



Development and implementation of an on-farm self-monitoring tool to promote welfare in dairy cows in northern Germany

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Following the German Animal Welfare Act from 2014, livestock keepers/stock farmers in Germany are obligated to gather and evaluate data regularly in order to monitor their animals' welfare. Since the legal basis doesn't present detailed implementations regarding the extent and method of monitoring, farmers are left alone finding a way to meet legal requirements. To challenge this problem the Operational Group "Tierwohl-Check" was initiated within the European Innovation Partnership (EIP-AGRI) to develop a management tool assisting dairy farmers to meet legal requirements and support their general herd management at the same time. A distinctive feature of EIP projects is their practical orientation. In order to create practical solutions, farmers are directly involved in the work process of the Operational Group supporting bottom-up interactive innovation. The principal objective is to assist farmers with an easy-to-use application which provides reliable indicators, reveals weak points and therefore supports herd management. At the same time the evaluation can be used to meet the legal requirements to document animal welfare. Accompanying the development process, the project's aim is to develop and implement an e-learning program for farmers and to assist multipliers such as veterinarians, consultants and others by providing training material as a train-the-trainer approach. This "Tierwohl-Check" indicator set for on-farm self-monitoring of animal welfare in dairy cattle will be presented as well as an assessment framework regarding the welfare outcomes (target and threshold values, benchmarking).

Abstract

Keywords: Monitoring system, key indicators, animal welfare, animal health, self-assessment, web application, dairy sector.

A main idea of Tierwohl-Check was to avoid re-discussing the suitability of well-known indicators, since this fundamental work has been carried out in two fundamental projects throughout Germany. While various initiatives have developed a variety of reliable indicators to effectively monitor the welfare of dairy cows, "Tierwohl-Check" directly benefited from the outcomes of the projects "Q Check" (German Association for Performance and Quality Testing (DLQ), <https://infothek.q-check.org/>) and "EiKoTiGer"

Introduction

(Association for Technology and Structures in Agriculture (KTBL), <https://www.ktbl.de/themen/tierschutzinidatoren-milchrinder>). Dairy farmers in Germany can already rely on an existing strong infrastructure, which provides four existing systems of data recording. Q Check following an interdisciplinary approach, has examined potential indicators from existing data and produced a set of 14 indicators mainly relating to the health of dairy cows. This set of indicators was fully implemented into the Tierwohl-Check tool and is presented in table 1.

At the same time, a self-assessment tool should provide a good evaluation on farm using indicators scoring the animals' condition. EiKoTiGer has focused on the collection of data on farm, evaluating indicators for milking cows, calves and beef cattle. For Tierwohl-Check the animal-based indicators for body condition, cleanliness, integument alterations, tail injuries, claw condition and lameness, of dairy cows as well as adequate use of lying places, rising behaviour and water availability were selected (Brinkmann et al. 2020). For herds with horned cattle, horn injuries were added to the set of indicators (Johns et al. 2020). The combination of the two sets of indicators ensures a maximum usage of the existing data from milk recording and cattle database and enables the user to describe the animal's welfare state by generating on-farm data.

Table 1. Analyse of the existing data for the control year 2019 of 2,585 dairy farms in Schleswig-Holstein, Germany (LKV SH 2020) giving the mean values of all farms (average) as well as the top +25% / +10% of farms and the low-ranking -25%/-10% of farms. Target and alarm values used in Tierwohl-Check are given in the right columns.

Indicators	-10 %	-25%	Average	+25%	+10%	Target	Alarm
Culling rate [%]	21.9	27.0	32.8	39.4	46.4	< 25	> 40
Culling rate under 100 days p.p. [%]	3.6	5.6	8.6	12.2	16.4	< 5	> 10
Productive life span (in months)	46.7	40.8	35.4	30.7	26.5	> 48	< 30
Mortality cows [%]	1.1	2.4	4.0	6.2	8.8	< 2	> 5
Cows with SCC<= 100 [%]	73.5	67.9	60.6	52.7	44.0	> 75	< 50
Cows with ZZ > 400 [%]	5.8	7.8	10.7	14.2	18.6	< 5	> 15
Healing rate during dry off [%]	72.7	64.5	55.1	44.4	33.8	> 75	< 50
Infection during lactation[%]	9.4	14.6	21.6	30.5	40.0	< 15	> 30
First lactation mastitis[%]	16.2	22.2	30.0	38.5	47.6	< 15	> 30
Chronical infection [%]	0.0	0.0	0.8	1.9	3.2	< 1	> 5
Milk fat-protein ratio \geq 1.5(100 days p.p.) [%]	4.3	6.1	9.1	13.1	18.2	< 10	> 15
Milk fat-protein ratio < 1.0 (100 days p.p.) [%]	1.5	2.9	5.3	8.9	13.4	< 5	> 15
Dead birth rate cows [%]	0.0	1.8	4.2	6.9	9.6	< 5	> 10
Dead birth rate heifers [%]	0.0	2.0	6.1	10.7	16.2	< 5	> 10
Mortality rate calves 0-3 weeks[%]	0.0	0.0	2.1	4.4	7.6	< 3	> 5
Mortality rate 3-12 weeks[%]	0.0	0.0	2.1	4.3	7.4	< 2	> 5
Mortality rate young stock 3 - 6 months [%]	0.0	0,0	0.0	2.3	4.7	< 1	> 5

The set of indicators is completed by a short overview of the cows' husbandry, making it easier for consultants or veterinarians to support farmers with the results of their self-assessments. The set of indicators allows a precise documentation of the animal welfare situation as well as conclusions on the animals' health, husbandry and management.

