SMARTER

SMAll Ruminants breeding for Efficiency and Resilience

Newsletter – Issue 3

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Contents

Editorial

SMARTER has hit the ground running during the first 18 months since its inception (November 2018). The reason is because the scientists and industry partners have built into the project, a combination of existing and new data sets to address the key questions in the project specifically related to sheep and goats. Much of the key messages that will emanate from the project rely on sound data recording both from industry and experimental populations of animals, with the focus being on characteristics associated with offspring performance coupled with maternal efficiency. We have begun to disentangle the genetic basis to new traits associated with animal resistance and resilience to disease as well as key aspects underpinning performance and profitability. As well, new definitions and ways of recording feed efficiency and other key traits important for animal efficiency and resilience, will enable the results from this project to provide practical advice to farmers and policy makers alike.

By combining the research focus around key production traits as well as widening breeding objectives to capture key aspects of animal resilience, we are then able to better understand any possible trade-offs that might be associated with breeding programmes that combine both. To this effect, SMARTER is both undertaking modelling as well as data analyses to better understand the genetic relationships amongst resilience/ resistance and productivity, so that the implications of combining (potentially) antagonistic breeding goals can be determined. The impact of this information will be that the results will be tested for use in practice to be then applied in national (and potential international) breeding programmes. You can read more about this latter aspect of the project in the 'International Evaluations' section of this newsletter.

SMARTER welcomes any group associated with sheep and goat production to become stakeholders of SMARTER, which then enables the impact of the results to be spread more widely. To this end, we welcome two new stakeholders from Italy and Cyprus onto our stakeholder group, which we anticipate will benefit from our interactions with them in the future. We also have gained two new partners to the consortium from the UK/New Zealand and Italy. You can read more about these new stakeholders and partners below.

Despite the COVID-19 pandemic, SMARTER partners have demonstrated their 'resilience' to the crisis by being able to deliver to the major milestones for much of the data-driven areas of work. However, some of the

experimental work has had to be postponed, and we anticipate being able to 'catch up' over the remainder of the project albeit with some alterations to plans and deadlines. As we adapt to having shifted much of our working lives to being online and at home together with children, pets, deliveries noise and other demands, we are fortunate in having already built strong working relationships amongst people who share their passion internationally in the development of resistance and resilience breeding solutions to the small ruminant sector.

COVID-19 IMPACT

The sanitary crisis impacted the SMARTER project. Several WPs had to stop their experimentations and delays are expected in several activities. An evaluation of the COVID-19 impact is on-going at the WP scale. The outputs of this evaluation will be presented to all partners and the REA to take potential remediation measures.

2 New partners in our SMARTER project: AbacusBio and CNR

AbacusBio

Tim Byrne - © Copyright AbacusBio

AbacusBio are specialists in breeding program design and evaluation in livestock, crop, forestry and aquaculture industries. The company has recently become a partner in SMARTER as leaders of Work Package 7 (WP7). AbacusBio will provide advice on methodologies and tools to support the project partners in the development of balanced breeding goals for agro-ecological resilience. As well supporting WP7, AbacusBio will complete task 7.4; this task involves quantifying the responses to selection in novel efficiency and resilience traits and identifying any trade-offs between genetic gain in these traits and productions traits, across breeds and systems. A key part of AbacusBio's role will therefore be to combine findings from other Work Packages (such as novel efficiency and resilience trait definitions and variance components) with novel economic and participatory trait weightings, developed in WP7. AbacusBio have broad experience in designing breeding goals and simulating breeding programs that balance economic, environmental and social traits, and hopes to be able to support WP7 and the SMARTER project to generate meaningful breeding program outcomes.

CNR

Alessandra Stella - © Copyright CNR

The Institute of Agricultural Biology and Biotechnology is part of the National Research Council of Italy and has a solid expertise in genomic analysis, bioinformatics and biostatistics. The main involvement in SMARTER is in the management of data storage, analysis and integration and in the genomic characterization of hardy or underutilised breeds' environmental adaptation (WP4). In particular, integration of heterogeneous genotypic data (different genotyping platforms, builds of the genome, re-sequencing data) and phenotypic information will be applied to study genetic diversity and demography. Data produced within the project will be managed differently for short-term and long-term storage. A local repository, suitable for application of data standardization and integration tools, will be developed and managed locally, allowing privacy and secured access to SMARTER partners. In the meanwhile, suitable archives and suites for long-term data storage will be identified and appropriated automation will be prepared for data preparation and submission. Protocols and tools for data querying will be prepared in collaboration with DB curators.

New stakeholders

In January 2020, two new stakeholders joined the Project and a short profile of each institution is reported.

Agris Sardegna (Italy)

Agris Sardegna is a Research & Innovation Institute whose seat is in Sassari in the Northern Sardinia. The agency works to promote sustainable development of the agricultural sector and biodiversity in Sardinia. As "Istituto Zootecnico e Caseario" before and as Department for Research in Animal Science since 2007 has worked for more than 60 years on genetic improvement the Sarda dairy sheep breed which is the largest dairy sheep breed in Europe.

