Smart farming and new technologies for dairy herd management

In many countries the number of farms is decreasing, while the number of animals per farm is increasing, and this means there is a huge need for professionalism on farms. It is necessary to secure animal welfare, food safety, overall efficiency, profitability, and transparency as well as interfaces to third parties. Implementing an optimal herd management system on farm has become one of the most important success factors for modern sustainable livestock farming.

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DairyNet, the new herd and farm management product from GEA, is the solution to support on farm processes and herd management. It consists of a software part and a hardware part – the DairyNet Box – which is a local server to integrate all operational processes on a dairy farm and to ensure the security of the systems.

For real-time data it is valuable that a herd management system runs independently from network connectivity or internet availability with low transmission rates, especially in rural areas.

However, to be a state-of-the-art farm software solution a mobile connection to an App via Wi-Fi to the internet is a necessity as well. Due to the complexity of all that is happening on the farm, herd managers want to work in a more time and place independent manner, therefore milking results, key performance indicators, animal journals with all necessary information of an animal need to be synchronised between the mobile solution and the server.

Synchronisation essential

To use the main mobile platforms an App should be available for iOS and Android smart phones. Whether you are in the barn or on pasture the App should give the right information at the right time. In addition, animal actions, sorting commands or control parameters for the milking robot need to be entered immediately where they are needed.

It is a great help for the farmer if an app works online and offline; being in the offline mode the entered information is sent to the server when reaching the Wi-Fi local network again or when reconnected to the internet.

Synchronisation between the app and the server should be as often as possible to avoid too many interferences. Good value is automatically one time per minute if the app stays in the foreground.

Efficient and innovative technology networks data or information from various sensors as well as the performance of the animals. This makes it particularly easy to gain an overview.

To get a fast overview of the value chain a configurable user-defined dashboard is the tool to visualise and evaluate key performance indicators, reproduction success or the performance of the milking robot.

Clear and accurate information

The combination of key figures and graphics presents a lot of information accurately and clearly. A calendar reached from the dashboard shows all upcoming tasks at a glance, or the remains of overdue tasks; this helps to allocate valuable time flexibly and use free spaces sensibly.

By focusing on animal health a good herd management system can detect early changes in behaviour, milk yield, cell count classes and conductivity and, thanks to precise analysis and timely steps, the performance level can be quickly optimised. Another important role for sustainable dairy farming is feeding management and the feeding strategy. To feed the right amount at the right time and to offer good feed efficiency is the key for conserving resources and profitability of a farm.

Feeding with precision timing management systems should have functions for precise dosing, the temporal allocation of feed and delivery via connected feeding systems.

Feeding in the milking robot or in the feeding stations in the barn needs to be aligned to be really precise in given feed.

With a modern state-of-the-art screen design and great performance a management system depicts herd management functions including numerous technical processes.

An intuitive operation gives a fast orientation, clear presentation and

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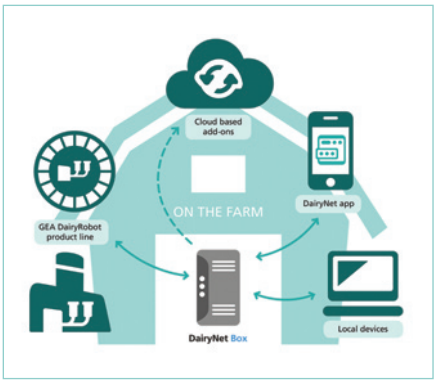
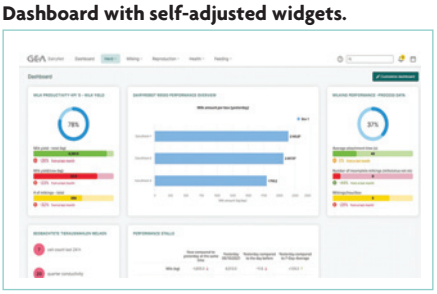
The infrastructure of the DairyNet system.



Dashboard with self-adjusted widgets.



Holistic view of the whole reproduction cycle of the whole herd.

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the important functions and information. Catchy icons and colour coding guide the user to the areas like milking, feeding, sorting, reproduction and health.

