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Challenging the myth of the irrational dairy farmer; understanding decision-making related to herd health

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Feature Series – Review Article

Challenging the myth of the irrational dairy farmer; understanding decision-making related to herd health

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Abstract

Veterinarians working with dairy cows are suggested to refocus their efforts from being task-oriented providers of single-cow therapy and develop themselves into advice-oriented herd health management advisors. The practising cattle veterinarian's ability to translate knowledge into on-farm application requires a profound understanding of the dairy farm as an integrated system. Consequently, educating and motivating farmers are key issues. To achieve such insight the veterinarian needs to work with several scientific disciplines, especially epidemiology and (behavioural) economics. This trans-disciplinary approach offers new methodological possibilities and challenges to students of dairy herd health management.

Advisors working with dairy herd health management may sometimes experience that farmers do not follow their advice. Potentially, this could lead to the interpretation that such farmers are behaving irrationally. However, farmers who are confronted with advice suggesting a change of behaviour are placed in a state of cognitive dissonance. To solve such dissonance they may either comply with the advice or reduce the dissonance by convincing themselves that the suggested change in management is impossible to implement. Consequently, herd health management advisors must understand the fundamental and instrumental relationships between individual farmers' values, behaviour and perception of risk, to stimulate and qualify the farmer's decision-making in a way that will increase the farmer's satisfaction and subjective well-being.

Traditionally, studies on herd health economics have focussed on financial methods to measure the value of technical outcomes from suggested changes in management, following the basic assumption that farmers strive to maximise profit. Farmers, however, may be motivated by very different activities, e.g. animal health and welfare or other farmers' recognition, making it impossible to provide 'one-size-fits-all' consultancy because the best decision depends heavily on the internal logic and context-bound reality on each dairy farm. Relevant information may be available, but to be implemented at farm level it has to be communicated effectively. This requires a trustworthy communicator. Consequently, veterinarians are recommended to receive training in communication; keywords in this process are dialogue and reflection. An educational framework based on science and the authors' experience is presented. The aim is to guide practising cattle veterinarians into a personal learning process considered necessary for them to be recognised by farmers as trustworthy dairy herd health advisors.

KEY WORDS: *Herd health management, mixed-methods research, motivating farmers, educational framework, trans-disciplinary, evolving veterinary science*

Introduction

In this review, we reflect on various cognitive processes involved in dairy farmers' voluntary decision-making related to herd health management programmes, and how these processes affect farmers' cooperation with veterinarians in advice-giving situations. Farmers' involuntary decisions, however, e.g. decisions following new legislation, are equally interesting from a decision-making perspective. Involuntary decisions are beyond the scope of this review, and interested readers are therefore recommended to study the work of, for example, Tenbrunsel and Messick (1999), Dernburg *et al.* (2007), and Heffernan *et al.* (2008).

The major points of progress and challenges in dairy herd health management were discussed, in an already classical paper, by LeBlanc *et al.* (2006). In our opinion, the following quotation captures the moment for practising cattle veterinarians and researchers involved in dairy herd health management: "There is an ongoing challenge for prevention of many diseases; although there is still much to learn, information already exists to substantially reduce or prevent the disease altogether – the challenge is in effectively and consistently implementing the required management practices. Ever-better understanding of epidemiology and pathophysiology will not in itself reduce the incidence of disease. The ability to translate emerging knowledge into on-farm application and actual prevention of problems requires understanding of the farm as an integrated system, a major component of which is educating and motivating humans to implement well-designed practices." From this, we have identified three propositions that appear to be outside the traditional veterinary curriculum, *viz* the farm as an integrated system, educating and motivating humans.

First, we will present a short description of the first two propositions, to provide the necessary background for the real objective of this review, which is to offer researchers and veterinarians working with dairy herd health management and dairy farmers a more fundamental understanding of the third proposition, i.e. how to motivate dairy farmers. By doing this, we hope to inspire practising cattle veterinarians to initiate a personal learning process to meet the challenge described by LeBlanc *et al.* (2006), i.e. how to evolve from a task-oriented provider of single-cow therapy to an advice-oriented herd health management advisor.

