veterinarians questioned this and the difference in views would be discussed. If recommendations were made during the discussion

while filling up the Impact Matrix they would be summarized, summed up again by the researcher and discussed again if necessary. Then discussion was stimulated by the researcher asking the advisors and veterinarians if they could give other recommendations in the areas previously identified with need for improvement by the farmer. To which the farmer would agree or not, especially if he already thought about constraints such as labor or cost, or something else. The development of health plans depended mainly on the already existent working relationship between farmer and advisor and/or veterinarian. The degree to which advice was given and would be farm specific and pertinent (as far as we would evaluate this) was determined by their working relationship. Often when already a strong working relationship existed the recommended measures were already given during other farm visits by the advisor or veterinarian. If their relationship was not strong proposed measures were either very general or nothing was proposed due to lack of animal health data and diagnosis of the problem. Therefore, sometimes the recommendation was not a measure to implement but further analysis (e.g. bacteriological) or observation (e.g. in case of lameness) to complement the diagnosis. In some cases advisors also took this part of the visit as an opportunity to ask the veterinarian advice or clarification on animal health related topics. After the end of the visit the researcher would write a summary of the visits including of the health and send this back to all participants.

- SE: While filling in the impact matrix the discussion led to recommendations regarding animal health from the veterinarian and the advisor. The advices given were of degrees from superficial to more detailed on the different farms. The farmer gave his or her point of view whether the recommendations were possible to implement on their specific farm. The opinions on which measures that would have strong positive effect to implement could vary and was in these cases deeper discussed. It gave a very dynamic discussion to have all three actors present at the same time and ended often in farm specific solutions that the farmer felt comfort with. Due to the time and format of the visit the developed health plans often come to just recommendations and seldom agreed action plans for measures to take. At the end of the visit a summing up of the recommendations were made to give the participants the opportunity to ad possible advice or measures. The visit and the given advices were summarized by the researcher and sent to the participants after the visits.

4.2.4 Aspects of the researchers

- DE: Looking at the health status of one specific dairy herd involving multiple actors led to the exchange of knowledge and fostered collaborative learning. The process allowed the participants to bring their attention to a shared issue in a constructive manner. The discussion benefitted from the frame and structure imposed by the pre-established roadmap for the visit which followed a deductive approach starting with the overall system and working itself down to specific health issues. The stakeholders jointly tried to find solutions for complex systems in a process of dialogue accommodating diverse viewpoints and perspectives.
- ES: The level of professionalism is very variable among farmers, farm advisors and veterinarians. Some regions in Spain need more knowledge than others. The use of advanced tools should be encompassed with good support at the farm since some farms have poor farm records (i.e. many farmers do not have their own feed analysis, main pathogens analysis of mastitis are not requested by veterinarians). For the researchers, the diversity of farm systems and profile of veterinarians and farm advisors sets a basis for personal learning and enrichment.

- FR: In agreement with the feedback described above from the French advisors it was identified that the whole process is of interest in bringing together different expertise on a farm to discuss animal health. This creates a more uniform vision on the animal health situation and animal health management amongst the participants. Furthermore, the visit was an opportunity to create informal contacts between advisors and vets which are rare in the French situation. And it was an opportunity for the farmer to express his personal and farming objectives and explain his practices.
  The process is seen as a discussion aid, rather than a diagnostic tool. Therefore, it was very difficult to arrive at specific health plans. Information is indeed exchanged between participants, but this is hard to measure in a scientific way.
  The Impact Matrix method as it is today should be improved taking into account the remarks from the participants in order to make it a more 'user friendly' tool, with a more specific objective than analyzing a farm system for it to be used in the field by veterinarians and advisors.
- SE: The whole process is of interest for bringing together advisor, veterinarian and farmer in discussing animal health of a farm, their expertise being complementary. Advisors have a more global knowledge and approach of the farm and the vets bring expertise with regard to animal health management. The farmer was able to raise up his/her expertise of the unique farm situation and thereby be more comfortable with the given advice and health plans and to really implement it on his/her farm. Besides, the visit was an opportunity to create informal contacts between advisors and vets which are rare in the Swedish situation. For advisors or vets it is an occasion to learn a lot about the practices of this farmer and ideas of how to reach out with advice. The method is seen as both a discussion support tool and a very good way of finding which areas for improvement to focus on in the specific farm.