The GEA DairyNet has a strong connection to the sensors in the milk path – during each milking the colour of the milk, the conductivity and milk yield at quarter level is monitored. The cell count sensor DairyMilk M6850 is the first somatic cell count system to focus on each udder quarter individually during the entire milking process.

It uses EPT technology, a patented physical method with no resources or reagents. This modern technology gives high efficiency with no extra costs and guaranteed transparency. Every milking visit of a cow is monitored with these sensors to detect early changes in the milk, which very often leads to the first sign of any kind of sickness.

Monitoring cow movement

An additional sensor system – GEA CowScout – monitors the cow's movement at all times. It shows any periods of high activity for each individual animal and analyses the feeding, lying and rumination behaviour.

Therefore, it is an excellent basis for quick reactions and successful reproduction and health management.

The attentions from the CowScout system and the alerts from the cow's milk visit in the robot are transferred and interpreted in the DairyNet software, so that changes in the milk and behaviour can be combined to find conspicuous animals at an early stage.

Convenient data entry and documentation of all animal actions is an important pillar for optimal herd management. The easier the task can be fulfilled, the better the quality of data.

Reproduction, administration, and health actions can be carried out on the mobile phone, to be there where the action takes place. If the management system has a claw health section, it is nice to visualise every claw.

Sometimes one claw has more than disease or bandage or treatments. Being used globally it is worth combining the claw diagnoses with a kind of key bridge to the ICAR claw health catalogue.

In general, to have a bridge for all diagnosis to the ICAR diagnoses and treatment catalogue helps later for benchmarking and finding the right diagnoses even for sicknesses that have happened in the past.

Useful tool to see the development of cows in first, second, third and higher lactations.

Follow-up actions

Animal actions should be planned well, and follow-up actions should be carried out according to specific standard procedures. Therefore, these functions should be user-defined because herd management on farms varies a lot from farm to farm.

Feed is one of the huge cost drivers on the farm. To feed the right amount, feed curves for days of lactation and/or for milk yield can be carried out through particular feeding curves being visualised in an easy to understand way. Additional constant feed for sick cows, for example, can also be administered. It does not matter where the feed is given, every milking robot and every feed station in the barn needs to be connected. The ration, the feed allowance, the consumption, and the feeding remainder are monitored to the gram.

Visualisation, especially for reproduction and milk management, is of high importance. Heat or reproduction calendars offer an information overview of every animal in its reproduction status.

If a cow is in heat the blinking of this particular animal shows very prominent if everything is in line or if the farmer has to intervene.

Functions like zooming in, filtering specific animal groups being shown on such a reproduction calendar or reproduction wheel offer a visualisation of the fertility and health status usable for all farm sizes whether small or big.

Often it is useful to dig deeper into the details of a single animal. Features like mouse over or jumping from one page can offer that. Furthermore, reproduction KPIs like insemination index, calving interval etc can not be forgotten on a dashboard.

A configurable dashboard gives the right freedom to create the main topics to suit everyone's need. The performance of the milking system as well as the performance of the herd, a widget which cows shall be checked – the main information can be visualised at a glance.

A time saving tool for the user is the function 'My Menu'. A menu not only for the farmer, but for all employees or for the veterinarian or the feed consultant can be configured. It is quite nice if the single menu can be structured according to persons or topics, for example just for feeding or veterinarian checks.

Optimise herd efficiency

Lactation curves are a good tool to optimise herd efficiency. With the visualisation of first, second or third lactating cows in different curves you can see if the milking persistency is good and all animals develop as wished. Single animals can be compared to the average and the performance can be analysed immediately.

It is quite handy for the people working on the farm to visualise all sections of the barn. To change animals from one sorting area to another, a sorting command function is the means of choice which can be carried out on a mobile via an app.

Control functions for the robot such as closing the milking box, blocking the exit for a specific animal, setting the function 'do not milk that cow now' or 'do milk the cow', should not be neglected when designing management software.

One of the systems that fulfils the requirements of the dairy farmer is the GEA DairyNet. It has a holistic view of systems and animals and shows trends in milk yield, indications of sources of errors and key figures for long-term strategies.

These in-depth analyses and indications are a valuable tool for the efficiency and profitability of dairy farms. ■