WP4: Tailored Standard Operating Procedures

Task 4C. “Integration of SOPs in a strategic decision support tool”

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1. Introduction

Animal welfare is a growing concern for consumers. Consumers often associate the increasing herd sizes per farm with a negative impact on animal welfare. The breakthrough of precision livestock farming (PLF) might also raise some concerns about the impact of technology on animal welfare. People are often skeptical about ongoing scale enlargement and sometimes fear that the modern farm with its automation and sensors will lead to less care for the animal (4D4F Consumer and civil society feedback, 2016). PLF is often seen as a tool to improve production and profit, rather than to improve animal welfare.

However, the abundance of data on dairy farms also opens up new possibilities to monitor animal welfare at farm level and advise farmers on how they can improve their management. Farm-specific data can be applied in a decision tool for farmers and advisors to score animal welfare on their farms. That is why Boerenbond (i.e. a farmer organization in Belgium) has launched the "Animal Welfare Scan", a digital questionnaire to evaluate the animal welfare on farms. Several aspects of animal welfare are evaluated and farmers get a score for each category (e.g. animal health, cow comfort, …). This will give them insights into their own management: "*Is there still room for improvement, and where?*" Follow-up welfare scans of the farm are also useful to identify potential progress and might be of interest for consumers, policy makers, and researchers to indicate how animal-friendly the dairy sector is and how improvements are made over time. Moreover, the tool can demonstrate the use of technology and data to improve animal welfare to consumers.

Within this 4D4F case study, ILVO investigated which types of data could be automatically incorporated into the Animal Welfare Scan – so that farmers and advisors no longer need to register the information manually. Secondly, an additional SOP on evaluating cow comfort using sensor data was published on the 4D4F website.

2. Case study: Animal welfare scan

Boerenbond (i.e. a farmer organization in Belgium) asked ILVO to help create a digital dairy welfare tool. The digital tool is an online questionnaire based on Welfare Quality® project. However, farmers and dairy advisors still need to register their data manually. In a 4D4F workshop, the application was scored as very time-consuming by farmers and advisors. In addition, the needed information was not always known by heart and farmers needed to check papers, lab results, farm management information systems, … to get the correct and up-to-date information.

This feedback was discussed with animal welfare scientists. Although they could understand the complaint of farmers and advisors, they still believed that most of the requested information is relevant and needed to provide users with appropriate information and useful advice. Taking the both views into account, the 4D4F team decided to focus on automation of the data input.

The idea behind this specific 4D4F case is twofold:

> (1) To automatically incorporate certain farm-specific types of data (whenever available) in the tool. Possible examples of data include the number of cows, culling rates, milk production levels, somatic cell count, … This should increase user-friendliness for the farmer and reduce the chance of manual input errors. The tool will be owned by Boerenbond (since they have paid to create the basic version of the app). But they are willing to make the tool available for non-member farmers, although the tool is currently only available in Dutch.
>
> (2) A SOP on how sensor data can be used to evaluate cow comfort has been published on the 4D4F website. The SOP was derived from the Animal Welfare Scan, and is available in English.

In conclusion, the work done to improve the “Animal Welfare Scan” fits within the goals of 4D4F as follows:

- It promotes the use of data in practice
- It demonstrates how data integration of different sensors and data streams can be used to take management decisions (in this case; improve animal welfare)
- The SOP on evaluating cow comfort is available for everyone on the 4D4F website

3. Work plan & results

3.1. Create questionnaire on animal welfare

As we have mentioned, the Animal Welfare Scan ("Dierenwelzijn Scan") of Boerenbond is an app which consists of an online questionnaire on dairy welfare. The questionnaire is originally based on the European Welfare Quality® project, which utilizes physiological, health and behavioural characteristics to assess the welfare of dairy cows on farm. The idea behind the app is that untrained farmers and dairy advisors are able to evaluate the overall welfare on their farm. The content of the questionnaire, and the evaluation of animal welfare, fall outside the scope of 4D4F though.

