THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Animal Data Exchange Working Group.

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1 Background

At the end of 2015, a first version of ADE for data exchange between on farm data collection systems and central databases was completed.

It included:

- 15 messages to exchange, milking results, milk analysis laboratory results, animal movements and reproduction events.
- Principles for data exchange based on a client / server approach where the client is the on farm data collection system and the central data base the server.
- Technical specifications of the messages according to the XML[1] standard available through XSD files.
- Technical specifications for communication protocol in accordance the SOAP standard available through WSDL files.

At the end of 2014, some major manufacturers and recording organizations from France, Germany and the Netherlands committed to start pilot implementations in 2015. These projects failed in particular due to manufacturer priorities.

At the beginning of 2016, the working group decided to slow its works and to analyze the need for its efforts on behalf of ICAR's members through:

- Face to face meetings with the manufacturers during the first half of 2016.
- A survey sent to all the ICAR members and manufacturers in July 2016 which obtained 59 responses.

In September 2016, the working group met in Arnhem to share the background analysis and to draft a strategy for the future.

[1] Refer to section below for all abbreviations used in this report.

2 Survey Results

Detailed results are available in separate document.

2.1 Current situation

More than 60 % of the participants are already performing electronic data exchanges between on farm data collection systems and central databases. Several formats and communications protocol are used.

2.2 Opinions

For a majority of the participants, it is “very important” or “important” to retrieve data from on farm data collection systems to send them to a central database and to send data from a central database to an on farm data collection device.

A majority of the participants report that farmers consider as important the ability to seamlessly data transmission from their farm system to any central database.

Conclusion: ***Data exchange between central databases and on farm data collection systems are already widely implemented in both direction. ICAR members see data exchange a important for their own businesses and for farmers.***

2.3 Needs

Frequency of data exchange

For a majority of the participants, data exchange should be performed continually or at least daily in both directions. In addition 1 out of 2 consider that a majority of farmers would be willing to allow a permanent secure access to their on farm data collection systems for the purpose of data transmissions.

Data which should be retrieved from on farm data collection systems

For a majority of participants and in order of importance, the most important types of data to be retrieved are:

- Identification and animal movement including birth and death.
- Milk production.
- Health data.
- Mating.

Data which should be sent to on farm data collection systems.

For a majority of participants and in order of importance, the most important types of data to be sent to on farm collection systems are:

- Identification and animal movement including birth and death.
- Official milk records.
- Reproduction events.

- Milk test laboratory results.
- Mating.
- Genetic evaluation.
- Disease test laboratory results.

Main conclusions - Needs.

Data exchange should be performed in both direction: from the central database to the on farm data collection system and vice versa.

The core needs concerns data which are already widely used. There are new needs for new data but they are diverse.

Potentially any data should be considered. Not only milking data due to the link between on farm electronic data collection systems and farm management software since more and more manufacturers are providing both equipment and a farm management software.

2.4 Importance of international standards

70 % of the participants consider that international standards would deliver value to their business and that ICAR should deal with that issue.

In addition 70 % are aware that ICAR has already established standards for data exchange.

3 Does ADE meet the needs expressed through the survey?

3.1 Exchange features.

In compliance with the needs, ADE allows permanent data exchange in both directions.

3.2 Business content.

The current ADE version covers already more of the half of the most frequent data:

- Milking result.
- Milk test laboratory results.
- Reproduction events.
- Identification and animal movement including birth and death.

The most important missing data are:

- Health data from on farm data collection systems and from disease test laboratory results.
- Official milk recording.
- Genetic evaluation and genotype test results.
- Pedigree
- Mating recommendations

The gap between the needs and the current specifications may be easily overcome as long as the semantic content of data is well defined; for example official milking results. However in some cases, the lack of precise definition would make standard not relevant.

3.3 Technical specifications.

To ensure the success of ADE, technical specifications are based on only one widely used technical standard:

- XML for messages.
- SOAP for communication protocol.

It does not suit to other approaches based on JSON or RESTFUL which are also used by some members.

3.4 Main conclusions

ADE business content does not meet all the needs but it is in compliance with the most important ones and it might be enhanced easily and quickly as long as semantic definitions exist.

Technical specifications are the critical issue. The main concern is how to make the technical specifications as flexible as possible without jeopardizing the success of ADE because of a too wide range of technical diversity.

4 Stakeholder attitude.

The main ADE stakeholders may be distributed in:

- "Implementers", which may be distributed in:
  - "Early adopters"
  - "Other adopters".
- "Indirect beneficiaries"
- "Third party software editors"

4.1 Implementers.

Implementers are entities which should invest to implement ADE. Implementers include recording organizations or similar, related data processing centers, manufacturers and miscellaneous consortium such as "Farmnet365" in Germany, NDX in Scandinavia or "Smart dairy farming" in the Netherlands.

