

## DataHUB360°, data at the service of breeders

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The evolution towards the automation of dairy farms is booming in the agricultural world, the digital data of breeders must take the turn of high-speed exchanges and allow valuation for the purposes of advice, calculation of indices for the genetics, but also predictive models on milk production and also on the management of their herd with short and long term modelling.

With the arrival of robots, connected milking parlours and sensors installed directly on the animals, breeders' demands are exploding. Each automaton needs individual data such as the inventory and the events of all the animals to ensure their operation and feed their algorithm to alert breeders on a daily basis in terms of heat detection and health.

*Keywords: Cows, data exchange, platform, robot, sensor.*

The Eliance federation and its network have been tasked with developing a high-speed data exchange platform called dataHUB360°, to meet the demand of breeders and automaton manufacturers for the import of data in real time and the daily export. Today, each breeder in the process of installing an automaton requests the dataHUB360° link to have the history of inventory data and events for his breeding, and avoid entering this information manually.

The second step was to export the sensor data and ensure its daily delivery to the evaluation database.

The enhancement of this data has made it possible to offer new services to breeders, a comparison by type of feeding system, in connection with the milk production of his herd, but also to secure the data feeding the genetic system of tomorrow based on actual farm data.

### Abstract

### Introduction

## Valuation of the data for advise the farmer

### Function of datahub 360°

The dataHUB is a Web platform, dedicated to the dairy farmer which allows communication with APIs (Cloud manufacturer), but also with automatons on the farm, it is intended to be multi-platform and bi-directional in order to enhance the entry of data on the farm automatons, and avoid double entry by the breeder.

The main objective is to facilitate the exchange of information between the automatons deployed in the farms and the data present in the databases of the Livestock Consulting Companies.

To exchange data, the security of exchanges takes on its full extent, as a result the dataHUB contains a consent module and generates encryption keys specific to each farm, in order to guarantee perfect confidentiality of this personal data.

The system is also able to monitor data exchanges in order to know in real time the information that passes through the import and export of the breeders' automatons.

A monthly history will also be kept to know the data exchanged with the automatons of farms, in order to guarantee to the breeders a routing of the data on his breeding.

The system is able to connect to farm automatons installed on computers connected to the Internet network, but also on manufacturer Cloud systems.

All exported data is stored in Eliance Livestock Companies database and is used to feed applications for official milk performance as well as other milk performance tools focused on milk meter monitoring but also many other applications as indicated in following

### Use the data for genetic evaluation

The datahub solution makes it possible to export the production data of each dairy cow which is stored on the milking parlour automatons equipped with milk meters and identification, during the milk performance control carried out by Eliance Livestock Companies.

These data are processed and then formalized by Eliance Livestock Companies before being sent to the central genetic database.

### OriWeb, tools for robot

OriWeb was designed to meet 3 main objectives:

1. Ensure the processing of daily robot data in order to be able to introduce them into technical and genetic information systems such as 24-hour checks
2. Optimize robot data processing processes to facilitate and automate the marriage of robot and laboratory files during the milk performance.
3. Allow the breeder to have these results quickly as soon as they are processed by email.

The calculation of cows' milk production will now be carried out, as recommended by ICAR, over 96 hours instead of 48 hours, taking into account all production.

This change makes it possible to align with international standards, to get closer to manufacturers' averages and to reduce the effects of performance control on production in the context of busy stalls.

Several levers have been activated to gradually move towards full automation of the robot performance check processing chain.

An intelligent engine will search for the robot file information in the data collected by dataHUB, eliminating the need for manual robot file collection and integration operations.

Centralization of the calculation engine which processes the data as soon as they are made available by the dataHUB platform.

OriWeb has been designed to adapt to the specificities of each company, by offering a very wide level of configuration, which can personalize, restrict or not use the modules offered.

A follow-up module by monitoring milk meters allowing both early detection of meter malfunctions and extending the validity of the checks beyond 12 months, as long as the monitoring checks confirm the validity of the installation.

***ADesse: tools for monitoring Milk Meter***

This new module, currently intended for checks on milking parlor with milk meter, is a real source of savings for Eliance Livestock Companies who can reduce the frequency of milk meter check visits. This method uses a Dynamic Linear Model (DLM, West and Harrison, 1989).

