
Challenges and Benefits of Health Data Recording in the Context of Food Chain Quality, Management, and Breeding - Perspectives of different stakeholders

Perspective by a veterinary: by Rolf Mansfeld¹ and Siegfried Moder²

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A veterinary perspective

Given the global current and future trends of shrinking agricultural areas from 5.000 m² per resident in 1950 to 2.000 m² in 2050 (Pallauf, 2002) there is a requirement for research in improving farm efficiency through technologically advances. The world human population is projected to be around 9 billion people in 2050. It has become more than clear that feeding the growing population is the "Major Challenge" into the future. Of course, providing sufficient drinking water is another big issue that needs to be solved. The key to feeding a growing population without harming wildlife habitats is research into high yielding farm automation and biotechnology (Avery 1996); that means further sustainable improvements are still required for already high yielding aspects of agriculture. The consequences are not only more complex production processes such as the use of more modern technologies, the implementation of quality assurance programs, but also breeds of high yielding animals managed and controlled by high yielding well educated and specialized humans.

There have been tremendous increases in milk yield over many decades. We have to face the risks associated with high performance, such as the analogy that modern cows are like high performance athletes requiring very high levels of management, housing, and feeding. But not only the cows themselves are demanding; the basic conditions such as consumer demands, legal requirements, reduction of the use of antibiotics and last, but not least the financial situation of milk producers has changed. Everyone involved in the process of milk production, such as process quality, product quality, animal health and animal welfare, abatement of epizootic diseases, consumer protection and - again last not least - economic affairs has to adapt to all these requirements and challenges and therefore has to be well informed at any time

Concepts of data processing systems including the integration of all people involved as farmers and veterinarians, consultants and public authorities, dairy industries, breeding organizations, and veterinary scientists were already published in the early 90's of the last century (Mansfeld and Grunert 1990). All the data processing and transmitting technologies they would have needed to become realized are available and affordable today. Therefore there is an obvious need for standardization

and some kind of centralization to make all the data useful for every person involved in the whole process. There also is a need for legal rules concerning the ownership and utilization of data.

For "Food Chain Quality" we have to know that product quality at the farm level is a result of process quality, and process quality itself is a result of -using all relevant information. Successful data processing needs a row of key indicators of animal health and performance, hygiene, biosecurity, and economic aspects. Those indicators must be provided by research; they should be evidence based as far as possible; they must be available for all partners involved in the production process. That means that farm data must be available for researchers and for the veterinarians engaged in production medicine practice.

The main challenges for researchers are:

- to perform epidemiological studies to get evidence based and practicable indicators for risk of disease (to develop early warning systems and health monitoring systems)
- to perform clinical studies to get evidence based and practicable indicators for animal welfare (housing, environment, feeding a.s.f.).
- to perform studies to get further knowledge of genetic disposition of diseases (genomic selection, breeding programs).
- to develop new management and therapy procedures based on data processing (total or selective drying off procedures for example).

For all the challenges mentioned above the availability of current and consistent data is a must. For that a superior cooperation of all partners and a clear allocation of responsibilities are necessary.

A farmer perspective

Perspective of a farmer: by Morten Hansen

(Dairy farmer in Denmark, near Hjørring, Northern Jutland. Vice president of the Red Breed Committee of Viking Genetics)

240 cows and 160 ha; educated as Agronomist and in animal breeding; has been working with research and advisory service of dairy cattle before becoming a farmer.

A well-functioning, fertile cow just producing milk without health problems is very important for me and other farmers. To achieve this goal we know that we need data from as many farms as possible. Today the farmers are willing to extensively record disease, both because of legislation and also because health data is needed for monitoring and benchmarking on the farms. Farmers are also aware of the importance of collecting health data for a national monitoring and national breeding program. On Danish dairy farms a new health program started some years ago that allowed farmers to treat animals for ordinary production diseases, such as foot rot, mastitis, metritis, retained placenta, and milk fever. More and more farmers have willingly enrolled in this program. In this program farmers must do the registration (of health traits) on their own. Before, it was the vet who did all registrations.

The day of a dairy farmer is very busy, so registrations must be easy and simple to do for both farmers and his employees. So far, registrations have been done on paper, and then the farmers entered the data on a PC later, or he submitted the paper to others who entered the data.