4.3 Further analyses

The quality of the health plans developed on the participating farms can only be evaluated over time, since it is determined by how well they were followed and by which impacts the listed actions might have. Since most effects on the animal health situation by corrective actions will take considerable time to realize a review of the impacts of these farm visits on the animal health status cannot be provided in this document.

The identification of system-relevant variables in the impact matrix and their associations, as indicated by the active and passive sums of the scores, needs to be further elaborated, also taking the farm characteristics (as recorded at the first visit) into account. As the scores within the impact matrix are also the result of the personal attitudes of the participants, their individual knowledge of the farm, their trust into the other actors, the understanding of the definition of the variables and the current animal health situation on the farm, to give just some examples, an in depth analysis considering the Impact Matrix scores of different farm visits will be necessary considering also the context of discussion in which the scores were obtained.

The full beneficial impacts of the process performed at the second visit are impossible to assess at this stage. Further analysis is needed as well as thorough exchange and active communication between the researchers in order to monitor the dynamics of the process and its outcome.

5 Conclusion

The approach applied at the second farm visit within IMPRO was generally considered as a useful, albeit time-consuming, support for on-farm discussion about the animal health situation between multiple stakeholders. Concrete health plans were however only seldom a direct outcome of the visit. The Impact Matrix analysis needs to be supported with additional analytical tools, such as information from regular monitoring of health and productivity at the farm, to arrive at actual and concrete health plans. The level of expertise of farm veterinarians and advisors influenced the outcome of the approach significantly. Finally, the obtained scores in the Impact Matrix are very farm and situation specific which makes comparison, analysis and interpretation of the results of the Impact Matrix a challenge.

6 References

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Vester, F. (2007). The art of interconnected thinking. MCB Verlag

7 Appendix

7.1 Recording booklet

impro

Check before the visit

	Tick if completed
General	
Has the farmer received the WP 5 questionnaire 1-2 weeks in advance?	
Have I motivated the farmer to complete the questionnaire before the second farm visit?	
Has the farmer received a reminder to complete the questionnaire (2-3 days in advance)?	
Have the veterinarian and the advisor received the sociological questionnaire before the visit (where appropriate)	
Economic questionnaire & Tool	
Am I using the original version of the economic tool?	
Is all necessary input (tab: 'Input 1st visit') data gathered and filled in in the economic tool?	
Is the economic tool saved under the correct name? (example [date_of visit]_[FARM_ID].XLSX -> 20130805_NL785534.xlsx)	

2

impro

2nd farm visit

Name of the farm(er): _____

IMPRO Farm ID: ☐

Date: _____

SEVENTH FRAMEWORK PROGRAMME

Preparations for the visit:

WP 5 Sociological questionnaire to veterinarian and advisor printed	
WP 5 Perceived costs printed (for Farmer, Veterinarian, Advisor)	
Empty Impact Matrix printed (for Farmer, Veterinarian, Advisor)	
Report on herd health status printed (if not sent before)	
Introduction prepared	
Card game prepared	
Voicerecorder checked	
Laptop with software tool (latest version) checked	

Participants

Farmer

Name*:

Veterinarian

Name:

Adress:

Telephone:

Mail:

Advisor

Name:

Adress:

Telephone:

Mail:

Researcher

Name:

Further participants

Name:

Name:

Name:

* If more than one person from a farm is participating, try to put the name of the „main decision maker“ in here and list further persons below.

impro

Sequence of the 2nd farm visit

1	Introduction and farm walk / settle all relevant questions	30 min
2	**Presentation of the herd health status** (participants have received information beforehand)	5 min
3	**Filling the Impact Matrix** together with farmer, advisor, vet (discussion moderated by the scientist)	120 min
4	Short description of the output of the impact matrix	10 min
5	Implementation the **economic tool**	15 min
6	Ask for farmer's view on his health situation and identify areas with room for improvement (**questions related to the farm protocol**)	5 min
7	**Discuss potential preventive measures/actions** (referring to areas with room for improvement, potential effectiveness – relationship with variables, expected costs etc.)	30 min
8	**Agreement on plan of action**	10 min
9	**Feedback session** and clarification of what happens next	10 min
	Time expenditure approx.	**3'55 h**

