



Registration of health traits in Austria – Experience review

C. Egger-Danner¹, W. Obritzhauser², B. Fuerst-Waltl³, B. Grassauer², R. Janacek⁴, F. Schaller⁵, C. Litzllachner⁶, A. Koeck³, M. Mayerhofer¹, M. Miesenberger⁷, G. Schoder⁴, F. Sturmlechner¹, A. Wagner¹ & K. Zottl⁵

¹ZAR/ZuchtData EDV-Dienstleistungen GmbH, Dresdner Str. 89/19, A-1200 Vienna, Austria

²Chamber of Veterinaries, Biberstr. 22, A-1010 Vienna, Austria

³BOKU - University of Natural Resources and Applied Life Sciences Vienna, Division of Livestock Sciences, Gregor-Mendel-Str. 33, A-1180 Vienna, Austria

⁴Representative of Animal Health Organizations, Landhausplatz 1, A-3109 St. Pölten and Bahnhofplatz 1, A-4021 Linz, Austria

⁵Representative of Performance Recording Organizations, Hammerlinggasse 3, A-8010 Graz and P. Werner Deibl-Straße 4, A-3910 Zwettl, Austria

⁶Representative of Breeding Organizations, Volksfestplatz 1, A-4910 Ried im Innkreis, Austria

⁶Chamber of Agriculture, Schauflergasse 6, A-1014 Vienna, Austria

⁷Representative of Breeding Organizations, Volksfestplatz 1, A-4910 Ried im Innkreis, Austria

Abstract

A project to establish an Austrian wide health monitoring system for cattle started in 2006. Veterinary diagnostic data, which have to be documented by law (law of animal drug control) are standardised, validated and recorded into a central cattle database. This Austrian wide project is a collaboration between agricultural and veterinarian organizations as well as universities and is further supported by the ministries. Beside provision of reports for herd management and preventive measures, breeding values for health traits and monitoring of the health status are project objectives. The precondition for an efficient use of health records are valid data. The challenge hereby is to distinguish between farms with low frequencies of diseases as well as incomplete documentation and recording. Presently 13,150 farms with about 220,000 cows are participating. Significant regional participation discrepancies are observed: from 80% participation in the eastern part of Austria to almost 0 in the very western part of Austria. The project is going to terminate at the end of 2010. Measures are undertaken to establish a routine monitoring system for health traits. The Austrian experiences in setting up a system of health registration with its successes and difficulties are described.

Keywords: registration, health traits, challenges.

1.0 Introduction

Improved animal health is gaining in increasing importance worldwide, because of its effect on farm economy and animal welfare but also as food security is of interest from the consumer perspective.

In Scandinavian countries, animal health data have been routinely collected and utilized for decades (Aamand, 2006, Philipsson and Linde, 2003, Nielsen, 2000). Experiences from these countries show that health traits can be successfully improved (Østerås and Sølverød, 2005, Heringstad *et al.*, 2007). The EU Animal Health policy: "Prevention is better than cure" (European Commission, 2007) stresses the importance to register health data and use them for preventive measures.

In Austria, recording of diagnostic data and treatments is obligatory by law since 2002. However, before the project "Health monitoring in cattle" started in Austria, those data were neither standardised, nor routinely collected and stored in a common database and could therefore not be used for breeding and management purposes.

Within the project a health monitoring system for cattle in Austria including all animals under performance recording has been established. The data are primarily used for management and breeding purposes. Operating figures about the cattle health status are another project aim.

The paper describes the concept, measures and experiences gained through four years of implementation of the project.

2.0 Aims

The project aims are the increase of animal health in cattle by breeding and management measures resulting in an improved economic sustainability. An overall aim is the increase in food security. By working together within this project, the collaboration between agriculture and veterinarians will be strengthened. The project also is expected to have an impact on the positioning of the Austrian Agriculture.

Main project aims:

- Development and implementation of a system to collect diagnostic data.

- Health reports for farmers and veterinarians as well as the centres of the Animal Health Organizations (TGD).

- Genetic evaluation for health traits.