The average milk yield per stand and milking session is calculated over all milking on that stand. The resulting stand average is compared with the overall average. The deviation will be close to zero for a properly working meter. A DLM is based on a comparison per milking session of the average per stand with the overall average

Milk forecasting is an important issue for dairy cooperatives or milk producer organizations.

***Res-Prévi: tools for dairy forecast***

Res'Prévi is the tool for producing and promoting milk production predictions for producer organizations and dairy cooperatives.

Res'Prévi uses two types of data: Data directly from dairies and data from milk performance. The dairies provide monthly milk delivery data for each farm as well as ancillary data (contracted volume and average milk price in the area). Eliance Livestock Companies provide all milk performance data, with also the data from dataHUB, animal variations in production as well as feed data.

The Machine Learning algorithm that was produced by the DataLab uses all the data described above to observe the impact of the variation of each of them on future milk production.

The model therefore learns from history to predict future data. The characteristic of Res'Prévi is that the model receives data very regularly, which allows it to adjust the prediction week after week.

The data from the dairies are transmitted each month and integrated by the DataLab.

Today this service is offered to 12 producer organizations and 1 dairy cooperative, representing 2,000 farms in France.

### **GenoCells®: tools for heath detection**

GenoCells® is a revolutionary technology to determine with a high accuracy the SCC of each cow directly from the DNA analysis of a tank milk sample. Used in France since 2018, this technology is based on the correspondence between animal genotypes (= genetic identity) and presence of their DNA via their somatic cells in the mixing milk sample. The SCC results from this disruptive genomic method are as accurate as traditional flux cytometry method ( $r^2=0.99$ ).

GenoCells® is more practical than a classic milk control operation because only one tank milk sample is necessary. This method can be performed several once in a year and is less expensive by 20% compared to the classic method.

The dataHUB platform makes it possible to retrieve the milk production of each cow between 2 milk tank pick-ups and allows this tool to save significant time for the return of the results to the breeder, whether for robots or milking parlours automated.

### **RoboMat: tools for robot valuation**

RoboMat is a data valuation software from robots and automated milking parlors of all brands.

All data extracted by dataHUB is used by the Robomat application. The goal is to provide appropriate and specialized advice to breeders equipped with automatons,

The system analyses herd performance quickly with or without performance monitoring.

The system produces indicators with real added value and complementary to those used in manufacturers' software. Data from dataHUB is routinely updated, every night at 5am.

The system makes it possible to define production objectives at the farm and to compare with other farms that are in the same production system. (Notion of benchmarking)

The use of filters (stages of lactation, type of livestock, type of cow, etc.) makes it possible to finely analyse the animals in the herd and see which ones are less efficient.

The system also tracks production level and cows that are less productive

### **Medria Solutions: sensor for cow monitoring**

Medria Solution supports breeders, advisory bodies and sectors by distributing monitoring tools and enhancing the resulting data.

The dataHUB platform is connected directly to the Medria API in order to import all farm data, and to export alarms in real time to other applications to carry out valuation and consolidate them with dairy data to alert the breeder.

Medria sensors monitor heat, calving, rumination and also animal comfort.

Work is in progress on thermal stress in order to measure the impact on milk production and to make farmers aware of the importance of animal welfare.

A study was carried out on the kinetics of the animal's weight during breeding. All data was obtained from the dataHUB platform and made it possible to perceive the importance of the energy balance during breeding, other studies are needed to confirm the influence of weight on breeding.

***Research: Influence of liveweight kinetics for insemination.***

Today, the data are in the farms and it is the farmers equipped with milking robots, automated milking parlours or sensors who are the data providers.

## **Conclusion**

The data begins to circulate for the needs of the breeders first to feed their automaton with inventory and event data. The use of data from automated breeders is developing, but the breeder must give his consent to use them and define the scope of their use. Data multiplexing is the next step because monitoring sensors or robot software also need other data from other controllers or sensors to operate.

The valuation of data in breeding is only beginning and the automatons must increase the scope of exportable data in order to allow the breeder to be able to share more data with his advisers, his experts in order to guide him, and advise him on the management of his herd.

Health data is an important issue, and must be harmonized to be usable for advice and study purposes.

New perspectives on artificial intelligence are in progress, but the algorithms need a lot of data to be robust, and research work is necessary for an optimum valuation of all this data.