impro

5 6

impro

impro

1 Farm walk and Introduction, settle all relevant questions

	Economic questionnaire & Tool	Tick if completed
1	Have I gathered the **economic questionnaire from the farmer** before the visit starts?	
2	Remarks on the economic questionnaire:	
3		
4		
	Sociological Questionnaire	**Tick if completed**
5	Is the **sociological questionnaire**, **filled by the farmer,** completed and been handed over to me before starting the farm visit?	
	Is the sociological questionnaire, filled by the **veterinarian** and the **advisor**, completed and been handed over to me before starting the farm visit?	
6	In case the sociological questionnaire was not completely filled in by either farmer, vet or advisor please indicate why it has not been completed:	
7		
8		
9		

impro

Ask if the Person who answered the sociological questionnaire **(farmer)** is the same who answered the questions during the first visit.
If not ask the following three questions from the protocol.

General information about farm and respondent		
1	How old are you?	☐ < 26 ☐ 26 – 34 ☐ 35 – 44 ☐ 45 – 54 ☐ 55 – 64 ☐ > 64
2	Gender	☐ male ☐ female ☐ no response
3	What is your role in the dairy enterprise?	☐ owner ☐ paid herd manager ☐ other paid position ☐ other: ……

1 Farm walk and Introduction, settle all relevant questions

oom for remarks concerning the introduction

2 Presentation of the herd health status

The farm and health figure report will be short and descriptive, no discussion will take place at this point!

1 2 3 4 5 6 7 8 9

11

3 Filling the Impact Matrix together with farmer, advisor, vet

- Hand out paper copies of the Impact Matrix to all participants
- Explain the scores to all participants
- Settle tape recording

mphasize:

- Focus on the specific farm
- Direct influence
- 'If A changed, how will B change?'

1 2 3 4 5 6 7 8 9

12

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13
Impact Matrix saved?

4 Short description of the output of the impact matrix

Sektors		No of variables
A	Active	
B	Active - Critical	
C	Critical	
D	Active - Buffering	
E	Neutral	
F	Critical - Reactive	
G	Buffering	
H	Buffering - Reactive	
I	Reactive	

	No of Variables
More influencing (AS - PS ≥ 0)	
More influenced (AS - PS ≤ 0)	

- Start with the sector most promising for effective influence: A and D
- Continue with variables in sectors E, B, C and G. In the sectors on the diagonal line (C, E and G) you may distinguish between variables on the more influencing side and the more reactive variables.
- Go to the Indicator variables F and I

- Have a look at feedbacks and connections, especially for variables in sector F (connections to A, B or C?). Use the impact matrix and / or the graphical representation with arrows to get more information on specific variables.

Sector	Systemic role	Use for System control
A	Active	Potential leverage points for system influence; change in these areas will stabilise the system, and increase system resilience
B	Active-Critical	High leverage, but outcomes are less stable, more difficult to control than Sector A indicators. Have a look at the feedback cycles if you consider modifications.
C	Critical	Catalysts that are suitable as change starters, but outcomes are very difficult to control, and can put the systems resilience at risk.
D	Buffering-Active	Medium leverage points with minimal side effects. Maybe it is necessary to give an impulse on this variable several times.
E	Neutral	Areas are difficult to externally control, but useful for self-regulation of system
F	Critical-Reactive	Changes in this area do not achieve expected results because of feedback loops. Interventions may easily provide results but they may be neutralized out of the system. Variables can be indicators for the system. They should be looked at more closely if they are linked to variables in the sectors A, B or C, because this could destabilise the system.
G	Buffering	Low leverage for system control. They cannot be modified out of the system but from outside. They may be important if connected to active variables (A, B) or if thresholds of the system are exceeded (if variable is in the "more influencing" triangle of the sector).
H	Buffering-Reactive	Sluggish system reaction with indicator change, but may be suitable for system experimentation.
I	Reactive	No lasting system change caused by change in these areas – indicative of 'Fixes that fail'. Variables in this sector are Indicators because they are highly depending on others

impro
5 Implementation the economic tool
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Tick if completed
onomic questionnaire & Tool
efore discussing the economic tool:
as the perceived cost questionnaire (in which Farmer, Vet and
dvisor are asked to estimate costs of disease) been completed and
ceived back?
is can be done while you fill in the answers of Part B in the
onomic tool.
ave I discussed the economic tool with the farmer?
ere there any questions I did not know to answer? If so write them
own.
uestions:
the economic tool completed and saved in the correct way?
impro
17
18

6 Ask for farmer's view on his health situation and identify areas with room for improvement

- try not to talk about 'PROBLEMS';
- If you ask, what is there to be improved, this is positive and leaves room for development

- Concerning the three questions:
  - How content are you with your health?
  - Does the comparison motivate you to improve the health status?
  - What else motivates you to improve the health status?