Agricultural Research Institute, ARI, (Cyprus)

ARI is a Research Institute under the Ministry of Agriculture, Rural Development and Environment of Cyprus. ARI is the only institute in Cyprus that conducts applied, innovative agricultural research aiming to create and transfer knowledge for the development of the primary sector and to solve problems at the farmer level. In addition to other research endeavours on small ruminants, ARI has worked on genetic improvement of the Cyprus Chios sheep and Damascus goats for close to 40 years. The Institution offices and experimental farm are situated in Lefkosia.

International Evaluations

Developing international sheep genetic evaluations is a key area of interest within the sheep industry and has particular relevance where high levels of across country trade exist. Currently genetic evaluations are estimated on a within-country basis only, with different countries measuring different traits, weighing at different time points and using different models for genetic analysis. As a result these current within country evaluations are directly not comparable across country meaning that we cannot (easily) compare animals from different countries. However, while international evaluations have not previously been derived for sheep, they have proven to be extremely successful in both the beef and dairy cattle industries with the development of Interbeef and Interbull, indicating that similar success could be achieved for sheep and goats.

In meat sheep, the foundation research underpinning international evaluations are currently underway as part of SMARTER, with Ireland and the UK being used as a case study. Phenotype data have been obtained from both countries for the Texel, Suffolk and Charollais breeds and strong links have been detected, with a total of 8,392 Texel, 3,313 Suffolk and 1,727 Charollais common animals identified between the two countries. Within this group of common animals, over 4,500 animals between the three breeds have progeny in both Ireland and the UK. Common growth and carcass composition traits were analysed between the two countries including traits such as early-life weight, scan weight, muscle depth and fat depth. Both univariate and bivariate analysis were performed on the data to produce international heritability estimates and international measure of genetic merit (i.e,. estimated breeding values; EBVs). Preliminary results from the international evaluations are very positive. Both heritability and EBV estimates were relatively similar to within country analysis but the accuracy of the EBVs improved within each country.

Based on these results, it is clear that international genetic evaluations could be of significant benefit to the sheep industry. Facilitating breeders to compare their animals on the same scale as those in other countries will enable more informed selection decisions at a genetic level. Furthermore, the increase in accuracy of EBVs achieved from the international evaluations should also increase rates of genetic gain achieved within each country which in turn will be of economic benefit to the entire sheep industry.

In the framework of the WP6, this foundation work undertaken in Irish and Scottish meat sheep will be extended to French meat sheep, and will be performed as well in dairy sheep (France and Spain) and in dairy goats (France, Italy, Canada, Switzerland).

First batch of practice abstracts for end-users.

The first batch of practice abstracts for end-users produced by the partners of the EU project SMARTER (SMAll RuminanTs breeding for Efficiency and Resilience) gathers six abstracts related to the WPs 1, 5 and 6 of the project. A practice abstract is a short summary in easily understandable language, of re-usable results produced by the research project. The targets are practitioners and stakeholders. The focus is on results and recommendations that can be used in practice. You can read the abstracts here.

SMARTER's session at EAAP 2020 virtual annual meeting

In light of the uncertainty about the COVID-19 pandemic and the difficulty in making plans about hosting a major International conference, the EAAP 2020 Annual Meeting will be held as virtual event from 1st to 4th December 2020. Before the beginning of the pandemic, in the frame of SMARTER's Task 8.2 (Dissemination and training for scientific community), a global abstract for a one-day session had been submitted by the coordinator Carole Moreno-Romieux, under the title: "SMARTER EU project: Breeding Small ruminants for efficiency and resilience". 16 abstracts have been submitted and the session will be organized as a virtual session at the 2020 Virtual EAAP Annual Meeting. More information coming soon on SMARTER website.

ICAR Meeting 2021

The ICAR meeting 2020 (Leeuwarden, The Netherlands) has been postponed to April 2021. Given the circumstances due to Coronavirus pandemic, the ICAR/Interbull 2020 conference which was due to take place from June 8th to June 12th, 2020 in Leeuwarden, The Netherlands, has been postponed to 2021. The ICAR Board decided to hold the ICAR/Interbull 2021 conference in Leeuwarden, The Netherlands from the dates of April 26th through April 30th, 2021. The technical session planned on efficiency and resilience in small ruminants and centered on SMARTER project will be maintained for the meeting in April 2021.

3 presentations are scheduled on SMARTER:

- Selection tools to benefit from international cooperation in small ruminants: a comprehensive work package of the SMARTER project (Astruc et al)
- A stakeholder platform to disseminate results from SMARTER project (Burke at al)
- SMARTER: which novel traits to improve feed efficiency? (Tortereau et al)

Take note that the 2021 conference will be a joint ICAR and Interbull meeting. For more information please visit the website.

Jacques-Raymond Brascassat : A goatherder and his flock in an Italianate landscape, possibly Faleria

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