SmartCow

an integrated infrastructure for increased research capability and innovation in the European cattle sector

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Newsletter – Issue 4

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Summary

Editorial

In this difficult period that all the countries of the world are going through, I hope you are safe and healthy.
The SmartCow project is now in its third year. During the two first years, we succeeded in creating a network of research infrastructures (RIs) and giving access to non-partners organisations, including private companies, in launching a series of joint research activities and actions on data, samples and methods, reflection on ethics in cattle experimentation and training activities.
Networking activities have started to create a unique portal to key European cattle RIs. In the next months we will further develop the interactive map and display information on around 40 research infrastructures outside the consortium that have responded to the online survey that was launched in 2019. A book of methods on cattle physiology and behaviour is currently in development and will be published beginning 2021 to provide guidelines for measurement of anatomic, digestive, metabolic, and behavioural traits in cattle. The focus is on methods that are novel, no or minimally invasive as well as less intrusive towards the animal. First outcomes of joint research activities are expected this year with the results of methane recovery tests on respiration chambers, the selection of the most promising proxies to predict feed efficiency and gas emissions in cattle, and the first algorithms to phenotype cattle traits from activity sensor data.
Training activities to upgrade young researchers in key methodologies available in the different SmartCow RIs were very successful in 2019 with 30 students trained during face-to-face courses and 150 students that attended a webinar. The training program will continue this year and details of the program are available in this newsletter.
The two first calls for transnational access to SmartCow cattle RIs allowed us to support 16 new research projects that represent more than 6000 experimental cow-weeks. Five projects are already completed and the other are ongoing or will start in the next months. The third and last call for transnational access projects just opened on April 1st and will be closed on June 25th. We draw your attention that there are still many experimental possibilities in particular at Teagasc Moorepark and Grange (Ireland) and FBN Dummerstorf (Germany) facilities.
Despite the Covid-19 epidemic currently raging in Europe, we are doing our best to continue the activities of the SmartCow project in the current period. We had to postpone our annual meeting scheduled for March to October. Some experiments had to be interrupted or postponed, but will resume as soon as possible. The European Stakeholder platform will be inviting to a remote meeting and 3 stakeholders events are scheduled by the end of 2020 (in Germany and Netherlands in October; Belgium on Nov. 20th; France at Rencontres autour des Recherches sur les Ruminants scientific congress early December). Finally, we hope to be able to attend the EAAP congress in Porto (Portugal) actually planned from August 31st to September 4th to present some results of the projects and discuss with all of you.

René Baumont (INRAE) - SmartCow coordinator

Fitter Livestock Farming Press Release Seminar "What research and innovation can deliver to support climate mitigation and adaptation in livestock farming?"

In Horizon 2020 many projects share the same concerns, and the EC incites them to do a joint dissemination, to gather their objectives, pool their results and their stakeholders, and organize joint communication events. In the field of animal science, the CDB Fitter Livestock Farming has been created, and at the moment six projects do participate to it (SmartCow, FeedaGene, Image, Saphir, GplusE, and GenTORE which coordinates the CDB). This joint tool has been created with the support of the EC, and Trust IT-Services helps managing it. SmartCow participated on 6th November with the five other projects to the second event organized jointly by the CDB to promote the results of the projects. It took the form of a well-attended afternoon seminar, focused on "What R&I can deliver to support climate mitigation and adaptation in livestock farming", organized jointly by the CDB and ATF Animal Task Force, in the frame of the 9th ATF seminar in Brussels

The CDB cluster will continue, and other new research projects might join it when Horizon Europe will have been launched. New joint dissemination activities such as sessions in scientific conferences (e.g. EAAP Davos 2021) and another annual meeting in Brussels will be organized.

To know more about this second event read the press release and see René Baumont's interview (SmartCow project coordinator).

Results of the Second Call for Transnational Access projects

The Transnational Access (TNA) programme of SmartCow makes available cattle research facilities of SmartCow partners for research by academic or industry colleagues from other (mainly EU) countries. There are eighteen research installations in seven countries, covering a range of cattle types managed in diverse husbandry and feeding systems. They include the most advanced animal science technologies applied to cattle in the fields of nutrition, physiology, ethology and animal husbandry. Successful bidders receive funding to cover the operating costs of facilities.