  → These questions are moderation tools leading the conversation in the right direction; the answers will not be documented other than by audio

- *Proposal:* the question concerning the ranking of production disease complexes was dropped, instead: **'What would you like to improve?'**

  Answer: as precise as possible, but at least one of the production disease complexes; good documentation of that answer is necessary!

Check areas for improvement and tick a box for each

	Stabilize			Improve			Do Nothing		
	F	V	A	F	V	A	F	V	A
Udder health									
Claw health									
Metabolic disorders									
Reproduction									
Calf health									
F = Farmer, V = Veterinarian, A = Advisor									

7 Discuss potential preventive measures/actions (referring to areas with room for improvement, potential effectiveness – relationship with variables, expected costs etc.)

1 2 3 4 5 6 7 8 9

1 2 3 4 5 6 7 8 9
Description of the proposed measures
< 1 month
1-6 month
> 6 month
Already identified possible constraints in the application of the proposed measures
Target animals (herd, group, individual)
21
1 2 3 4 5 6 7 8 9
Description of the proposed measures
1-6 month
> 6 month
possible constraints in the application of the proposed measures
(herd, group, individual)
22

Description of the proposed measures	< 1 month 1-6 month > 6 month	Already identified possible constraints in the application of the proposed measures	Target animals (herd, group, individual)

8 Agreement on plan of action

Mark the measures the farmer agreed on in the table of proposed measures, transfer the measures after the farm visit to the scheme of Areas and levels

Description of the agreed measures	Time-frame	Target animals	Area of action[2]	
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other
	☐ Short ☐ Middle ☐ Long	☐ Herd ☐ Group ☐ Individual	☐ Housing ☐ Feeding ☐ Milking [2] ☐ Diagnosis[2]	☐ Hygiene ☐ Treatment[2] ☐ Organisation ☐ Other

[1] Timeframe for implementation: Short < 1 month ; Middle 1 - 6 month; Long > 6 month

[2] Areas for action: Housing, Feeding. Milking & milking technique, Improving diagnostic procedure, Hygiene, Handling & Treatment, Organisation of

9 Feedback session and clarification of what happens next
Were there any comments / questions regarding the **Impact Matrix approach**? Write them down below.
1
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28

9 Feedback session and clarification of what happens next
Were there any comments / questions regarding the **Impact Matrix approach**? Write them down below.
1
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28

Were there any comments / questions regarding the **sociological part** after completing the farm visit? Write them down below.

Were there any comments / questions regarding **economical part** after completing the farm visit? Write them down below.

Documentation from the 2nd visit

	Tick if completed
Collecting socio-economic questionnaire	
• Tape recording –on the discussion of the Impact matrix and the agreement, for later processing to identify ○ items with large differences between participants. ○ modifications of costs in economic calculation	
Impact matrix from each farm	
Outcome of the Impact matrix	
Agreement between farmer, vet and advisor	
How was the process appreciated	
Where there any comments / questions on the WP5 topics? If yes please send them to : jaap.sok@wur.nl or felix.vansoest@wur.nl	
Send: the sociological questionnaire back to: jaap.sok@wur.nl or by mail	
Send: (1) the completed economic tool , (2) Part B – economic questionnaire and (3) Perceived costs questionnaire back to : felix.vansoest@wur.nl preferably as soon as possible. (2) and (3) preferably as scanned documents	
Send Feedback to the farmer, veterinarian and advisor	
Output of the impact matrix	
Output economical tool	


Agreement on plan of action

7.2 Examples of health plans

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UNIKASSEL VERSITÄT
Ökologische Agrarwissenschaften

Farm D01, 2013-12-19

ACTION PLAN

Udder health

Estimations: Farmer: improve Vet: improve Advisor: improve

Objective: **Reduce the number of (heifer) mastitis cases**
Measures:
1. Pathogen detection, quarter milk samples (best practice: 1-2 times per year of all cows)

