Exchanging data from and into on barn automats and sensors

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Computerized procedures are progressively getting in farm business as any other business.

As size of herds increases, use of on farm automated cattle husbandry monitoring is developing. The number of computerized farm equipments, such as automatic feeders, milking robots, sensors, etc. is quickly increasing (for instance 10,000 milking robots in the world, in 2010, in quick progression). These devices produce many recorded data. Some of them are only useful to control the working automated system. But others can inform about the hard management status of each animal, his feed consumption, his body weight or milk production...

Manufacturers have made their own herd management software and sell it to farmers. But many of them have already implemented data import-export procedures to exchange some available data with other systems, among them milk recording organization central data bases.

Retrieving these data is for cattle organizations a challenge to succeed in order to be able to continue providing renewed services to farmers. It is also a challenge for farmers and their software providers in order to make interoperable the different parts of their information system.

This paper talks about some lists of questions that are raised by this challenge. It describes an import-export module developed to facilitate data exchanges with third party software.

Keywords: Computerized procedures, automated systems, data exchange, multi system data import, sensors.

1.0 Issues about data exchange

1.1 Which data should be exchangeable?

Automated systems may produce some data that are not relevant for use by a third party software. But every produced data related to the farm producing system, characterizing the cattle and individuals flock, should be available for the farmer, and reusable on any other electronic system for his own purposes. Farms are organizations. Automated machines are parts of their facilities and have to be able to share data with the farm information system. These data, some of them are phenotypes relevant for genomic evaluation, should also be easily (electronically) transmittable, under the control of the farmer, to milk recording and breeding organizations.

In the other direction, the farmer may want to enter herd data that are also useful for the working of the automated system, on a specific medium, rather than directly on the software linked to the automated system. He may use for data entering, another device such as a handheld computer, or a terminal linked to the cattle organizations data base. The software of the automated system must then be able to introduce them in its database.

1.2 Semantic definition and codification of exchanged data

The information extracted from automated systems must be interpretable. In practice, different farmers may be equipped with several kinds of automated systems (e.g. milking systems) and several kinds of external software. So, a specific type of software that would be implemented in several farms may have to exchange the same type of information issued from different brands of automated devices.

Therefore it is useful that a standardized conceptual data model defines animal event types to be exported. And that it is implemented by automated system manufacturer in their import-export module. The data model should allow to include the way that event has been captured: by which device, the
devices being registered elsewhere, in order to let the user decide whether data from different origins have really the same meaning.

Example of events: Animal milking, feed intake, artificial insemination, dry off, ...

Such an international data dictionary (ISO 11788) exists already. It should be updated to take into account new registered events and new captured data.

1.3 Physical level interchange protocols

The protocols to be used include different layers

- Type of medium: USB keys, Local network, hertzian way, Wi-fi, ...
- The file and message formats: Adis files (ISO 11787), XML files, ...
- The transport protocol: Ex: FTP or HTTP + WEB service (SOAP), ...

Iso has published Standard ISO 17532 which defines way to electronically exchange in real time data between on farm devices and partially with far external systems, and to add plug and play new devices to an existing local network.

The usable Physical level interchange protocols supported by commercial automated system are evolving. So, actually the farm management software has to adapt itself to the available protocols.

2.0 Example of one farm multi system data import – export tool

French and Quebec organizations (France Conseil Elevage and Valacta) have realized the importance of data exchanging with automated systems. They have built a common project to develop an internationally reusable import-export tool with on farm computerized system.

They worked with the 5 most important companies, leader players on the market of dairy cattle automated systems.

The import – export module may be interfaced with the respective automated system from these companies. This module is installed on the farmer’s computer in a specific folder. It dialogues at the initiative of the milk recording field staff, or at automatically scheduled times, with the executable program installed by the automated machine manufacturer. It may exchange data in both directions. The data exchanged at this level are formatted in ISO ADIS standard.

An XML message has been designed to be exchanged with any 3rd party systems. It is based on ISO data definition and codification. It lets transmit any animal event type. In the first release the set of
exchangeable event types are limited. The module can also export ADIS formatted message for milking organizations that use this format message.

The farmer may decide which kind of event data he wants to submit automatically to the automated system. For data to be input, the farmer may view, check and validate them before they are submitted to the software of the automated. So it is an appreciated help for the farmer who has not to key again already recorded data.

This portable module makes up for the incomplete standardization of import export modules on the automated systems. It permits the farmer to have his data at his disposal and to send them electronically easily to recording and breeding organizations. The next releases will add new types of events to be exchangeable, and new types of automated systems and sensors to take in account to exchange with them.