3.2. Link with existing data providers

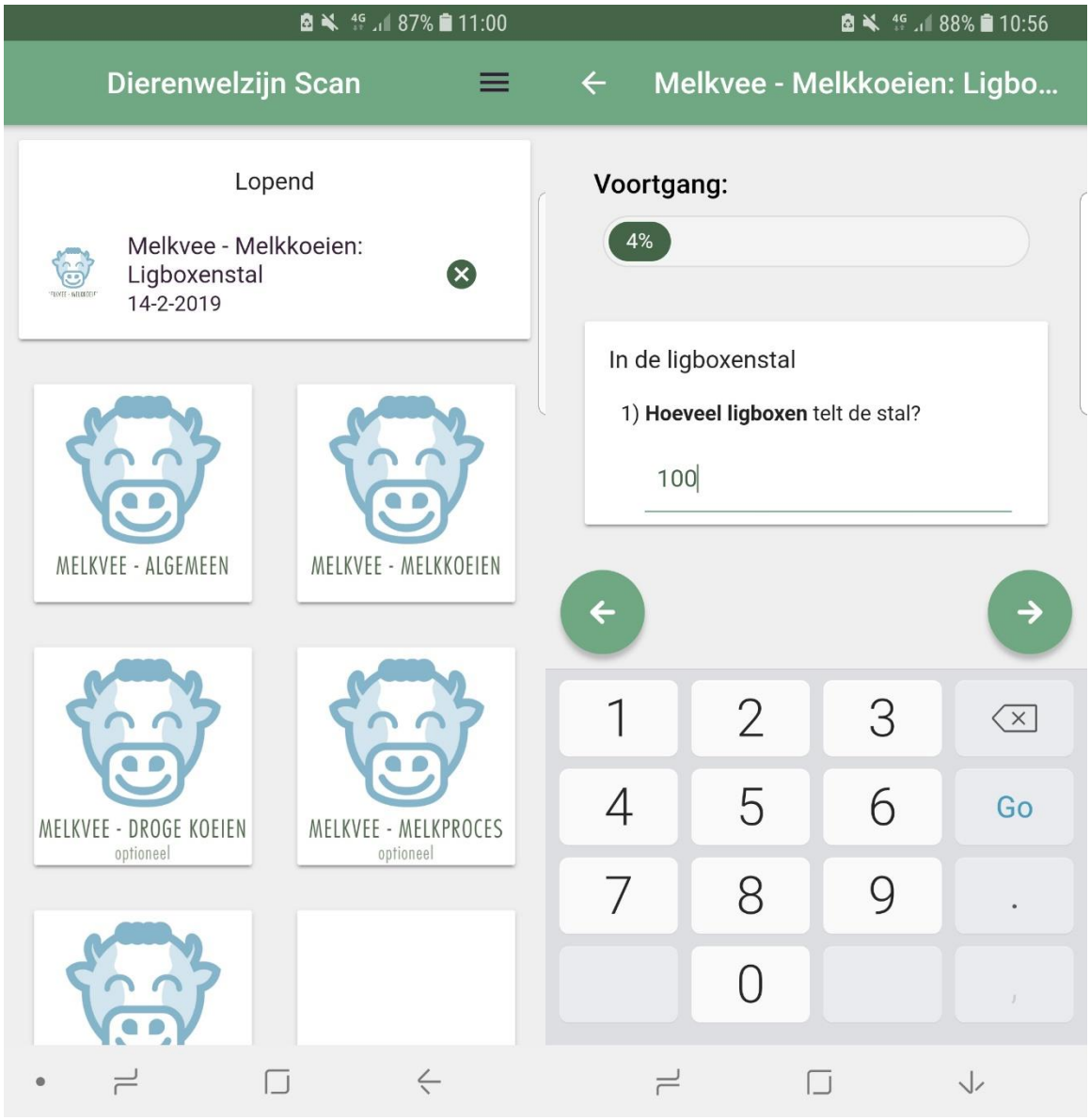
The first step taken by ILVO in this 4D4F case study, was to see which available data input related to animal welfare could be digitized and filled in automatically (as opposed to manual entry). At ILVO, we studied the entire list of questions related to dairy welfare, and assessed –one by one- which data was available in a digitized form. We came up with the following (non-exhaustive) list:

Question?	**Where / how can this piece of information be accesses?**
Date of the animal welfare scan?	Phone or tablet
Average number of adult dairy cattle on farm (including dry cows)?	National or regional animal health agency (Flanders: DGZ)
Culling rate of the last 12 months?	
Death rate of the last 12 months?	
Average age at culling in the last 12 months?	
Number of abortions in the last 12 months?	
Bulk milk somatic cell count of last measurement?	National or regional milk laboratory (Flanders: MCC)
Highest bulk milk somatic cell count of last 12 months?	
Number of lactating cows?	
Average daily milk production per cow (kg/cow/day)?	Dairy Herd Improvement agency (Flanders: CRV)
Average % of cows with newly elevated high somatic cell count ?	
Average % of cows with elevated high somatic cell count ?	

Table 1. *An overview of variables available in digital form to score dairy welfare on a farm*

3.3. App development

Talks are still going on between ILVO and the relevant data providers (as mentioned in Table 1), but progress has been made towards automatically integrating this data into the app. It app itself is already available for Android systems (on Google Play) or iOS systems (in the App Store). However, a browser version of the questionnaire is also available, in case the farmer or advisor does not have access to a smartphone or tablet. For now, the app is only available in Dutch, but it can be translated should the need arise.