Claw health

Estimations: Farmer: improve Vet: improve Berater: improve

Objective: **Reduce the number of lame and severely lame cows**
Measures:
2. Re-position cattle crush so cows can be (claw-)treated directly after milking by one person
   Constraint: re-building measures necessary, space requirement for crush
3. Improve floors in cattle housing, increase solid floor area, rubber mats; start with feeding area
   Constraint: very labour-intensive and expensive; low priority

Metabolism

Estimations: Farmer: stabilise Vet: stabilise Berater: stabilise

Objective: **Reduce energy deficiency in early lactation**
Measures:
4. Selection of breeding stock towards low lactation curves
5. Additionally supply individual animals starting high into lactation (Ketosan, propylene glycol) >> sell those animals in the mid-term

Reproduction

Estimations: Farmer: improve Vet: improve Berater: improve

Objective: **Decrease calving interval and age at first calving**
Measures:
6. Improve heat detection

Other areas

Objective: -
Measures: -

Farm D18, 2014-02-07

ACTION PLAN

Udder health

Estimations: Farmer: improve Vet: improve Advisor: improve

Objective: **Improve udder health**
Measures:
1. Culling of repeatedly conspicuous animals (especially check somatic cell counts at the start of lactation)
2. "More accurate" treatment

Claw health

Estimations: Farmer: stabilise Vet: - Advisor: stabilise

Objective: **Stabilise, reduce percentage of moderate lameness**
Measures:
3. Maintain claw care (1x regularly Nov-Dec, check every cow at least 1x during pasture for stones and injuries)

Metabolism

Estimations: Farmer: no need for action Vet: - Advisor: stabilise

Objective: -
Measures: -

Reproduction

Estimations: Farmer: stabilise Vet: - Advisor: stabilise

Objective: -
Measures: -

Other areas

Objective: **Control liver fluke**
Measures:
4. Check rearing farm: Which remedies are being used? Is the desired effect achieved?

Objective: **Control scabies in winter**
Measures:
5. Apply pour-on remedy

Objective: **Reduce diarrhoea in calves**
Measures:
6. Feed milk to calves 3x per day

Advice and health plans from the visits:

Example 1 (E10):

- **Better analysis of reproductive performance. Discuss with the veterinarian.**
- **Education for the veterinarian in order to integrate preventing tools and proactive management.**
- **Refine the demography of the herd. Reduce the proportion of dry cows in the herd. Debate with the veterinarian.**

Example 2 (E20):

- **Adjust supplementary feeding according to grazing for a better energy balanced ration. Discuss with the farm advisor and veterinarian// Adjust supplementary feeding according to grass. Discuss with the farm advisor.**
- **To carry on a better management of the pastures (a substantial amount of silage is discarded) and pasture productivity. Debate with the farm advisor.**
- **To predict the availability of forage to feed animals from on farm pastures**
- **To evaluate and monitor the ration. Discuss with the farm advisor.**
- **Education to the farmer about body condition score. A reflection from farm advisor and veterinarian**
- **Improve body condition score of heifers before parturition.**
- **Reduce production costs of the conserved forages. Discuss with the farm advisor.**
- **In the long run:**
- **Analysis of an increasement of the amount of concentrate to be provided to the group of lactating cows according to milk production without costing more diseases. Discuss with the veterinarian.**
- **Coprology analysis for lactating cows**

Nom de l'élevage: F01

Date visite: 26/11/2013

Health objective	Udder health: S/I/N* IMPROVE First priority Important to obtain a herd SCC < 400.000 cells/ml	Claw health: **S**/I/N* Find cause of lameness problems	Metabolic disorders: S/I/**N*** Not a problem	Reproduction: **S**/I/N* Most important reason for culling	Calf health: S/I/**N***

		< 1 month 1-6 month > 6 month	**Already identified possible constraints in the application of the proposed measures**	Target animals (herd, group, individual)
Housing	Description of the proposed measures			
	Measures already installed			
Feeding	Description of the proposed measures Do the heifers and lactating cows get enough minerals.		How to provide them with a sufficient amount is difficult. Have to find a way for them not to waste too much and be able to ingest enough	
	Measures already installed			
Milking & milking techn	Description of the proposed measures Schedule the check up of the milking machine earlier than planned, was planned for January do it now. Improvement of the foremilking technique Premilking desinfection of the teats, if allowed under organic regulation Desinfection of the milking claw after milking of cows with a high somatic cell count			
	Measures already installed They change teat cup liners two times per year			