The survey and the meetings with the manufacturers confirm that:

- The majority of implementers support an international standard developed by ICAR.
- The current ADE version is in compliance with the more frequent needs as well with the state of art of ICT.

Considering that ADE has addressed the lack of international standards which was one of the bottlenecks, the key prerequisite is now a critical mass of users to make the investment in ADE profitable. The critical mass is a group of significant recording organizations and manufacturers.

The working group considers that some European organizations might be the starting point as long as they harmonize their demands addressed to the manufacturers on two main issues:

- **Date:** start operating the ICAR ADE services in 2018.
- **Type of demand**: not replacing the existing interfaces, but addressing the need for new ones.

4.2 Indirect beneficiaries.

Indirect beneficiaries do not invest but they get benefit from an improvement of data exchange between on farm data collection systems and central data bases. That group is diverse. The main categories are:

- Farmers using an on farm data collection systems.
- Artificial breeding organizations.
- Research and development organisations.

That group is not in favour or against international standards considering the results more important than the way to achieve them.

Farmers

The survey confirms a good level awareness of farmers of data exchange between central databases and on farm systems. Furthermore, ICAR's members believe farmers would be willing to give secure access to on farm systems for data transmission. The main benefits are to avoid double data entry and a more transparent way to monitor data flows between farms and central databases. Farmers are considered the most important group of beneficiaries.

Artificial breeding organizations.

For artificial breeding organizations the main benefit is to access to new data or to more data to improve genetic evaluations for their breeding programs.

Research and development organisations.

Currently, how combinations of huge amounts of diverse data can be analysed to improve decision-making is an important research topic. That activity may also benefit from an improvement in data exchange between central databases and on farm data collection devices.

4.3 Third party solution providers.

In many cases data exchange is performed through third party solutions. Several solutions have been developed to communicate with different on farm data collection systems through a lot of heterogeneous interfaces. Some of these solutions are marketed by farm management software providers, others are developed by recording organizations. In some countries farm management software providers play a key role in data exchange. The implementation of an international standards would have an impact on that business by reducing the cost maintaining many difference data exchange systems.

5 Recommendations for the future.

5.1 Continue to develope standards

According to our survey, international standards are important to making data exchange between central databases and on farm data collection systems easier, faster and more reliable.

The working group members consider that ICAR should edit and maintain these standards which are already rather well known.

However to avoid unjustified duplication of efforts, ICAR should coordinate its activity with the two main standard makers, ISO and UNCEFACT. Furthermore, internal duplications within the ICAR working groups should be avoided.

5.2 ICAR guidelines

Even there is no implementation, the current ADE version which meets the most important needs and which is in compliance with state of art of ICT should be submitted to the approval of members.

5.3 Road map by mid 2018.

Considering that a critical mass of users may be existing by the end of 2018, ICAR should take the following provisions:

Fostering and supporting early adopters.

ICAR should support as much as possible the early adopters by:

- Regular contacts.
- Monitoring progress.
- Sharing information.
- Responding in a reactive manner to any demand dealing with the ADE.

Issuing a reviewed version 1.9 for the early adopters by mid-2017.

The results of the survey confirming that the existing messages meets already an important subset of the needs, the priority should be not the business content but to make the technical specifications as flexible as possible without jeopardizing the profitability of the investments because of a too wide range of technical diversity.

By mid-2017, a reviewed, version 1.9, addressing at least the following technical issues should be issued:

- Message syntax: XML, JSON, JSON + XML + CSV…
- Communication protocol: SOAP, REST, SOAP + REST…
- Roles during the communication: is the equipment always the client? Might it be also the server?

Issuing a new version 2.0 by mid 2018

As long as early will have started using ADE, a new version should be issued by the mid 2018 to take into consideration the feedback from the early adopters and to enlarge the business content to close the gaps identified by the survey.

Abbreviations.

ADE	Animal Data Exchange
ADED	Agricultural data element dictionary
ADIS	Agri-cultural Data Interchange Syntax
CSV	Comma-separated values
FTP	File Transfer Protocol
ICT	Information and communication technology
ISO	International Organization for Standardization
JSON	JavaScript Object Notation
REST	Representational state transfer
SOAP	Simple Object Access Protocol
UNCEF ACT	United Nations Centre for Trade Facilitation and Electronic Business
WSDL	Web Service Description Language
XML	Extensible Markup Language
XSD	XML Scheme Description