
Benchmarking in dairy production: "How to transform data to valuable decision support"

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From raw data to operational daily management - examples from DMS (Danish Dairy Management System)

The Danish Cattle database system has a very long tradition for collecting data within the areas of first milk recording, later reproduction, breeding and feeding. The data sources are many; the farmers, different service people around the farm, milking and feeding equipment, dairies and slaughterhouses. Since nobody do the registration of data for fun it is important that there is a strong motivation for doing the registration. In Denmark the motivation is output in management tools, breeding evaluation and different law regulations.

This very enormous amount of raw data gives good and solid background for processing of data into valuable management tools in daily operational management and periodic Key Performance Indicators. Knowledge Center for Agriculture in Denmark - owned by the farmer's organizations - has a long tradition for developing decisions support tools for the farmer at his advisors. In the dairy cattle business a management package is offered and used by more than 80% of the dairy farms, either directly by the farm manager or through the Veterinarian or the Advisor. Today the package - Dairy Management System (DMS) - includes modules for animal registration and management, feed ration planning and optimization, for production and economic planning, for production follow up on the production operational (day to day) and tactic level (quarterly) and this prognosis tool for prediction of the production.

For the operational management DMS offers 3 different tools to present the KPI's from processed data:

- KPI tool.
- Benchmarking tool.
- Reporting system with different kind of analysis on the production.

With these tools the farmer can follow the daily production and benchmark against a comparable group of herds and analyses for reasons in problematic areas presented in pedagogical graphical presentations. The tools are still under development, but are released in its first version. So far the focus has been milk production, reproduction, health and feeding

With more animals to manage pr. labor hour and a growing focus from the financial partner, there is an increasing need to have a precise overview of the dairy production on a daily operational level. The manager needs to know in real-time about the production efficiency within milk production, reproduction, health and feeding areas. The overview

Abstract

Introduction

can be found partly in different management system, but often the picture is insufficient, due to lack of data, and the manager has to look in different systems to get the total overview.

In Denmark Knowledge Center for Agriculture (today SEGES) - owned by the farmer's organizations - has a long tradition for developing decisions support tools for the farmer at his advisors. To meet the needs for Dairy farmer of today and tomorrow there has been focus on what kind of information are valuable to the farmer and his manager in the different decision situations. There is a need for a daily "Am I on the track" tool. For that purpose an operational KPI tool with daily updated Key figures has been developed

The decision maker also has a need to find areas for improvement, and for this purpose a Benchmarking system has been developed. The Benchmarking can be done against your own goals or a group of herds comparable with your own herd.

To complete the decision support there is a need for a system to analyze the different factors impact on the specific Key figure. To meet that need an analyzing system has been developed. The system has a few standard reports, and a setup, where you can build up your own user defined reports from a huge variety of analysis on the specific Key figure

The tool

The basic under the three described systems are the Danish Cattle Database. In the database we have a very solid data background. Data are delivered from very many sources around the dairy production:

- Mandatory recordings.
- Milk recordings.
- The farmer own voluntary recordings.
- Recordings from service suppliers.
- Veterinarians.
- A.I technicians.
- Breeding advisors.
- Nutritional advisors.
- Dairies.
- Slaughter houses.
- Etc. ...

In the following figures we have tried to illustrate the data sources, and how the directly and indirectly deliver data to the Danish Cattle database. The illustrations are split into the two areas; single animal level and herd level (Figure 1 and 2).

The system includes 15 KPI's which are calculated each day on the newest data. The 15 KPI's shows the efficiency of the production in the above mentioned areas. In the system the single KPI is benchmarked against the goal set by the manager, and with a green or red dot indicate if the production is on target or not. This gives the manager a tool, where he very quickly can see where to act (Figure 3).