Nom de l'élevage: F01

Date visite: 26/11/2013

Improve diagn procedures	Description of the proposed measures Identify the pathogen(s) causing the mastitis problem using bacteriology Hoof trimming of the whole herd in march/april before they go outside Check whether the primiparous animals also have early mastitis problems			
	Measures already installed			
Hygiene	Description of the proposed measures			
	Measures already installed			
Handling & treatment	Description of the proposed measures Check whether the treatments of mastitis are efficient. Adapt the treatment strategy at drying off			
	Measures already installed			
Organization of work	Description of the proposed measures			
	Measures already installed			
Other	Description of the proposed measures Cull cows who had already 2/3 times a somatic cell counts of >700-800.000 cell./ml		Are there enough heifers to do so	

Nom de l'élevage: F01

Date visite: 26/11/2013

	Measures already installed			

*Stabilize/Improve/Do nothing

Nom de l'élevage: F19

Date visite: 05/12/2013

Health objective	Udder health: **S**/I/N* High somatic cell count but has already dropped from 1000.000 to 400.000 by culling of cows with 1 million cell counts and more treatment with antibiotics at drying off. Cell counts rise especially during winter when the cows are on straw	Claw health: S/I/**N*** 	Metabolic disorders: S/I/**N*** none	Reproduction: S/I/**N*** Doing ok	Calf health: **S**/I/N* Has improved by the care of Nadine (co-worker she amongst other things milks and cares for the calves). And the mortality has substantially dropped by not having calvings in January/February, the months where usually 100% of the calves born died.

	BVD has just been diagnosed in the calves. Might cause problems due to euthanasia calves and eventually more abortus on renewal of the herd. And will have an economic impact.	< 1 month 1-6 month > 6 month	**Already identified possible constraints in the application of the proposed measures**	Target animals (herd, group, individual)
Housing	Description of the proposed measures			
	Measures already installed			
Feeding	Description of the proposed measures			
	Measures already installed			
Milking & milking techn	Description of the proposed measures			
	Measures already installed			

Nom de l'élevage: F19

Date visite: 05/12/2013

Improve diagn procedures	Description of the proposed measures			
	Measures already installed			
Hygiene	Description of the proposed measures			
	Measures already installed			
Handling & treatment	Description of the proposed measures Looking again with veterinarian at the treatment protocol at drying of.			
	Measures already installed			
Organization of work	Description of the proposed measures			
	Measures already installed			
Other	Description of the proposed measures			

Nom de l'élevage: F19 Date visite: 05/12/2013

	Measures already installed			

***Stabilize/Improve/Do nothing**

Farmer has to strategy to intervene less possible. The farmer does not hesitate to cull cows who are not healthy or underperforming in reproduction, he considers this as a natural selection to improve the overall health status of the herd. And will only invest in something when it will have a substantial profit (<50%)

Vet considers drying off with antibiotics as a preventive measure.

Advice and health plans from the visits:

S19:

- **Make a follow-up in due time and evaluate the changes that has been done and to see how things is going in the new system. – Discuss with the advisor and the veterinarian.**

S22:

- **Work with the udder health, eg. start up preventive measures and work with the veterinarian.**
- **Make CMT test for the cows with high Somatic Cell Count and check these up with the veterinarian.**
- **Feeding – Special minerals to the dry cows, maybe extra addition of eg. selenium/ vitamine E.**
- **Give straw as feeding (plus around 2 – 3 kg drymatter of feed) during drying of to not get an imbalance in the rumen. It can also make the cows lesser hungry when coming out from the dry cow section.**
- **At least 2 – 3 weeks habituation to concentrate before calving. 1 week is to short for the stomach. Can make a big difference.**
- **Discuss with the advisor on the feeding.**
- **Can be of value to give luke-warm water (and maybe nutritional solution) just after calving to make the cows start up in a better way. Discuss with the veterinarian.**

In the long run investments:

- **Concentrate feeding stations.**
- **Robot scraper.**
- **New stable for the calves – maybe.**