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The farm as an integrated system

Average herd size has increased rapidly in many countries to meet world market competition. This structural change has been followed by new challenges such as environmental concerns, animal welfare, quality of products and processes, availability of human resources, and demands for capital. Profit seems closely related to economy of scale and, logically, the individual cow loses its importance compared with the health and welfare of the herd. Competition in the world market is fierce, which leaves almost no room for poor decision-making. Constantly, the dairy farmer must evaluate if financial payoff of each component in the production system is satisfactory. Likely, many farmers view the services provided by the veterinarian as one of these cost components (Noordhuizen *et al.* 2008). This structural development has placed the traditional role of the practising cattle veterinarian under substantial pressure because the classical veterinary services, i.e. treatment of individual cows, no longer represent the same value to the farmer. Therefore, veterinarians are asked by farmers worldwide to provide cost-benefit estimates that justify the costs related to their services.

A series of seminal publications on dairy herd health management in the late 1970s by Blood *et al.* (1978) in many ways founded the scientific discipline of dairy herd health management. Those pioneers focussed on the herd management system, with the basic assumption that if the production system that produced a specific herd health problem was fixed, this would result in a healthy herd. Essentially, this is how production medicine is defined today. Later, the field of dairy herd health management has developed to include a more trans-disciplinary approach, combining such disciplines as sociology, psychology, economics, behavioural science and communication with classical veterinary disciplines, especially veterinary epidemiology (Kristensen and Enevoldsen 2008; Noordhuizen *et al.* 2008). Recently, an expansion of the applied methodology has been proposed (Kristensen *et al.* 2008a), suggesting that veterinarians with an interest in herd health management would benefit from studying the framework of mixed-methods research, as herd health management programmes are characterised by an iterative process of refinement of concepts and propositions and an initial inductive approach to formulate questions. This process typically includes a mixture of inductive and deductive analyses and, if an epidemiological pattern is identified, the subsequent deduction of a hypothesis that can be submitted to testing. The aim of such a test would be to reject or accept the generated knowledge situated within the hypothesis. It follows that the iterative processes often provide new research questions or strengthen conclusions related to the involvement of stakeholders. The multiple stages of inquiry in this iterative process help to rephrase questions, reconstruct instruments, reconsider data, and refine interpretations and conclusions (Figure 1).

With a mixed design, the different research methods may be combined into a coherent whole, making the evaluation of results a synthesis of all the available data and not just a report of findings from each specific methodology. As such, mixed designs are recommended for their ability to generate new insight and/or redirect research questions (Greene *et al.* 2001).

A trans-disciplinary approach offers new methodological possibilities to students of herd health management, as the social sciences have a longer tradition in accounting for individual differences,

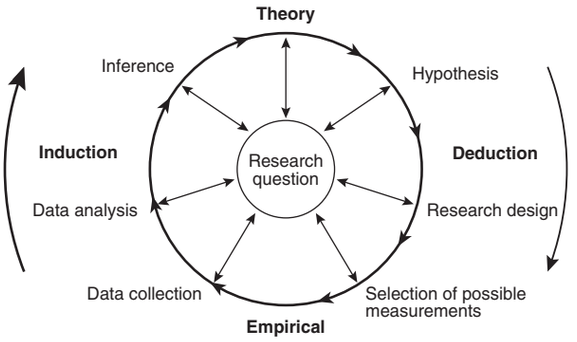

Figure 1. Conceptual model of the iterative process of induction and deduction in herd health management and research. Reproduced with permission from Kristensen *et al.* (2008a).

that appear crucial if advisors intend to tailor their communication to stimulate the implementation or improvement of a herd health management programme (Heffernan *et al.* 2008; Jansen *et al.* 2010b).