At our First Annual Project meeting in Dumfries, we reviewed the research priorities for TNA and decided that they should remain unchanged as: Efficient use of feed resources; Mitigation options to reduce GHG and other emissions; Efficient and robust animals, adaptation to climate change; Animal health and welfare; Product quality; Precision cattle farming; and Basic science for applied and integrated approaches.

The second call for proposals was launched in April 2019, pre-proposals checked over the summer and sixteen Full Proposals were by submitted 30th September 2019. We are grateful to our panel of expert reviewers, who helped in evaluating the projects so that we could announce projects to be supported by early December 2019.

Six proposals were selected for support through the TNA programme and these came from both industry and academic organisations based in the Spain, Switzerland, Ireland, Norway, France and the UK. Organisations providing access to their facilities for the projects are: INRA, SRUC, University of Reading, FBN and IRTA.

The new projects cover a wide range of topics, including two projects looking at animal and dietary factors affecting methane emissions and the rumen microbiome; projects exploring the effects of novel feed ingredients and feed processing methods - both for organic and mineral diet components. Precision Livestock Farming technologies are another important focus for SmartCow and were represented in this round of TNA projects through applications to monitor reproductive function.
The Third and Final call for TNA proposals is underway – using a one-stage submission process with submissions due by final deadline of Wednesday 25th June 2020 (see below for more details).

Third TNA call is launched!

SmartCow Transnational Access: Third Call for proposals launched
Free access to the leading European cattle research facilities

We are pleased to announce the launch of the third call for proposals for Transnational Access (TNA) within the SmartCow project. The TNA call makes available cattle research facilities of SmartCow partners for research by academic or industry colleagues from other (mainly EU) countries. The facilities include the most advanced animal science technologies applied to cattle in the fields of nutrition, physiology, ethology and animal husbandry. Successful bidders will receive funding to cover the operating costs of facilities and travel expenses to visit the facilities, but not their own costs.

For more information and application visit the special section of the SmartCow website where you will find all the details about the third TNA call. Deadline for application**: Wednesday 25th June 2020.**

Don't miss this opportunity!

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TNA experiment at Aarhus University

Last summer Francisco Maroto from the University of Cordoba, Spain visited Aarhus University and together a project with focus on "From feed composition to animal performance by using Near Infrared Spectroscopy" was planned in detail to run over the summer. We planned to have four TMRs with variable composition during the experiment, in order to have variability in animal response, measured as feed intake and milk production (needed for NIRS calibrations). For that, we replaced a portion of the high-quality forage in the ration with straw (0, 5, 10 and 15% in the different experimental groups, Figure 1). We can see this variability in the spectral signals of the different diets, although there is also some overlap. Francisco and his colleges are now working on publishing a paper including the results. The main challenge of this research is the definition of animal response reference data to build NIRS calibrations. Several options are being explored. The visit and skype meetings every second week during the experimental period were very important for a common understanding and a successful outcome.

Rations - © Copyright AU

Feed bin - Copyright Francisco Maroto Molina

Agrimetrics launch cloud-based data platform and hold Database Users' training & 'VoCamp'

Agrimetrics have delivered a cloud-based data platform for the SmartCow project (Work Package (WP) 3; Deliverable 3.2). This data platform will facilitate the sharing and exploitation of data generated by the research institutes (RIs) in the SmartCow project, contributing to increased research capability and innovation in the European cattle sector.

Workshop attendees Cécile Martin (INRAE), Björn Kuhla (FBN), and Les Crompton (UoR)- Copyright Agrimetrics

The platform was designed to ensure the interoperability of the data gathered in the project. It allows researchers to upload and link data with that of other groups of researchers. The linking is achieved through an ontology - developed by Agrimetrics with input from ATOL experts - representing the data and concepts used by the researchers working within the SmartCow project. Data that was not collected or observed at the same time can now be queried together and exported, into an environment of the user's choice, for further analysis.

Led by Anisa Aubin (Customer Delivery Manager) and Monika Solanki (Data Scientist), Agrimetrics held the first database users' meeting (Milestone 29) on 13th and 14th February 2020, in Paris. This meeting comprised training on using the platform and incorporated a 'VoCamp': a workshop giving the data owners in attendance (representing the majority of WPs and RIs) the opportunity to provide input to the development of standard vocabulary concepts for the SmartCow project.