3.0 Methods and measures

3.1 Project organization

Under the leadership of the Federation of Austrian Cattle Breeders (ZAR) a health monitoring system has been elaborated and implemented in close cooperation with the organizations involved in animal health issues. These are the Ministry of Agriculture, Forestry, Environment and Water Management, the Ministry of Health, the University of Veterinary Medicine Vienna, the University of Natural Resources and Applied Life Sciences Vienna, the Animal Health Organizations, the Chamber of Agriculture, and the Chamber of Veterinarians. The Federation of Austrian Cattle Breeders, also representing performance recording and breeding organizations is the project executing organization.

The project is managed by a steering committee. Temporary working groups have been set up to elaborate different project aspects (health reports, breeding values, training module,..).

3.2 Project history

The project officially started in 2006. The set up of the project and preparation was carried out in 2005 and beginning of 2006. The different measures carried out within the project are listed in table 1. In 2010 the main emphasis is put on the implementation into the routine.

Table 1. Timeframe of implementation of different measures within the project.

	2005		2006		2007		2008		2009		2010	
Preparation												
Elaboration of the project design and financing	x	x	x									
Legal basis for health data recording			x									
Technical aspects of recording implemented			x									
Project implementation												
Motivation and information				x	x	x	x	x	x	x	x	x
Provision of health reports after each milk recording					x	x	x	x	x	x	x	x
Monitoring of recording and data validation			x	x	x	x	x	x	x	x	x	x
Promotional program for direct electronic transmission of diagnoses data by veterinarians					x	x	x	x	x	x	x	x
Web based annual health reports							x	x	x	x	x	x
Educational project based on health reports								x	x			x
Research project to elaborate a genetic evaluation				x	x	x	x	x	x	x	x	x
Publication of first breeding values for Fleckvieh									x	x	x	x
Continuous improvement of health reports						x	x	x	x	x	x	x
Key figures on animal health										x	x	x
Implementation to routine												
TGD-programme health monitoring											x	x
Health traits part of the breeding programme												
Tyrolean Grey						x						
Fleckvieh											x	

3.3 Health data registration

3.3.1 Legal framework

Based on the law of drug control 2002/2005, diagnoses have to be documented on the receipt for the documentation of drugs. Due to a by-law on residual control, enacted and realized treatments have to be indicated in a special book at the farm. According to the publication GZ 74 .200/0012 – IV /D/8/2006 published by the Ministry of Health in April 2006, diagnoses have to be specified with a two-digit code. The standardized key of diagnoses was published by the Ministry of Health before the project started.

3.3.2 Data type and standardization

Diagnostic data are standardized by veterinarians using an elaborated key with 65 diagnoses subsumed to 10 groups. This key only includes on-site findings by veterinarians of major diagnoses relevant for breeding purposes but currently no laboratory results. To link more detailed keys of diagnoses used by veterinarians a list of synonyms was provided. The receipt for the documentation of drugs (law of animal drug control) has been extended by the two-digit code for the standardized diagnoses. From this receipt the number of the farm, the ID of the animal, the date of veterinary treatment, and the code of first diagnoses only is recorded. The ID of the veterinarian is no mandatory field. Information on drugs is not recorded.

Arzneimittelanwendungs-, Arzneimittelabgabe-ur

Betrieb: (Name und Anschrift)		Legende: B=Behandlt NB=Nachbe A=Abgabe R=Rücknah Tierarten: (T Rd = Rind Schf = Schaf Gfl = Geflüge	
LFBISNr.: <input type="text"/>			
TA	Identität der/s Tiere/s OhrmarkenNr BoxenNr.	Diagnose- schlussel (2-stellig)*	Menge
B O	<input type="text"/>	<input type="text"/>	
A O	<input type="text"/>	<input type="text"/>	
R O	<input type="text"/>	<input type="text"/>	
		NB O	

Figure 1. Excerpt of the receipt for the documentation of drugs with the newly introduced field for the standardized diagnoses.

3.3.3 Data collection and data storage

Diagnostic data are registered into the cattle database, where all other data from performance recording are stored.

Data may be transmitted electronically by the veterinarians or recorded by the performance organizations. Supplementary information (observations, hoof trimming) can be registered by farmers. This information is stored separately to distinguish observations from farmers and diagnoses of vets.