Educating

Researchers and advisors working with dairy herd health management may sometimes experience that farmers do not follow their advice despite a promise of related profit. Interpretation of this non-compliance could be that such farmers are behaving emotionally, foolishly and irrationally (Garforth 2010). This notion touches on the well-known discrepancy in perception of 'necessity' and 'risk' between experts and lay people (Rowe and Wright 2001; Sorge *et al.* 2010). In a study on farmers' risk analysis related to genetically modified crops, the authors discussed how lay people identified closely with broad, i.e. 'thick', views on risk as opposed to experts who presumably focussed on 'thin' risks, i.e. parameters that represent a proven increased risk (Mauro and McLachlan 2008). However, to make a decision about something important requires self-confidence, i.e. a deep and fundamental belief in one's own ability to 'make it happen' (Jansen *et al.* 2009). Thus, to stimulate farmers' decision-making a herd health management advisor needs to recognise that farmers may attribute risk to 'thick' parameters. Once recognised, the advisor has the possibility to engage in true advice-giving, i.e. a two-way process, with active participation from both the advisor and the audience, to reach a synthesis of arguments preceding the decision-making process (Noordhuizen *et al.* 2008).

An insightful psychological framework was provided by Festinger (1957), describing how different circumstances (and interactions thereof) may complicate a decision-making process by introducing a state of cognitive dissonance in situations where a decision-maker is advised to change their behaviour and actions. Such situations may arise if the change involves pain or loss, i.e. the magnitude of the resistance to change will logically reflect the magnitude of the pain or loss; the present behaviour is otherwise satisfactory, i.e. the resistance to change would then be a function of the satisfaction obtained from the current behaviour; and the suggested change is impossible because the emotional behaviour is beyond the voluntary control of the person, or the required behaviour is not in the behavioural repertoire of the person, or some external circumstances make the suggested change impossible. Obviously, the resistance to change cannot be greater than the pressure to respond to reality.

It follows that farmers are placed in a state of cognitive dissonance when they are offered advice suggesting a change of balance in the parameters included in their risk analysis related to certain management practices. To solve such dissonance the farmer may either change their behaviour accordingly or reduce the dissonance by convincing themself that the suggested change in management is impossible for any of the reasons mentioned above (Festinger 1957; Jansen *et al.* 2010b).

The perceived existence of a 'knowledge deficit' between science and lay people on food hazards was discussed by Hansen *et al.* (2003). Potentially, this discussion is also valid for the discipline of dairy herd health management. Those authors listed four basic assumptions, as follows. Firstly, subject to acceptable levels of risk, the optimisation of productivity is a commonly shared value in modern societies. Secondly, the acceptable level of risk associated with optimal productivity is universally agreed. Thirdly, scientific knowledge is the most effective basis on which to improve both the production of goods and control of risks, and therefore, scientific evidence should be the primary guide in risk management. Fourthly, if lay people (the public) do not comply with the advice or recommendations of scientific experts this is because they have a poor understanding of the scientific reasoning informing that advice, i.e. a 'knowledge deficit'. These assumptions suggest that people who accept the knowledge-deficit model tend to believe that the best strategy is to bring public opinion into line with the experts in a one-way educational effort designed to eliminate a lay person's ignorance or emotions. On the other hand, critics of the knowledge-deficit model claim that it fails to recognise that people's basic values concerning safety and the production of goods are in fact both flexible and individual. If this criticism of the knowledge-deficit model is accepted it is easier to accept that farmers may disagree with experts and their science-based recommendations for numerous other reasons than lack of knowledge (Hansen *et al.* 2003; Mauro and McLachlan 2008).

Clearly, the best way to predict the likely success of changes in management following an advice-giving situation is the farmer's willingness to overcome 'the anchoring of old habits' (Noordhuizen *et al.* 2008). A study on udder health that focussed on the farmer's belief in their own capabilities showed that most dairy farmers in the Netherlands thought they had sufficient knowledge of mastitis. However, this knowledge was not always decisive when related to the farmer's own situation (Lam *et al.* 2008). Those authors concluded that the most important farm objectives were to obtain a high nett return and to keep farm management simple. This, however, could very well be in conflict with the advisor's perception of a 'necessary' decision, because farmers would likely regard any introduction of extra preventive measures to be expensive, complicated or simply unnecessary to implement in their situation.

Motivating dairy farmers

Motivation has been defined as the inherent satisfaction derived from pursuing a specific activity (Deci and Ryan 1987). The challenge to herd health management advisors is to capture the fundamental and instrumental relationships between an individual farmer's values and behaviour, perception of risk, and 'objective' estimation of these risks, to guide the farmer in a direction that is likely to increase the farmer's satisfaction and subjective well-being. Giving effective advice requires four fundamental characteristics that all relate to trust, *viz* caring and empathy, dedication and commitment, competence and expertise, and honesty and openness.