Benchmarking system

In the Benchmarking module there are a number of standard reports, telling about the performance of the herd within production, reproduction and udder health. The reports consist of a number of key figures, for each key figure the user can see the actual performance for the periods "last month", "last 3 months" or "last 12 months". The actual achieved result is benchmarked against the former period and the users own goal. It is

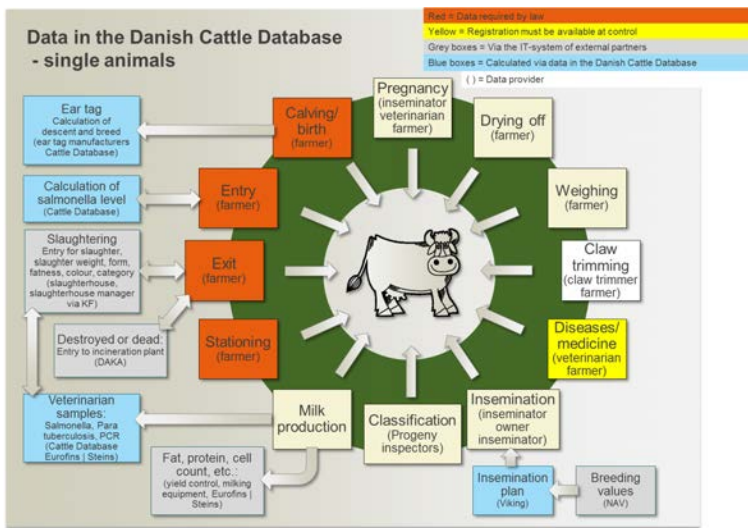


Figure 1. Data in the database at the single animal stage.

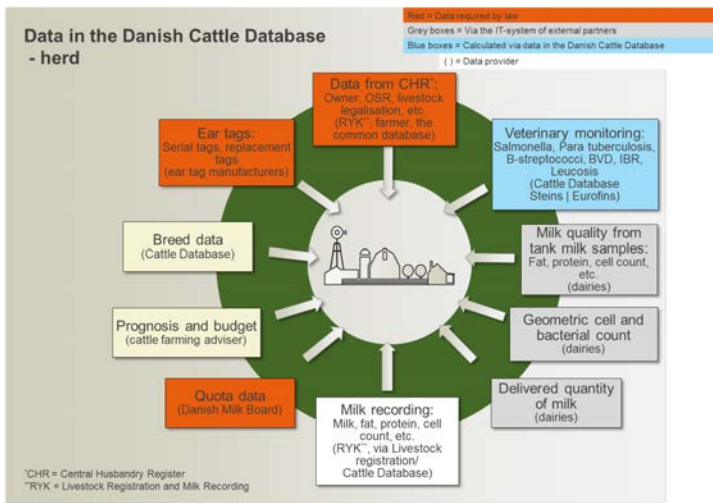


Figure 2. Data in the database at the herd stage.

Topic	Status	Key figure (unit)	Achieved	Alarm limit	Reporting period
Milk	✓	Milk delivered (kg/day)	8,906	Min 7.835 \ Max 9.072	Latest delivery
	✓	Milk quality (number of deductions)	0		Latest measurement
Reproduction	✓	Inseminations of cows (Numbers)	8	Min 3	Last 7 days
	✗	Inseminations of heifers (Numbers)	1	Min 2	Last 7 days
	✗	Not pregnancy examined cows (Numbers)	4	Max 0	Last day
	✓	Not pregnancy examined heifers (Numbers)	0	Max 0	Last day
Health	✓	Disease treatment, cows (Numbers)	0	Max 4	Last 7 days
	✓	New infection, lactation (%)	8	Max 15	Last milk recording
	✓	New infection, dry period (%)	14	Max 35	Last milk recording
	✓	Dead animals (Numbers)	0	Max 1	Last 7 days
Feeding	✓	Energy efficiency (%)	97	Min 93	Last feed control
	✗	Milk minus feed cost (kr/kg ECM)	1,38	Min 1,50	Last feed control

Figure 3. KPI Example

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also benchmarked against the comparison group, which is set from a number of characteristics. On a graphic display the achieved key figure is placed as shown below with yearly milk production per cow as example

In the Benchmarking module it is possible to set up your own report from a large number of key figures within the areas:

- Milk production.
- Reproduction.
- Health.
- Mortality.
- Meat production.