3.3.4 Data security

Health data are very sensitive and therefore data security for farmers and veterinarians has to be warranted and given high priority. The farmers have to sign an agreement for recording of data explicitly stating the possible use of data. For provision of the health reports to veterinarians an additional agreement has to be signed. It is important that the farmer has only access to the diagnosis registered at his own farm. For the veterinarian it is important that the veterinarian number is only stored in the database without a link to the person. Therefore it is not possible to trace back to the veterinarian.

3.3.5 Data validation

Precondition for the benefit of health data is a good data quality. Plausibility checks concerning diagnoses, identification of animal and herd are carried out before the data are stored in the database.

Only data from farms fulfilling criteria concerning continuous and complete registration of diagnoses are included in genetic analyses (Egger-Danner *et al.*, 2009, Koeck *et al.*, 2010). Emphasis is put on defining the observation period. A minimum of 0.1 first diagnoses per cow and year is required.

3.3.6 Promotional programme for electronic diagnostic data transmission

To motivate the veterinarians to update their software for direct transmission of the diagnostic data an amount of 200 € was provided once. Additionally 10 cent are paid per electronically transmitted diagnosis during the course of a disease.

3.4 Health reports

Optimized herd management is important for an economically successful farming. To recognize problems early additional health information is valuable. Therefore diagnostic data were included to the already

existing reports provided to the farmer after each milk recording. As a consequence of the project the veterinarian can also get this information if the farmer agrees.

Additionally annual reports were elaborated enabling the farmer to compare farm results to the ones of the previous year as well as to the average on district and province level.

Annual reports with comprehensive information on health aspects are provided in a long and short version. A graphical overview will soon be added. These annual reports are also used by the veterinarians for their evaluation of the herd health status of the supervised cattle herds within the Animal Health Organization. An internet based tool provides annual reports with daily updated information.

The use of the health reports by farmers and veterinarians is also an important contribution to data quality as incorrect documentation and recording of diagnostic data may be recognized.

3.5 Genetic evaluation

One major project aim is the provision of breeding values for health traits for sires. Before the project only indirect information as somatic cell count or indirect fertility traits has been used. Koeck *et al.* (2010 a, b) show that heritabilities for reproductive diseases and mastitis are comparable with those from analyses of health data by e.g. Heri ngstad *et al.* (2005) and Zwald *et al.* (2004 a, b). Since April 2009 first breeding values for fertility disorders, clinical mastitis and milk fever are provided to the farmers breeding Fleckvieh. Showing the existing genetic variation between bulls assists in motivation to support the project.

3.6 Motivation and information

To encourage farmers and veterinarians to adopt a new technology, emphasis needs to be put on information and awareness about benefits. At the beginning of the project, when no project results are available this is more difficult. Experiences from the Scandinavian countries are helpful. The employees of performance recording organizations were given the task of convincing farmers to join the project and to collect signed agreements to join the project. The veterinarians were informed by their Chamber and the Animal Health Organization. Before starting the information campaign the employees of the performance recording organizations and representatives from the other partner organizations were trained as disseminators.

Additionally more emphasis should have been put on convincing opinion leaders in advance to the project start and also on including breeding organizations in the motivation of the farmers more intensively. During the project progress reports were provided continuously. Further farmers and veterinarians were asked to share their experience about the use of the project.

3.6.1 Education project on health reports

For the interpretation of the health reports a special training programme was set up. It was realized that too much information was provided where many farmers were lacking the knowledge to interpret and work with this data. In a participatory way each farmer elaborated his plan of action; 6,500 farmers participated.

3.7 Operating figures about health status

The Ministries and the Animal Health Organizations will be provided with different operation figures on the animal health status and on the development of single diagnosis on regional and national level.

3.8 Implementation to the routine

To ensure that diagnoses are registered further on and used in management and breeding, information has to be adopted officially by the involved organizations in the routine. The following steps have already been achieved.

Animal Health Programme (Ministry of Health, 2010): In March 2010 the Animal Health Organizations have decided that the Health monitoring programme is officially recognised. Information based on performance recording and health monitoring will be part of the evaluation process in supervised herds.