Rational theories of choice

Traditionally, veterinary scientists have turned to microeconomics to measure technical and financial outcome(s) following changes in levels of management, e.g. Dijkhuizen *et al.* (1995) and Kristensen *et al.* (2008b), when trying to understand farmers' activities in order to evaluate the effect of a suggested change in management (Hogeveen *et al.* 2010). The advantages and disadvantages related to rational theories of choice were discussed by March (1994), as well as the underlying assumption that human decision processes are both consequential and preference-based. A rational procedure may be viewed as one that pursues a 'logic of consequence', that makes a rational choice conditional on the answers to four basic questions, as follows. The question of alternatives: What actions are possible? The question of expectations: What future consequences might follow from each alternative? The question of preferences: How valuable (to the decision-maker) are the consequences associated with each of the alternatives? And, the question of decision rule: How is a choice to be made among the alternatives in terms of the values of their consequences?

Thus, theories of rational choice assume that decision-makers share a common set of (basic) preferences and that they have perfect knowledge of all alternatives and their consequences (Ahuvia 2008). However, from studies in behavioural economics it is evident that not all alternatives are known, that not all consequences are considered, and that not all preferences are evoked at the same time (e.g. March 1994; Tversky and Fox 1995). Rather, instead of considering all alternatives decision-makers seem to have incomplete and inconsistent goals, not all of which are considered at the same time. Therefore, the assumption of logic in decision-making is biased by emotions and coincidence (Faro and Rottenstreich 2006). Equally, decision-makers do not consider all consequences of their alternatives, i.e. they focus on some and ignore others based on their personal beliefs and perceptions, that they are likely to perceive as more objective than other decision-makers' beliefs and perceptions (Hadar and Fischer 2008).

Identity

Farmers want to farm; it gives them their fundamental identity and their sense of achievement (Burton 2004). Weber *et al.* (2004) studied how people may exhibit several different identities depending on how they perceive a certain situation. This led to the notion that people have messy, multi-faceted, multiple and incompletely integrated identities. If this is correct, it is no surprise that farmers may find satisfaction in very different (farm) activities. The different motivating factors among dairy farmers were explored, and their importance quantified according to farmers' decision-making related to improvements in management of mastitis (Valeeva *et al.* 2007). Eight different motivators were identified, *viz* job satisfaction, the overall farm situation, preventing economic losses (related to mastitis), animal health and welfare, ease in meeting legislative demands, financial incentives, quality and image of dairy products, and recognition for a job well done. Burton *et al.* (2008) elaborated on and stressed the importance of recognising farming activities that were able to display a skilled role capable of differentiating 'poor' and 'good' farming perfor-

mance. In that study, social identities were viewed as templates for individual action.

The standard strategy for increasing the internalisation of an identity is to highlight the implications of identity of a certain kind of behaviour (March 1994). The requested act is often minor, but the recognition of being a certain kind of farmer can be made explicit to the farmer by the herd health management advisor. This is, of course, usually in a situation where the farmer may experience some kind of 'reward' for being that kind of farmer, but the key strategy is not the reward itself but the fact that the advisor recognises the farmer's interpretation of identity. This approach also finds support in the belief-system theory, that proposes that individuals continually strive to act in ways that are as moral and competent as possible to meet personal values surrounding an individual's self-concept (Grube *et al.* 1994). Later, the advisor may ask for much larger acts or sacrifices from the farmer, who is likely to engage in much more complicated acts in order to avoid violating the established identity and thus evoke cognitive dissonance. Further, it is important to recognise how farmers are able to be creative and innovative when it comes to solving a herd health management problem or a production constraint on their farm. The possibility to display such professional skills provides the farmer with an opportunity to be recognised as a 'good' farmer by other farmers (Burton *et al.* 2008). It follows that the recognition of 'identity' is important if the herd health management advisor intends to prompt or stimulate sustainable cultural changes in management practices.