STATUS	NØGLETAL (ENHED)	OPNÅET	REFERENCE VÆRDI	MÅL	OPNÅET VÆRDI I FORHOLD TIL SAMMENLIGNINGSGRUPPEN	RANGERING
^ Basisoplysninger - Basisoplysninger						
	Antal årskøer (Antal)	89,4	91,7		25% laveste: 89,4 25% højeste: 104,5	
	Udsætterpct., køer (%)	52,6	29,4		35,2 - 49,6 52,6	
^ Mælk - YKTR						
	Årsydelse pr. ko (Kg EKM)	9.409	8.878	9.900	8.504 - 10.171 9.409	57 / 71
	Dagsydelse pr. ko (Kg EKM)	25,8	24,3		26,0 - 27,9 25,8	57 / 71
	Leveringsprocent (%)	98	98		97 - 98 98	

Figure 4. An example for the benchmarking report.

The analysing system

In the analyzing system the user can choose between a few dedicated reports. One of the Standard reports is the output of the milk recording, where analyses of the milk production, BHB and Somatic Cell Count test are put together in one report.

In addition the user can put together his own report from a huge number of analysis blocks on specific topics e.g. the history of a certain Key figure. Below there are examples of two Key figures, which can be relevant to put together in the same report.

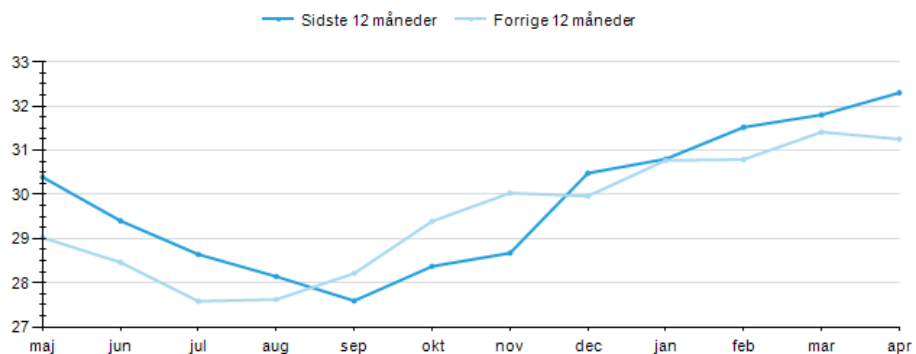


Figure 5. Daily yield per cow (Kg ECM).

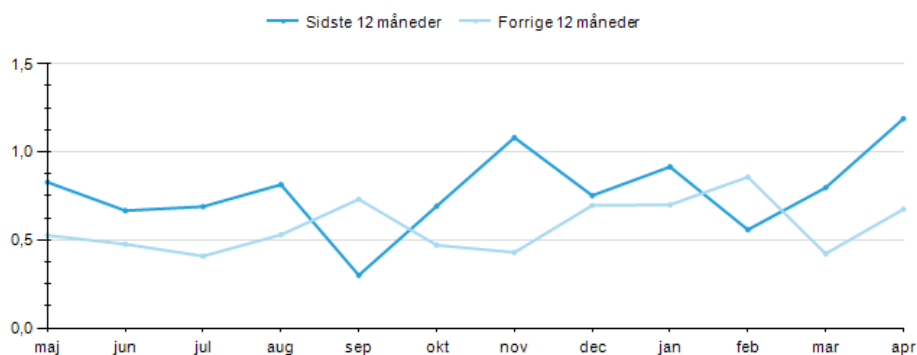


Figure 6. Incidence of recorded nutritional diseases.

The three described system are each included as modules in the total management system, DMS, which is a broadly used IT tool for the farmer and his advisors. In DMS the modules are integrated in each other so the user only has to enter the same data item once e.g. a goal for yield is entered under "goals" and is available in all modules

DMS is used for the mandatory and voluntary registration in the dairy (and beef) production. DMS is also used for feed management and economic management. 95% of the dairy farmer user of the Basic package of DMS.

With DMS the Farmer gets a "all in one" tool to manage his dairy production

Conclusion