

SMARTER

SMALL RuminanTs breeding for Efficiency and Resilience

Newsletter – Issue 7



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SMARTER Fourth Annual Meeting! – by R. Rupp and R. Bica

SMARTER has held its fourth annual meeting between the 18th and 19th May 2022. This was the second in person meeting which the SMARTER project has done since the first one in Edinburgh. This is great as past meetings had to be done online due to the ongoing sanitary situation. The agenda included a first day in which each WP could present the work they have been undertaking, followed by a second day more focused on the stakeholders involved in the project. In total 70 people attended, 53 in person and 17 online. Two days prior to the start of the meeting, a WP4 statistics course was held in Leon (16-17 May) which helped understand and manipulate the SMARTER database with interesting presentations on landscape genomics, population statistics and several others. This meeting was the opportunity for all partners to exchange and present what has been done, with just over one year left in the project timeline. The main practical work packages of the project (WP1-3) went through the deliverables and milestones which they have achieved and those that are still due because of Covid. A common theme for the WP's is the need to identify appropriate GWAS (genome-wide association studies) data which will allow to find loci controlling feed efficiency (WP1), disease resistance (WP2) or both resilience and efficiency traits as evidence of pleiotropy (WP3). All work which has yet to be completed is in line with the new updated timeline of the project ending in June 2023. Substantial contribution to the development of the supporting theory for genomic evaluation ssGBLUP was done within WP5. The concept of reliability assuming metafounders was formally defined, and the associated methodology on how to calculate it was properly derived. Advances in improving and testing methods to calculate the gamma matrix, which quantifies the genetic relationship between metafounders, were also achieved during this period. In WP6, work is being undertaken to produce a document containing 3,000 informative SNPs, which will be circulated to all partners. Our Uruguayan partners presented a comprehensive multicriteria assessment of sheep systems, including impact on methane emissions, soil, water quality and biodiversity (WP7). In terms of dissemination of project material (WP8), prizes were given to the partners which contributed more material to aid dissemination, with INIA's Gabriel Ciappesoni claiming first prize and securing himself some delicious chocolate and parmesan! Partners were also urged to



upload all data which has been published in SMARTER publications to a common data repository (WP9) as this will facilitate things for the end of the project. The stakeholder sessions focused on whether the stakeholder's expectations were met following the first in person meeting in Edinburgh, how the project dissemination is going and what they think on the future of the project as well as beyond it. One question was raised on how to value the underutilized breeds compared to large commercial populations that can be involved in transnational genetic evaluations. Overall, a very good discussion was had. With the project coming to an end, discussions were had on potential dates for the key events which are still to come. The summer school, which had been delayed, will now most probably happen in March 2023 in Toulouse as well as the final SMARTER meeting which is still scheduled for Toledo in May 2023. Therefore, there are exciting things to come from the project and if you would like to be kept updated with all the latest information, follow us on our social media: [Twitter](#) and [Facebook](#).



Repeatability of health and welfare traits and correlation with performance traits in dairy goats reared under low-input farming systems – by S. Vouraki, A. I. Gelasakis, V. Fotiadou, G. Banos and G. Arsenos

The sustainability of low-input pastoral farming systems raising dairy goats, depends partly on enhancing animal health and welfare status. However, research on between-animal (co)variation of health, welfare and production traits is scarce. The objectives of the study were to estimate the repeatability of health and welfare traits and to investigate their association with performance of three breeds of dairy goats reared under low-input farming systems in Greece. A total of 1210 goats of Eghoria (n=418), Skopelos (n=429), and Damascus (n=363) breeds were assessed. Udder health, parasitic resistance, welfare indicators, milk yield and quality, and body condition score were recorded monthly for two consecutive milking periods. Udder health records included somatic cell count (SCC) and total viable count (TVC). Based on combinations of SCC and TVC and thresholds set at $>10^6$ cells/mL and $>2 \times 10^4$ cfu/mL, respectively, additional udder health phenotypes were defined. Parasitism included myiasis, tick infestation, gastrointestinal nematode (GIN) and cestode faecal egg count (FEC), and lungworm faecal larval count (FLC); infection regarding endoparasites was defined with FEC/FLC. Welfare



indicators included presence of ear and horn injuries, ocular and nasal discharge, body and udder abscesses, injuries and lesions of skin in different body parts, diarrhoea, hernias, overgrown hooves, arthritis, lameness, and udder asymmetry. Trait repeatability and animal correlations were estimated. Significant repeatability was reported for all udder health and most welfare traits in all breeds, GIN and cestode FEC, and GIN and lungworm infection in Eghoria, and myiasis in Skopelos breed. Correlations of health and most of welfare traits with performance were non-significant or favourable. Overall, results indicate that there is significant between-animal variation for udder health, resistance to parasitism, and welfare traits to support management and selection practices aiming to improve health and welfare status of Eghoria, Skopelos, and Damascus goats. Such practices could be implemented without compromising animal performance.

This study was undertaken by AUTH team in the framework of Smarter (WP2) and has been published in the journal *Veterinary Sciences* (<https://doi.org/10.3390/vetsci9060289>).