Rational-choice models have been accused of downplaying processes of social influence and overall utility (including subjective well-being), that eventually limit the explanatory power in real-life situations of rational-choice models (Burton 2004). Further, the underlying assumption behind rational-choice models, i.e. the vigilant and calculating decision-maker focussed on maximising the expected payoff associated with each possible choice, is unlikely to offer an exhaustive picture of most farmers' attitudes and behaviour. Therefore, rational-choice models have only limited predictive value when it comes to farmers' management practices (Jansen *et al.* 2009).

To stimulate others into a change of behaviour is not an easy task. In fact, behavioural changes are notoriously difficult to achieve, sustain and measure, even when the suggested interventions are evidence-based, practical, affordable and acceptable (Grol and Grimshaw 2003; Gunn *et al.* 2008; Ellis-Iversen *et al.* 2010). Also, as discussed by Janz and Becker (1984), people's preventive measures are determined by the perceived threat (perceived vulnerability and severity), and by perceived effectiveness of proposed measures (perceived benefits and barriers). Identical findings were reported from the field of animal health (Heffernan *et al*. 2008). In that study, farmers' mutual distrust created a barrier to the implementation of collective biosecurity measures, i.e. low perceived effectiveness of proposed measures. Instead, the situation developed into a social dilemma, where collective interests were at odds with private interests.

To summarise, in a decision-making situation, a dairy farmer will probably not spend much time calculating the 'best possible' action. Likely, an action that is perceived as 'adequate' will be satisfactory.

Perception of risk

Perceived risk is an important precursor for people's willingness to make an active decision. In theories of rational choice, the basic idea is to assume that risk preference accounts for any deviation in observed behaviour from the expected behaviour if the decision-maker solely maximises utility based on expected monetary value (Tversky and Fox 1995). However, behavioural studies of decision-making under risk show that people often violate both the expected utility model and the principle of risk aversion underlying most economic models (Pindyck and Rubinfeld 2005). Farmers have often been labelled as risk-averse (e.g. Rat-Aspert and Fourichon 2010), indicating that farmers may perceive risks as larger than they really are. This would support the idea that lay people focus on 'thick' risks. Interestingly, in a meta-study on differences between lay people and experts' judgement of risk, there was very little support for this viewpoint (Rowe and Wright 2001). In fact, the authors concluded that evidence for greater validity in expert judgements of risk, if interpreted positively, was weak at best.

In a study to determine whether advisors rely primarily on their personal beliefs and risk preferences or on their estimates of their clients' beliefs and risk preferences in an advice-giving situation, the results revealed that advisors tended to rely on their own risk preferences when giving advice in a risky situation (Hadar and Fischer 2008). In the context of dairy herd health management, it is also interesting to speculate about the most widely demonstrated demographic factor related to perception of risk; that of gender. Men tend to judge risks to be smaller and less problematic than women (Slovic 1999). Presently, most dairy farmers are men, and an increasing number of veterinary students are women. In many countries, >90% of veterinary students are women. If the herd health management advisor offers advice to stimulate or support a decision that implies a change of management practices, and this advice is more related to her own perception of risk than to the farmer's perception of risk, then what? More research is needed, especially on the perception and communication of risk in dairy herd health management.

Many behavioural studies aim at identifying respondents' beliefs to target a perfect persuasive message that will stimulate the intended change of behaviour. Such attempts typically follow three steps. First, salient beliefs are elicited and condensed from a sample of the target group. Second, a questionnaire is constructed to identify beliefs that distinguish intenders from non-intenders. Finally, an intervention is designed to change the key beliefs identified. However, a meta-study drawing from 30 studies with more than 20 different types of interventions concluded that only about two-thirds of the studies resulted in a (small to moderate effect where measurable) change of behaviour in the desired direction (Hardeman *et al*. 2002).

Veterinarians as herd health management advisors

Important research about veterinarians' cooperation and communication with dairy farmers was conducted by Jansen *et al*. (2010ab). Those authors argued that information may be available and even technically optimal for decreasing a disease, but to be implemented at the farm level it has to be effectively and consistently communicated to farmers. Essentially, veterinarians need to communicate in a trustworthy and competent way (Noordhuizen *et al.* 2008). The recent study focussed on a group of farmers perceived by their affiliated veterinarians to be 'hard to reach' in terms of communication and advice-giving (Jansen *et al.* 2010b). Those authors concluded that there are ample opportunities to communicate with such farmers if a communication strategy is tailored to each farmer's perception of reality and specific needs.