Picture 1 and 2. *Print screen op the app "Dierenwelzijn Scan" of Boerebond in Dutch. Left: opening screen, where you can choose the type of questions (lactating cows / dry cows / milking process / calves) . Right: The questionnaire itself (where it says: "How many cubicles are there in the barn?")*

It should be noted that data on cow welfare is not considered as "privacy-sensitive information" by law, but farmers might perceive this as a sensitive matter either way. They should have complete trust in the tool and the organization hosting it in order to fill in their farm specific data. So taking that point into account from the start will be important. Both in Belgium and in the Netherlands, there are data hub initiatives focusing on dairy data. Within these hubs, data exchange with respect with data ownerships and data privacy is possible. Collaborations with these hubs is a plus, because of this trusted data governance.

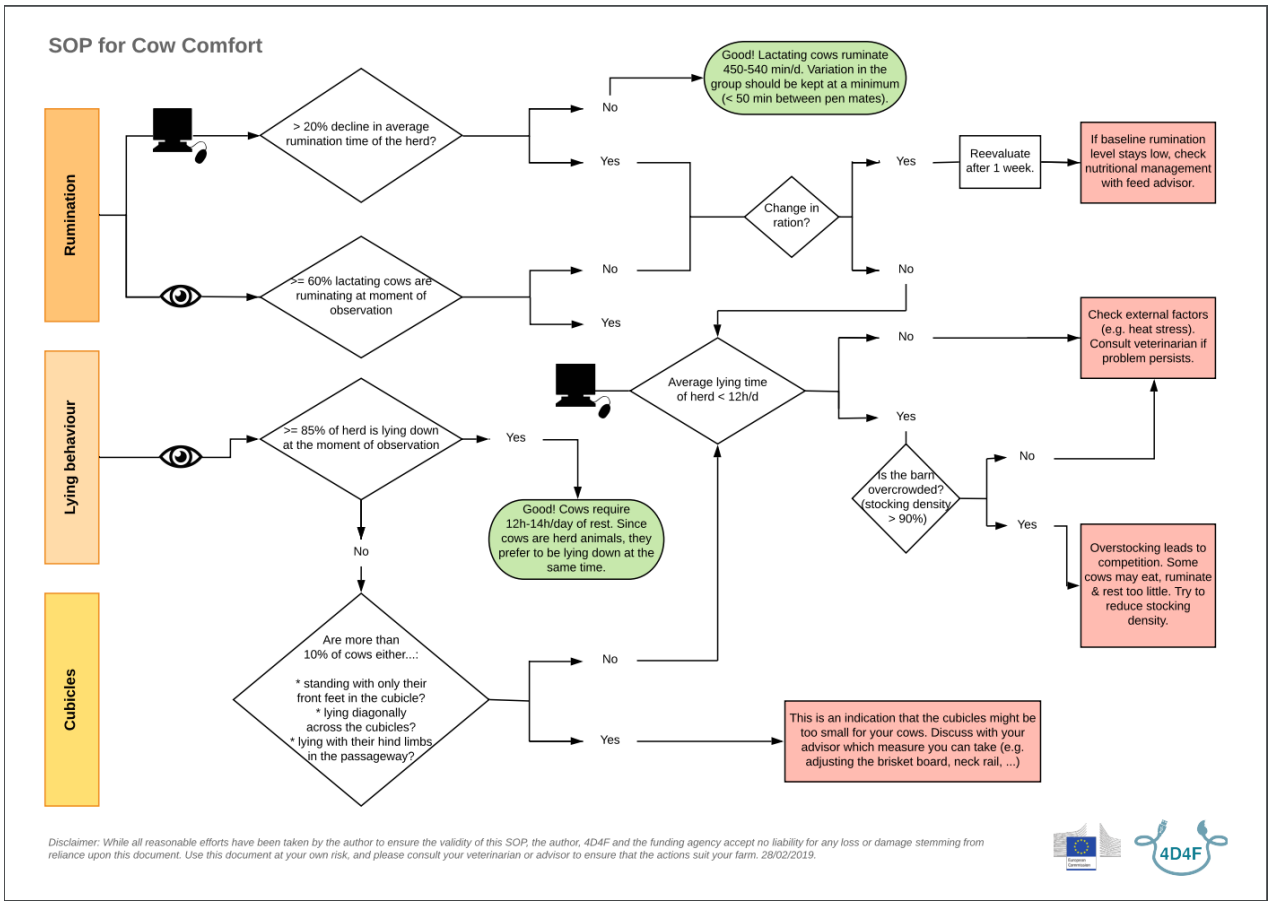
3.4. Testing in practice

The Animal Welfare Scan was launched in the beginning of 2019. Previously, the questionnaire and app had been tested in practice on commercial dairy farmers. 4D4F partner ZLTO also surveyed several commercial dairy farmers to gauge their opinion about the Animal Welfare Scan. This revealed that the relevance of some questions is not always clear, indicating that additional background information may need to be provided. Some questions also require the farmers to observe for instance 10 dried-off cows of 10 dairy calves, which is impossible for smaller farms. These questions ought to be adjusted according to the farm size. One of the farmers also suggested to add a question about the farm type (organic or regular). Finally, one farmer remarked: "This takes a lot of time. What's the added value for me?" This comment shows that we need to put more effort into raising awareness, and demonstrating the benefits of increasing animal welfare for farmers. That is of course the ultimate goal of this tool.