Breeding programme: The Tyrolean Grey Association already decided in 2008 that monitoring of health traits is compulsory for its members. The Austrian Fleckvieh (Simmental) Federation adopted health traits to their breeding programme in April 2010.

Permanent working group within the Federation of the Austrian Cattle Breeders (ZAR) with representatives of the different partner organizations will be set up to ensure that the monitoring of diagnoses is continued and further on developed.

4.0 Results and discussion

4.1 Participation

In most regions, the project to establish an Austrian wide health monitoring system started between September and December 2006. Table 2 shows the impact of implementation in different regions from 2007 till 2010. In total, 13,150 farms with 220,000 cows are presently participating.

Some regions achieved a very high participation within a few months with slow, but continuously increasing support by the veterinarians. Regions like Lower Austria and Styria have participation close to 80%. Presently about 80 to 90% of these farms are providing veterinary diagnoses, which results in approximately 70% of health registered cows. In the very western part of Austria, the project did not really start yet. The most essential prerequisite is the support of the opinion leaders in both, agricultural and veterinarian organizations. Surveys on farmers about their future breeding emphasis stress the desire to improve especially fertility and udder health. Nevertheless, continuous information is needed to strengthen confidence and to convince of the benefits.

Table 2. Number of dairy farms within the Austrian Dairy Herd Recording System, development of percentage of farms participating in the Health Monitoring (HM) and farms with veterinary diagnoses data in the database (HMVDR).

Regions	Farms	HM farms %				HMVDR farms %			
	Feb.10	Feb.10	Feb.09	Feb.08	Feb.07	Feb.10	Feb.09	Feb.08	Feb.07
Burgenland	136	23	17	13	12	55	54	36	21
Carinthia	1,288	76	76	73	71	64	53	42	14
L. Austria	3,925	78	77	77	76	90	80	64	21
U. Austria	4,864	55	51	33	28	58	49	49	24
Salzburg	2,194	44	44	42	41	65	59	42	11
Styria	3,383	79	66	63	61	85	82	66	37
Tyrol	6,009	36	23	20	7	20	13	3	0
Vorarlberg	1,479	1	1	0	0	58	50	0	0
Austria	23,278	54	48	42	37	66	61	50	23

4.2 Important project measures for success

Participative approach: For registration of veterinarian diagnoses the cooperation between farmers and veterinarians is needed at the different levels (farm, organizations on different levels). It is important that starting from the project design to the implementation all partners involved in cattle health issues are participating. In this way it can be achieved that the project aims and expectations of all the partners can be achieved. Synergies can be used and different aspects and knowledge can be contributed; e.g. the health reports were elaborated in cooperation of representatives from performance recording organizations, feeding experts, veterinarians and research.

Benefit for key players. Farmers and veterinarians are only ready to adopt new technologies and approaches, if they are convinced by the benefit and if the benefit-cost-analysis is to their advantage. Different expectations have to be fulfilled. Farmers and veterinarians are using this information to improve herd management. Ministries and Animal Health Organizations are interested in monitoring of the health status. For consumers, food safety is of importance. For farmers and breeding organizations the use for breeding purposes is the main goal. For motivation, early and continuous information about

the results is essential. To endure the joint benefit and to reduce costs it is important to link and use infrastructure jointly.

Technical implementation with guaranteed data security. Before such a project may start, the technical structure has to be elaborated and questions especially concerning data security can be answered in detail for farmers and veterinarians. A key of diagnoses which is accepted by the veterinarians is additionally essential. For genetic evaluation, a less detailed key of diagnoses would be sufficient. For fertility traits Koeck *et al.* (2010) showed that rather high genetic correlations between traits are observed. Due to low frequencies the breeding values can be estimated more reliably for combined traits. However, for veterinarians more detailed information about the diagnoses can be of interest.

Sustainable high quality data recording and validation. For opponents of health data recording the main arguments are insufficient data quality and data security. The easiest and best way of data recording is electronic transmission of diagnoses directly by the veterinarians. Once the software products have been adopted, the data can be provided directly to the database without big effort. Veterinarians using electronic devices are normally recording all the measures taken. Analyses show that incidence rates based on diagnoses which are electronically transmitted are slightly higher for traits like (cystic ovarian disease) or metabolic disorders where also drugs without waiting periods are applied. Therefore the farmers were enabled to record additional information as observations themselves.