Herd health management advisors are therefore recommended to take a pro-active role and make sure that communication is tailored to the inexperienced milker as well as the experienced herd manager or farm owner, who may have little knowledge about herd health (but does hold the purse strings). Consequently, differences between on-farm structures regarding personnel makes 'one-size-fits-all' communication impossible if the advisor intends to stimulate improvements in management (Valeeva *et al.* 2007). Further, practising veterinarians, when offering their herd health management advice and programmes to farmers, need to take into account the unique nature and complex combinations of factors contributing to herd health, animal welfare and farm performance (de Kruif and Opsomer 2004), as well as the farmer's well-being both on and outside the dairy farm (Bigras-Poulin *et al.* 1985; Dolan *et al.* 2008).

The relationship between how veterinarians in Denmark perceived dairy farmers' expectations and their involvement in an extended dairy herd health management programme was explored using Q-methodology (Kristensen and Enevoldsen 2008). The veterinarians, who worked for the farmers in the study, tended to believe that the farmers expected the veterinarian to provide advice that would increase the farmer's profit. Similarly, veterinarians in Britain perceived that the most important barrier to farmers' investment in herd health was their own inability to convince farmers of the possible financial benefits of a herd health management programme (Gunn *et al*. 2008). However, most of the farmers participating in the study in Denmark expected the veterinarian to participate in a team, working towards the farmer's overall goals. From that study, we conclude that veterinarians would be wise to invest time in discussions with each farmer, to match their expectations into a shared understanding of the farmer's reasons for participating in such management programmes.

The veterinarian's challenge may be described by a quote from Pindyck and Rubinfeld (2005): "when value judgments are involved, microeconomics cannot tell us what the best policy is". This conclusion is supported by other authors from the research area of economic psychology (Tversky and Fox 1995; Pingle and Mitchell 2002). This research discipline works with the premise that all attempts to understand and predict human behaviour primarily on monetary incentives are problematic. That statement found further support in a study by Ahuvia (2008), who concluded that only 2–5% of the variance related to measures of subjective well-being could be explained by income.

Practising cattle veterinarians face a need to evolve into herd health management advisors because the veterinary practitioner, like the human health practitioner, is no longer perceived as an expert and enforcer of health strategies who transfers knowledge to lay people (Jacobs 2010). Instead, veterinarians may find themselves being facilitators of complex processes between different stakeholders in which knowledge is co-created and in which farmers take part as equal partners. Thus, dialogue and reflection become important ingredients in the advice-giving situation. This process was termed 'empowerment' in a study related to the management of mortality of calves (Vaarst and Sørensen 2009). Those authors stressed the importance of the advisor's ability to 'empower' farmers, i.e. enable farmers to develop their own competencies to control and take responsibility for their own life situation.

Unfortunately, we have found no evidence that places practising cattle veterinarians in the category of pro-active advisors. In fact, the quite opposite seems to be more likely. Noordhuizen *et al*. (2008) listed a number of weak points for cattle veterinarians, such as (the cattle veterinarian) "does not indicate what he could contribute to the dairy farm" (supported by Mee 2007), and "is little pro-active and hence too much in waiting". The latter point is supported by unpublished studies at the Danish Knowledge Centre for Agriculture, where practising veterinarians were categorised as introvert in their relationship with dairy farmers.

Evidently, many of the theories presented contain constructs to explain how farmers are stimulated to change their behaviour. The studies examined for the purpose of this review typically used different terminologies, creating the illusion that they were substantially different from one another. However, if constructs in different theories describe the same phenomena, this would add to the ability to synthesise knowledge across scientific disciplines. To put it another way, the lack of consensus regarding what to call certain constructs, in our opinion, has resulted in fragmented literature on farmers' beliefs, attitudes, knowledge and subsequent motivation to improve management practices that could be better integrated. This conclusion, however, is no different from the research area of human health behaviour, as discussed by Noar and Zimmermann (2005).