But of course there is a big need for other electronic applications for disease registrations. From my point of view it must be simple (e.g., you cannot have 100 different disease categories) and easy to use. Also, the application should be used for monitoring the disease records and, for example, it could be used with all other data of the cow to find unprofitable cows that should be culled. But again, I would like to stress for the people developing these applications: do not be too ambitious!!! It is better to have a simple program that works well and farmers use that instead of a full package with a lot possibilities and details. A detailed app would be rarely used because we do not put energy into learning all the possibilities. As an example, I still have and love my five-year-old cellular phone. First of all, I have learned all the menus and possibilities so it is easy to use. Secondly, it has a very good antenna, good sound, long-lasting battery, and if I drop it, it still works. All this is much poorer on the new smartphones. Things that we must also consider!

Perspective by a performance recording organisation: by Daniel Lefebvre

Director of Valacta, Canada

Challenges and opportunities mentioned:

- Case definition.
- Maintenance of producer interest.
- Producer and vet focus on "pain points".
- Frequency of reporting to producer.
- Significance of rates in small herds for some diseases.
- Canadian Quality Milk program.
- Test- and sensor-based methods.

Perspective by an AI industry: by Xavier David

Director of Unceia, France and Coordinator of EuroGenomics

The context of breeding has changed a lot:

For about 10 years, the context of animal breeding has been evolving a lot, especially in the developed countries. In the past, animal breeding was focused on technical performance to afford enough productivity for the farmers and enough food for the consumer. Beside these goals that are more and more relevant because of the perspective of the increase of the world population, the society expresses new needs: such as consumers pay attention on health and life conditions of the animals in (at) the farms, on the impact of agriculture, and also animal production on environmental

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impact, and stress more and more the link between food and human health. Farmers want also to minimize the use of antibiotics to have healthy animals, which is also very much in line with consumers' concerns about antibiotics used on farms.

These trends are now so important, and the lobbying of NGO's so effective, that governments on the national levels, and on the European level, propose to legislate in this way: 2 new European laws, i.e., the Animal Health Law and the Animal Welfare Law, are currently discussed.

New era for animal breeding

Since 2008, animal breeding is able to use innovative tools such as genomic selection. The dramatic decrease of sequencing costs opens new ways of selection: now some area of SNPs, and later some genes responsible of trait performances. The goal is still to keep smart breeding, which means selecting the best animals without modification of the genome.

On parallel: farmers who run larger herds with less human labor look for new breeding goals with emphasis on easy-going cows with high economic performance.

Challenges of health traits

Selecting health traits is certainly a big challenge for various reasons.

Firstly, the low heritability level (<0,2) makes the impact of environment important which emphasizes the need for larger number of reliable data.

Secondly, health traits are complex due to the status of immunity coming either from birth or from treatment, and from the interactions with other functions, such as reproduction, or nutrition.

Thirdly, the recording of health data is difficult: which is the opposite of production or type traits, health traits are collected by different players, sometimes for different purposes. Farmer's organization collect health traits to keep the health status of farms as safe as possible. Vets work with them to provide the best service to their customers in terms of preventive actions and advices, while the AI industry requires such data to match new phenotypic data with genomic information for better selection.

And lastly, there are also other difficulties related to health data records: there are variable clinical signs for the same disease, and collecting the information of healthy animals is relevant data, too.

Recommendations of AI industry

Even if the prior target of collecting health data is to help the management of the herd, AI industry, especially within EuroGenomics, sets up some new and modern breeding goals including health traits.

The success of these breeding goals is based on reliable registration tools making the recording for the farmer simple. Such tools are also developed to be reliable by optimization of the new technologies of information and communication.

Finally, the priority should be put on traits with an economic impact on profitability of the herd, such as udder health in dairy farming.

As examples of traits selected in the population within EuroGenomics, there are clinical mastitis (DFS, Austria and France), quality of hoof (The Netherlands and DFS), and paratuberculosis (France).

The AI industry helped t in the 1950s to dramatically improve the health status of the herds in Europe, and at present the new challenge is to focus breeding on healthy, easy-going and sustainable animals for dairy and beef farms.

To conclude