The data validation for breeding value estimation is very important especially at the beginning of setting up such a system. It cannot be taken for granted that all of the farms start recording diagnoses immediately after joining the projects. The distinction between farms with low frequencies and incomplete recording is a challenge.

Continuous information and motivation. To achieve a high participation, which is especially important for breeding purposes due to the rather low heritabilities of the health traits, continuous information, motivation and awareness are important. Farmers as well as veterinarians and especially their opinion leaders need to be convinced by the benefits and encouraged to participate.

Financing and economic aspects. It is important, that the project can be established without additional costs for farmers and veterinarians. The additional benefit has to be bigger than the effort involved. Basically the effort to record these diagnoses can be compared with recording of calving ease. On average about 0.7 first diagnoses (per course of a disease) per cow and year need to be registered. On the long term the additional effort has to be paid. An average calving interval of 398 days and an average SCC of 209,000 (ZuchtData, 2009) show the potential of cost saving. An economic study based on Austrian field data show that one month extended calving interval and an average SCC above 250,000 costs 125 and 180 € per cow and year, respectively (Stocker, 2008).

Legal framework: A continuous recording of health data based on broad participation is a big challenge. For the sustainability these traits have to be used routinely by the different organizations. Thus, legal frameworks for documentation and use of diagnostic data are very valuable (law of drug control, law of animal breeding). The inclusion of such traits in breeding goals and the use for preventive measures by veterinarians and Animal Health Organizations is especially important. A level has to be reached where health traits are recorded and used like other fitness traits.

5.0 Conclusions

The registration and utilization of health data is gaining importance. Measures to monitor and improve animal health and food security are sensible. Therefore the full support of all involved partner organizations is essential. Success depends on the cooperation between farmer and veterinarian on farm level as well as on the collaboration of breeding and performance recording organizations, veterinarians and researchers as well as on the support of the Chambers and Ministries. The cooperation is a challenge but also the chance to establish a joint system to share benefits and to use synergies efficiently. Performance recording data as well as diagnostic data are available for breeding and management purposes by the farmers and breeding organization, but the information can also be used by veterinarians and Animal Health Organizations.

For establishing a system of health monitoring beside a participative approach, an appropriate system of registration and data storage with warranted data security and the provision of benefits for all partners involved are essential. The motivation and information process is to our experience a much bigger challenge than setting up of the technical requirements. It is especially important to convince opinion leaders already at an early stage. Continuous information to build up confidence and to communicate the benefits are key factors for success.

For the sustainability of continuous recording of health data these traits have to be used routinely by the different organizations. Thus, legal frameworks for documentation and use of diagnostic data are very valuable.

6.0 Acknowledgements

The collaborative work of the project partners in Austria (Federation of Austrian Cattle Breeders, University of Natural Resources and Applied Life Sciences, University of Veterinary Medicine, Chamber of Agriculture, Chamber of Veterinaries, Animal Health Organizations, Performance Recording Organizations, Breeding Organizations) to establish a "Health monitoring system in cattle" and all dairy farmers and veterinarians participating are gratefully acknowledged. The project has been financed by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) of Austria, the Ministry of Health and the Federation of Austrian Cattle Breeders (ZAR).