Users' Training

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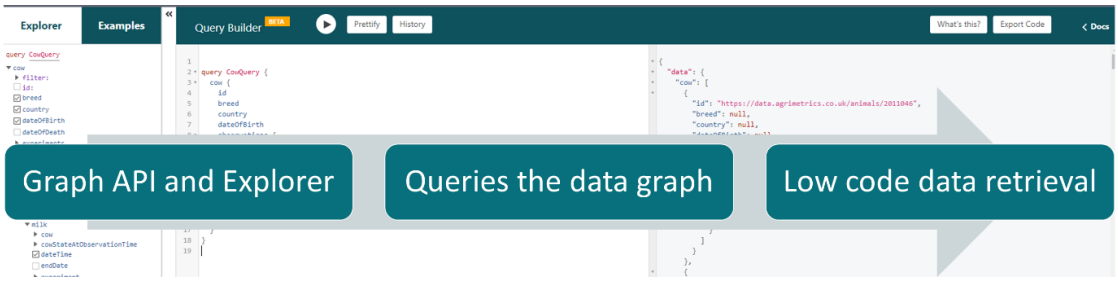
The data platform training was delivered in a hands-on session, followed up with comprehensive user documentation distributed to participants. It comprised training on how to upload data to the platform (via the Catalogue) and how to query the data using 'SmartCow Query Builder', a customised version of Graph Explorer created for the project.



SmartCow Query Builder: a user interface allowing researchers to query and export data to an analysis environment of their choice – Copyright Agrimetrics

An objective of the workshop was to collect and collate feedback from users to inform both further development of the platform and future updates of the Data Management Plan (DMP). Consequently, the next update of the DMP will include further information and clarity on how Agrimetrics ensures that the research data held on the platform is secure, including the process for assigning permissions and access. It will also include a section on how the long-term sustainability of the cloud-based data platform will be managed.

VoCamp

The need for standard vocabulary concepts was identified during the initial development of the data platform. In the course of the project many partners have uploaded data and, amongst these, a variety of formats (languages, entities, units) and conventions (nomenclature, date/time notation) have been observed. The development of a shared vocabulary and naming convention for the SmartCow project will make it easier to integrate, link and compare data.

During the workshop, data headings and data associated with different domain areas (animal behaviour; milk production; nutrient utilisation & efficiency; gas emissions; animal information) were reviewed to identify the commonly reported parameters for which the terminology used is inconsistent. The workshop outputs are a proposed convention for data headings and, for each domain area, a list of recommended standard terms for the commonly reported parameters identified. These outputs will be communicated to all SmartCow partners, along with a template of data headings to standardise the format of uploaded data, in due course.

Sincere thanks to all those who participated and helped to make the workshop a success. If you are a data owner and have not yet used the platform, Agrimetrics invites you to create an account by visiting app.agrimetrics.co.uk and emailing help@agrimetrics.co.uk for instructions on viewing the catalogue and uploading data.

Validation of equipment to record eating behaviour

In WP7 we have validated equipment to measure eating behaviour in collaboration between AU, INRA and IRTA. We used the guideline to develop protocols for the validation.
The results of the validation show that both visits to the feeders and duration of eating are measured with high accuracy and precision, there were only few seconds difference between the observed visits duration and the automatically recorded duration (Table 1). However, occasionally, cows perform other behaviours than eating when they are at the feeders and in that case, the duration of eating is not as accurate. The duration of not eating while at the feeders varied between facilities, during long visits (>600 s) cows at AU spend more time not eating when visiting the feeders than cows at INRA and IRTA (27 s versus 12 and 0 s respectively).

Table 1. LSMeans ± standard error (SE) for the difference in duration between observed duration in feeder and as registered by the system per location and observation of short (< 150 s), medium (150-599 s) and long (≥ 600 s) visit durations (s)

	LSMeans ± SE (s)
AU	-0.21 ± 0.14[a]
INRA	-2.63 ± 0.29[b]
IRTA	0.40 ± 0.19[c]
Short (< 150 s)	-0.50 ± 0.17 [a]
Medium (150-599 s)	-1.03 ± 0.15 [b]
Long (≥ 600 s)	-0.92 ± 0.21 [b]

* Different letters in superscript within group and column indicate significant differences P < 0.05

Post-doctoral position

A Post-doctoral position is available within SmartCow project at INRAE Clermont-Ferrand/Theix, France: "Refining methods for nutrient use efficiency measurement in cattle".
Deadline for application: **30th May 2020**. For more information and application read the job vacancy.

For more information visit our website: www.smartcow.eu

Twitter: @cow_smart - Facebook: @smartcowproject