The integration of practical farmers throughout the project work was a key factor of finding successful solutions. For getting these indicators into practical use for the farmers, it was the aim to provide a tool to easily analyse the animal welfare without too much effort. At the same time the farmers should gather valuable information to optimize their individual herd's management..

Together with the group's farmers, the application setup was carefully optimized during several practical cow-side test sessions, ensuring high usability and supporting user's focus on the important points. Thus, it was possible to take into account the point of view on animal welfare of practical dairy farmers, research institutes and consulting organisations.

By access to LKV's cattle register, the application knows all animals in the herd according to the last milk recording and offers the scoring of indicators by using representative pictures for each indicator. The number of cows recommended to be scored is automatically calculated according to the herd size.

When optimising the order of indicators presented in the app, the testing was expanded onto more dairy farms in Schleswig-Holstein. Therefore, a group of 20 farmers trained to correctly score the animal-based indicators and get used to the app interface. The training was carried out in one-day training events in the stable and due to an online training. All participants carried out a full data collection afterwards with their own herd, using the recommended sample size. The herd size of the farms involved varied from 60 to over 300 cows and included farms with all types of milking systems, with sample sizes from 35 to a maximum of 80 cows to be scored. Feedback of the farmers involved was collected after the data collection by a short survey.

In addition to the testing carried out by farmers, further data was collected on 13 farms by a project member to identify all remaining technical issues. After a short introduction to the herd, the data collection was all carried out by the project staff and the results were discussed with the farmer directly after the evaluation.

For each indicator a target and an alarm value was defined in the previous projects. The indicators from Q Check were checked against the existing data from the Landeskontrollverband Schleswig-Holstein e.V. (LKV SH) for the control year 2019. The results are presented in table 1(LKV SH 2020).

To meet legal requirements, Tierwohl-Check provides documentation and evaluation of the collected data. The app offers a report to easily analyse the animal welfare situation of the herd and detects weak points. Results are presented and stored directly in the app and in addition can be printed or sent out as a pdf file. In addition, a benchmark will be implemented in the future. When the users notice weak points in their report, the results can be used to share information with their consultants or veterinarians to focus on problems specific for their herd or to keep track of developments over the time.

To help farmers getting used to animal based indicators and offer a training opportunity before scoring cows in the stable, an e-learning tool will provide further information and assistance. Also broader live trainings and seminars shall be enabled during the project and beyond.

Material and methods

Results and discussion

The chosen indicators and usability of the app were well accepted by the farmers involved. All participants were asked to rate the usability of the app, the amount of time used for the data collection, the readability and the quality of the pictures presented, technical issues and the relevance of the chosen indicators. While the content-related points and the overall usability gained positive feedback, remaining technical problems were addressed more distinct and could be optimised in the following time. The succeeding data collection by the project member to detect the described technical problems was a valuable approach and sensibly complemented the tests by the farmers.

When analysing the status-quo data of the LKV SH the given target and alarm values showed a very good suitability. The data of 2,585 dairy herds were analysed for the period of one year, representing 85.8 % of the dairy cows in Schleswig-Holstein.

Table 1 shows the average value reached by the herds, as well as the better 25/10 % and the less successful herds 25/ 10 %. The outcome was then compared to target and alarm values given by Q Check. For all indicators, except the first lactation mastitis, the average of the herds was able to achieve values between the target and alarm value or even better. For the first lactation mastitis, only the better 25% of the herds were better than the alarm value, but didn't achieve the target value.

Comparing the data base for the indicators of existing data and the results of the data collection on farm, the existing data was more representative for dairy farms in northern Germany. For the selection of farmers for the data collection on farm, the requirements were rather to involve motivated participants to gain a high-quality feedback of the app performance, than to gather representative amount of data for the evaluation of animal welfare in Schleswig-Holstein.

Conclusion

For a successful implementation into practical farming, self-assessments may not only be carried out to follow legal requirements, but have to create a real added value for the farmers and their livestock. The attempt to offer a digital tool with reliable recommendations on how self-assessments can be carried out, found broad acceptance by the farmers involved.

A high acceptance of the app in future mainly depends on good usability and the realized benefits for animal health and welfare following from reliable data analysis and consequent management measures.

Therefore the process of improving the app performance requires further consistent efforts. The execution of regular self-assessments remains to the farmers themselves. For making the best possible use of the documentation, evaluation and benchmark given out, consultants and veterinarians ought to be involved to implement effective measures.

In the end, the implementation of a self-assessment tool based on scientifically well-developed indicators and consequently designed in cooperation with farmers is the opportunity to be one step ahead of further legal regulation and to sustainably improve the animal welfare situation of dairy cows.

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