7.0 References

- Aamand, G. P., 2006. Data Collection and Genetic Evaluation of Health Traits in the Nordic Countries. British Cattle Conference, Shrewsbury, UK, 2006.
- European Commission, 2007: European Union Animal Health Strategy (2007-2013): prevention is better than cure. http://ec.europa.eu/food/animal/diseases/strategy/animal_health_strategy_en.pdf.
- Egger-Danner, C., B. Fuerst-Waltl, W. Holzhaecker, R. Janacek, J. Lederer, C. Litzllachner, C. Mader, M. Mayerhofer, J. Miesenberger, W. Obritzhauser, G. Schoder, and A. Wagner, 2007. Establishing a health monitoring for cattle in Austria: first experiences. In: EAAP-Book of Abstracts No 13: 58th Annual Meeting of the EAAP, 26-29.8.2007 Dublin, Ireland, 363.
- Egger-Danner, C., Koeck, A., Obritzhauser, W., Fuerst, C., Fuerst-Waltl, B., 2009. Impact of health data quality on breeding efficiency in Austrian Fleckvieh cows. In: EAAP-Book of Abstracts No 15: 60th Annual Meeting of the EAAP, 24.-27.8.2009, Barcelona, 411.
- Heringstad, B., Rekaya, R., Gianola, D., Klemetsdal, G. and Weigel, K.A., 2003. Genetic Change for Clinical Mastitis in Norwegian Cattle: A Threshold Model Analysis. *J. Dairy Sci.* 86: 369-375.
- Heringstad, B., Chang, Y.M., Gianola, D. and Klemetsdal, G., 2005. Genetic correlations between clinical mastitis, milk fever, ketosis and retained placenta within and between the first three lactations of Norwegian Red (NRF). In: EAAP-Book of Abstracts No 11: 56th Annual Meeting of the EAAP, 3-4.6..2005 Uppsala, Sweden.
- Heringstad, B., Klemetsdal, G. and Steine, T., 2007. Selection responses for disease resistance in two selection experiments with Norwegian red cows. *J. Dairy Sci.* 90: 2419-2426.
- Koeck, A., C. Egger-Danner, C. Fuerst, W. Obritzhauser, und B. Fuerst-Waltl, 2010. Genetic Analysis of Reproductive Disorders and their Relationship to Fertility and Milk Yield in Austrian Fleckvieh Dual Purpose Cows. *J. Dairy Sci.* 93: 2185-2194.
- Koeck, A., B. Heringstad, C. Egger-Danner, C. Fuerst, und B. Fuerst-Waltl, 2010. Comparison of Different Models for Genetic Analysis of Clinical Mastitis in Austrian Fleckvieh Dual Purpose Cows. *J. Dairy Sci.* (in press).
- Ministry of Health, 2010. Kundmachung des TGD-Programms Gesundheitsmonitoring Rind. <http://www.bmg.gv.at/cms/site/standard.html?channel=CH0920&doc=CMS1271936439807>.
- Nielson, U. S., Aamand, G. P. and Mark, T., 2000. National Genetic Evaluation of Udder Health And Other Traits in Denmark. Interbull Open Meeting, Bled, 2000, Interbull Bulletin 25: 143-150.
- Obritzhauser, W., Egger-Danner, C., Grassauer, B., Holzhaecker, W., Winter, P., 2008. Preliminary results of a general health monitoring system for cattle in Austria. XXV. World Buiatrics Congress, Budapest, Hungary, July 7th, 2008.
- Østerås, O. and Sølverød, L., 2005: Mastitis control systems: The Norwegian experience. In: Hogeveen, H. (Ed.), Mastitis in dairy production: Current knowledge and future solutions, Wageningen Academic Publishers, Niederlande, 91-101.
- Phillipson, J. and Lindhe, B., 2003. Experiences of including reproduction and health traits in Scandinavian dairy cattle breeding programmes. *Livestock Production Sci.* 83: 99-112.

- Stocker, F. 2008. Fitness – nur ein Schlagwort oder klarer wirtschaftlicher Nutzen? Seminar des Ausschusses für Genetik der ZAR, Zentral e Arbeitsgemeinschaft österreichischer Rinderzüchter (Hrsg).
- Zwald, N. R. , Weigel, K. A ., Chang, Y.M., Welper R. D. and Clay, J. S., 2004a. Genetic Selection for Health Traits Using Producer-Recorded Data. I. Incidence Rates, Heritability Estimates and Sire Breeding Values. J. Dairy Sci. 87: 4287 – 4294.
- Zwald, N. R. , Weigel, K. A ., Chang, Y. M., Welper R. D. and Clay, J. S. , 2004 b. Genetic Selection for Health Traits Using Producer-Recorded Data. II. Genetic Correlations, Disease Probabilities and Relationships with Existing Traits. J. Dairy Sci. 87: 4295 – 4302.
- ZuchtData Jahresbericht, 2009. <http://www.zar.at/article/archive/25>