Future perspectives

Herd health management advisors would benefit from improving their ability to communicate in a way that facilitates the context-bound reality at individual dairy farms, and address the farmer's fundamental values in life. We recommend that practising cattle veterinarians study the methods related to the belief-system theory, to stimulate changes in farmers' values, attitudes, and behaviour, as discussed by Grube *et al*. (1994).

How to become a dairy herd health advisor

We have had the opportunity to scrutinise literature and combine it with our experience. Obviously, there are still many aspects and perspectives about advice-giving in a herd health situation that we have not referred to in this review. Also, we have identified quite a few areas that need to be studied and discussed by researchers. However, practising cattle veterinarians cannot wait for science to propose possible solutions to these challenges because changes in the dairy industry happen much faster than the scientific process. Consequently, we have summarised our understanding of how a practising cattle veterinarian may qualify to become a valued dairy herd health management advisor. Our recommendations follow (more or less) the mind-set and methodological structure known from evidence-based medicine, e.g. Sackett *et al.* (1996), and find further support in the references cited, combined with our experience as herd health management advisors (Kristensen and Jakobsen 2010). We offer the following research-based recommendations.

Learn about herd dynamics

Learning about herd dynamics, e.g. the biological and sometimes time-dependent variables, relationships, dynamics and objectives related to the cows, herd and farmer in a given farm context, is to the dairy herd health management advisor what anatomy and physiology are to the practising cattle veterinarian. The ability to take into account the unique nature and complex combinations

of factors contributing to herd health, animal welfare and farm performance is vital if one wishes to be accepted by dairy farmers as a qualified and trustworthy herd health advisor. We recommend the use of simulation models to provide estimates of technical and financial effects of suggested changes in management. Such estimates are necessary to help the farmer prioritise between mutually exclusive decisions, and to illustrate the value added to the dairy farm by herd health management programmes. This learning process takes time.

Provide the necessary and sufficient information needed for valid advice

Two types of information are necessary. The first is to find out how the suggested changes in management affect key performance indicators. The premise is valid data. One needs to be very systematic and critical (disciplined) when collecting data to qualify advice. Studies have shown that the process of collecting data in cattle practice is very problematic. An important reason for this is that practising cattle veterinarians (un-)intentionally may allow their own values and beliefs to interfere with the quality of data. Also, many recommendations from research to practice are based on estimates from studies of multi-herd data files where the quality of data, generally speaking, is unknown. Therefore, herd health management advisors are in a position that allows them to improve the relevance and value of their advice if they are able to obtain accurate and herd-specific estimates of cost-effectiveness of preventive measures (Hogeveen *et al*. 2011).

The second requirement is to reveal the farmer's true goals. The effectiveness or value of herd health management programmes cannot be measured solely on a monetary scale. One needs to understand what motivates the farmer, and how the farmer measures the 'value' of the satisfaction derived from pursuing a specific activity compared with other possible activities. This requires a bond of trust and true communication between farmer and advisor, as discussed by Lam *et al*. (2011).

Having demonstrated enthusiasm, commitment and knowledge about the cows, the herd, and a genuine interest in understanding and stimulating the farmer's decision-making process from the farmer's perspective, it is our experience that farmers are likely to engage in more profound discussions about their ambitions, goals and values in life. Obviously, knowing the goal helps the advisor to tailor communication.

We strongly suggest that veterinarians improve their communication skills, especially because such skills are not part of the traditional veterinary curriculum. Communication is the bridge to overcome the professional-lay discrepancy. Remember that communication means 'make common'. The purpose of working with dairy farmers and dairy herds is not to transfer our own knowledge, values or risk preferences into the farmer's mind, but to stimulate, qualify and empower the farmer to make informed decisions that eventually improve farmers' utility and bring them closer to their own definition of success.

Evidently, these recommendations cannot be all-inclusive in any way. Rather, we hope that practising cattle veterinarians and students of dairy herd health management may view these recommendations as a robust framework for an individual learning process. We believe that such a learning process is necessary for practising cattle veterinarians to be accepted by dairy farmers as trustworthy herd health management advisors.

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