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 si ze of herds i ncreases, use of on f arm automat ed ca ttle hus bandry moni toring i s devel oping. Th e number of c omputerized farm equi pments, such a s au tomatic feeders, mi lking robots, s ensors, etc. is quickly increasing (for instance 10 000 milking robots in the world, on 2010, in quick progression). These devices produce many recorded data. Some of th em are onl y useful to con trol the wor king automated system. But others can i nform about the hard management status of each a nimal, 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 al ready i mplemented data i mport-export pro cedures to exchange some avail able data wi th other systems, among them milk recording organization central data bases.

Retrieving th ese data i s for cattl e organi zations a challenge to succeed i n o rder to be a ble to conti nue providing renewed rel evant servi ces to farmers. It i s al so a chall enge for farmers and thei r software providers in order to make interoperate the different parts of their information system.

This p aper ta lks a bout so me lis ts q uestions t hat are r aised by t his c hallenge. I t describes a n imp ort-export module developped to facilitate data exchanges with 3d 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 s ystems may produce som e data that are not rel evant for use by a 3d par ty software. But every produced data related to the farm producing system, characterizing the cattle and individuals flock, should be avail able for the farmer, and reusabl e on any other el ectronic system for hi s own purposes. Farms are or ganizations. Automated machi nes are parts of th eir facilities and have to be abl e to s hare data with the farm i nformation system. These data, some of t hem are phenotypes relevant for gen omic evaluation, should al so be easi ly (electronically) transmi ttable, under the c ontrol of the farmer, to milk recording and breeding organizations.

In the other direction, far mer may want to enter h erd data tha t are al so us eful for the worki ng of t he automated s ystem, on a specific medium, rather t han di rectly on the software li nked to the automated system. He may use for data entering, another device such as a handheld computer, or a terminal linked to the cattle organi zations data ba se. The softwar e of the aut omated system must th en be a ble t o introduce them in its database.

1.2 Semantic definition and codification of exchanged data

The i nformation extracted from automated syst ems must be i nterpretable. In practi ce, different farmers may be e quipped wi th se veral kinds of automated systems (e.g. mil king systems) and s everal ki nds 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 i t i s useful that a standard ized concep tual data model defi nes animal event types to be exported. And that i t is implemented by automated system manufacturer i n their import-export module. The data model shoul d all ow to include the way th is event has been ca ptured : by whi ch devi ce, the

devices bei ng regi stered elsewhere, i n order to l et the user decide whether data from d ifferent ori gins have really the same meaning.

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

Such an international data di ctionary (ISO 11788) exi sts al ready. It should be up dated to take i nto 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 publ ished S tandard ISO 17532 whi ch defi nes way to electroni cally exchange i n real ti me data between on farm devices and partially with far external systems, and to add plug and play new devices to an existing local network.
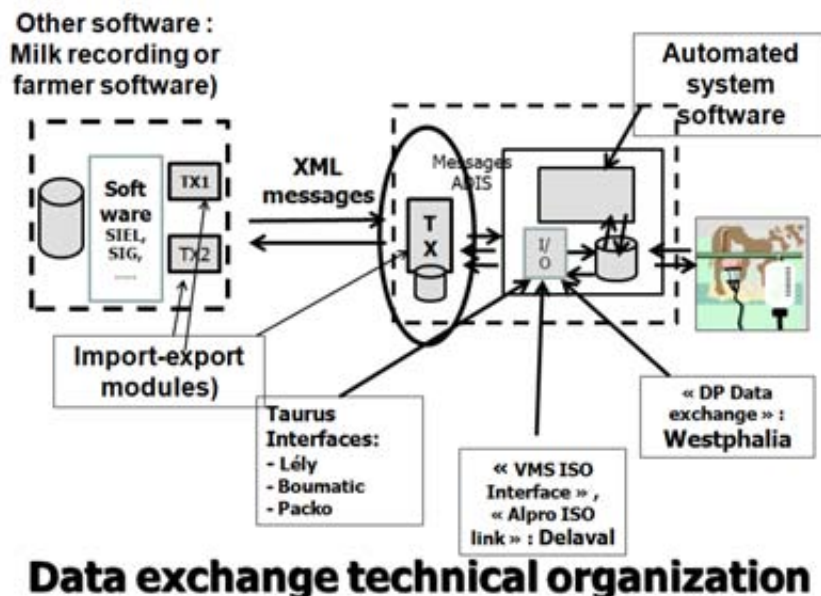
The usable Physical level interchange protocols supported by commercial automated system are evolving. So, actually the farm management software has to adapt itself to the available protocols.

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

French and Quebec org anizations (France Consei l El evage and Va lacta) have real ized the i mportance of data exchangi ng wi th a utomated systems. They have buil t up a   common proj ect to devel op a n internationally reusable import-export tool with on farm computerized system.

They worked wi th the 5   most i mportant compan ies, leader pl ayers on the market of dai   ry cattle automated systems.

The i mport – export mo dule may be i nterfaced wi th the respecti ve aut omated syst em from these companies. T his mo dule is in stalled o n t he fa rmer's c omputer in a s pecific fo lder. I t dialogues a t t he initiative of the mil k recordi ng fi eld staff, or at   automatically schedul ed t imes, wi th the executabl e program installed by the automated m achine manufacturer. It may exchange data i n both directions. The data exchanged at this level are formatted in ISO ADIS standard.

Data exchange technical organization

An XML message has been designed to be exchanged with any 3d party systems. It is based on ISO data definition an d codi fication. I t lets tr ansmit any   animal event type. In the fi   rst rel ease the set   of

exchangeable event types are l imited. The module ca n al so ex port ADIS formatted m essage for milking organizations that use this format message.

The farmer may deci de which ki nd o f event data he wants to submi t automati cally to the automat ed system. For data to be input, the farmer may view, check and validate them before they are submitted to the software of the auto mated. So i t i s an appreci ated hel p for the farmer who has not to key agai n already recorded data.

This p ortable mo dule ma kes u p fo r t he in complete s tandardization o f import e xport modules o n t he automated systems. It permits the farmer to have his data at his disposal and to send them electronically easily to recordi ng and b reeding orga nizations. The next rel eases wi ll add new types of events to be exchangeable, and new types of automated syste ms an d sens ors to take in account to exchange wi th them.