Eghoria goats - © AUTH

Influence of dietary protein restriction in prepubertal ewe lambs on first lactation milk traits and response to a mammary gland inflammatory challenge – by B. Gutiérrez Gil

In light of the increasing global protein prices and considering also the need to reduce nitrogen emissions from contemporary livestock production systems, the aim of the present study was to evaluate the potential effects of a protein restriction performed in prepubertal ewes, under commercial conditions, on first lactation milk production traits and the response triggered by an experimental inflammatory challenge of the mammary gland performed at the end of the first lactation. To that end, a nutritional challenge (NC) was performed on 40 Assaf female lambs, which were divided into two groups (n=20): the control group (C), which received a standard diet for replacement lambs, and the NC group, which received the same diet but without soybean meal between 3 and 5 months of age. After the first lambing of these ewes, milk production measurements were recorded. Approximately 150 days after lambing, 24 of the 40 ewes (13 NC and 11 C) were subjected to an experimental inflammatory challenge of the mammary gland using an infusion of *Escherichia coli* lipopolysaccharide (LPS).

Measurements of somatic cell counts (SCC) (as a local trait related to inflammation), rectal temperature and plasma concentrations of 14 cytokine/chemokine biomarkers (as systemic inflammation response traits) were collected at 11 time points from the intramammary infusion. In response to intramammary LPS inoculation, the SCC local indicator trait, rectal temperature, and five plasma biomarkers showed significant changes in basal levels across the dynamic analysis (IL-6, IL-10, CXCL8, IL-36RA and VEGF-A). The GLM analysis performed to assess the potential effect of the protein restriction on milk production traits in the replacement ewes did not show significant influences on any of the analyzed traits. Moreover, the studied diet did not significantly influence the local response measured through the somatic cell count (SCC) indicator. Regarding the systemic indicator traits, the protein restriction would have only influenced on the change regarding basal concentration levels of two of the relevant plasma biomarkers identified in response to the intramammary LPS inoculation, both of which are known to have regulatory properties of the inflammatory response (IL-10 and VEGF-A). Overall, our results would suggest that a protein restriction diet performed in replacement ewe lambs at prepuberal age may not have relevant effects on traits of major economic interest for sheep flocks, such as milk production traits and SCC. Further analyses using larger population sizes would be needed to confirm these preliminary results. The study is being prepared for submission to an international indexed journal.

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The national roundtables: 10 major events to disseminate to national stakeholders – by J.M. Astruc and C. Mosconi

Among dissemination events and communication to stakeholders, the national roundtables may be considered as a highlight in the SMARTER project, within the task 8.3 “dissemination and training for stakeholders”. These national roundtables are organized in 10 countries (the 9 European countries involved in SMARTER and Uruguay).

The objective was to present the main practical results of the project to national stakeholders, in the local language to better reach the breeders, the organizations involved in genetics, inter-professional organizations, partners of research and development institutes, policy makers and newspapers. The targeted audience was at least 50 people for each individual roundtable.

The following table presents the schedule of the different roundtables. Some having already been done, and some still to come.

Country	Organising partner	Date	Location
France	RDF	5-6 April 2022	Sèvremont
Uruguay	INIA_UY	21-22 April 2022	Tacuarembó
Hungary	UNIDEB	22 April 2022	Debrecen
Spain	UNILEON	6-8 June 2022	Valladolid (Foro Ovino)
Greece	FRIZARTA	25 June 2022	Agrinio City
Ireland	TEAGASC	12 July 2022	Thurles
Switzerland	FIBL	17 November 2022	Entlebuch
UK	SRUC	7 December 2022	Edinburgh
Italy	ARAL	6-10 February 2023	Padenghe sul Garda
Norway	NSG	17 February 2023	Tbd

Each organising country could rely on set of slides prepared by each technical work packages to present the objectives and the most relevant and practical achievements over the last 3 years. Beyond these common presentations, a custom part adapted to the needs of each country (traits-oriented, evaluation-oriented, breeding goals-oriented ...) gave the opportunity to go further in the discussion and to interact with the stakeholders. Finally, a moment of exchanges / discussions with stakeholders was suggested, to get feedback on the results and possible ideas to add within the last year of SMARTER.

Videos and material are available on [the dedicated webpage](#).

Breaking News! SMARTER goes to Qatar to play the 2022 football world cup!

The Uruguayan national team will dress men suits made of superfine wool from Uruguayan producers with whom INIA worked for more than 20 years. The idea was proposed during the Uruguayan SMARTER Round Table held on 21-22 April 2022 organized by INIA. A great collateral effect of SMARTER project. So let's go Celeste!



Photo credits: "Asociación Uruguaya de Fútbol (AUF)"

The Climate Action Award: another SMARTER synergy!







Gabriela Bordabehere in Milan

Another good news related to the synergies that SMARTER is causing in Uruguay. An Uruguayan Merino farmer Gabriela Bordabehere ([from La Soledad farm](#)) and Gucci received The Climate Action Award at Milan Fashion Week SS2023. Gabriela's farm together with other sheep producers are part of *Nativa Regenerative Agriculture program* (from Chargeurs Luxury Materials and Lanús Trinidad), in partnership with Gucci and supported by INIA. Much of the scientific knowledge that helped make trade deals a reality was done within SMARTER (WP7). Analyses of LCA, carbon stock, biodiversity (birds), Ecosystem Integrity Index (developed by Blumetto et al., 2019) and predictomics (for CH₄, RFI, GFW) were included.

In addition, Gabriela was the leading farmer [in the video of the Smarter Round Table in Uruguay](#), which also had a representative from the firm Chargeurs Luxury Materials at the discussion panel and in the video. For more information visit [the SMARTER webpage](#).

Coming events

List of the upcoming events with SMARTER project partners attendance.

Event 	Date 	Location 	Partners 
Summer School	27 – 30 March 2023	Toulouse, France	All partners
ICAR Annual Conference	22 – 26 May 2023	Toledo, Spain	All partners



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