3.5. Create & publish SOP on evaluating cow comfort

A SOP on monitoring cow comfort using both visual assessments and sensor data was also published on the 4D4F website: https://4d4f.eu/content/standard-operating-procedures. The SOP shows how rumination data and lying times (as registered by commercial activity meters) can be used to evaluate cow comfort in the barn. This SOP demonstrates how sensor data can also be used to improve the welfare of the dairy cow, as opposed to the idea that sensors are only of value to increase farm productivity.

The KPI's and cut-off values used in this SOP are based on the Animal Welfare Scan, scientific publications and personal experience. Of course, we stimulate farmers and advisors to adapt this particular SOP to their own situation. Nevertheless, this SOP is a good starting point.



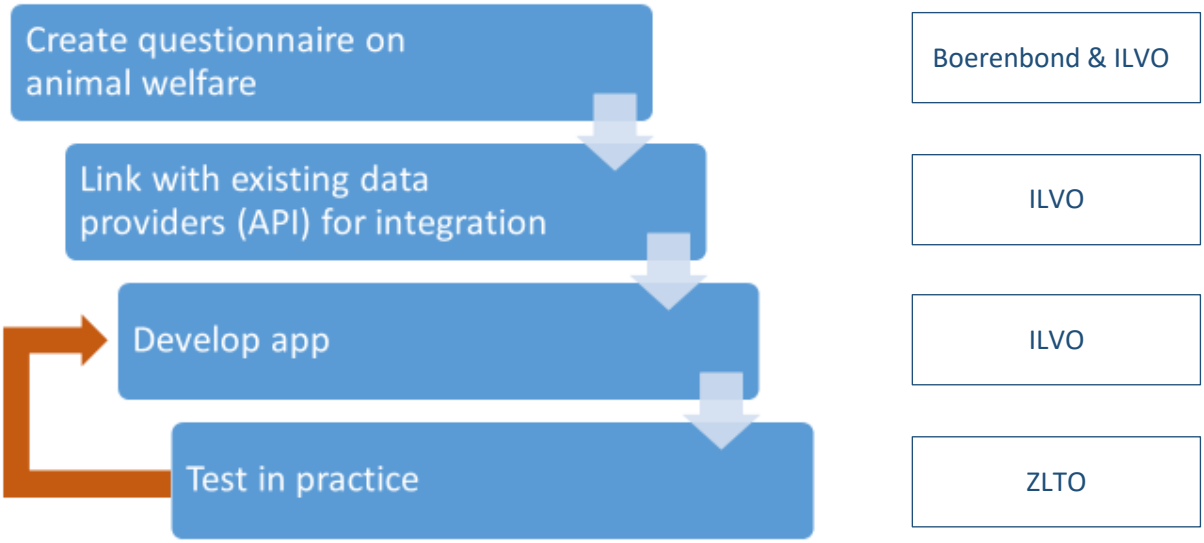
Picture 3. *Standard operating procedure for cow comfort*

4. Conclusion & recommendations

The largest farmers' organization in Belgium has developed an app –together with ILVO- to monitor the welfare of dairy cattle on farm. The questionnaire used in the app is originally based on the Welfare Quality® project. By filling in this questionnaire, the farmer gets more insight into the behavior and health of his herd. The output of the questionnaire can therefore be used to adapt farm management and improve the overall welfare of the animals.

The goal of this 4D4F case study was to improve the functionality of this app, called "Dierenwelzijn Scan" or "Animal Welfare Scan", by automatically integrating certain digital data input so that the user (i.e. the farmer or the advisor) does not need to enter the data manually. This increases user friendliness of the app, which might stimulate he use of the digital advice tool in return. It also lowers the risk of data input errors.

Our work plan to develop such a digital tool is described below (Picture 4). Should 4D4F partners – or other external parties- be interested in developing a similar tool for their region, they can get in touch with Stephanie Van Weyenberg, senior researcher at ILVO, for more information on how to set-up such a process: Stephanie.Vanweyenberg@ilvo.Vlaanderen.be



Picture 4. *Work plan to develop an app to monitor animal welfare on farm.*

Finally, the SOP on evaluating cow comfort is publicly available (in English) on the 4D4F website.