Meeting of the ICAR Sheep, Goat and Camelid Working Group (SGC-WG)

Prague, Czech Republic, 18th June 2019
Opening and welcome

18 June 2019
8:30 – 13:00 am
Prague Congress Centre
Room Club A

Apologies from A Carta, D Brown, S McIntyre, M Antonini, E Ciani, E Wall
Agenda

1-Opening and welcome

2-Overview on the activities of the WG  
   - Inclusion of large camelids, membership, highlights 2018/2019, website

3-Activities of the meat recording EAG  
   - Draft guidelines: discussions

4-Activities of the fiber recording EAG  

5-Large camelids  
   - Survey on large camelids and preliminary results, future actions

6-Activities of the milk recording EAG  
   - Survey dairy sheep and goats

7-Information on SMARTER project

8-Technical session 8

9-Date of next meetings

10-Any other business

11-Closure
Overview on the activities of the working group

Inclusion of large camelids
Membership
Highlights 2018-2019
Website
SGC-WG : + Large Camelids

Meeting in Auckland: Elena Ciani and Pamela Burger, during the ICAR-WCGALP 2018, expressed their interest to include large camelids in ICAR.

Discussion with M Burke & B Wickham => proposition to extend SGC WG to large camelids.

Update terms of reference. Agreed by Board in November.

Sheep, Goat and small Camelid WG => Sheep, Goat and Camelid WG
Terms of Reference for the ICAR ICAR Sheep, Goat and Camelid Working Group

Version: 2.0
Date: 28th November 2018
Status: Board Approved.

Table of Contents
## Terms of Reference Large Camelids

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2018</td>
<td>Reformatted to comply with ICAR branding guidelines. Amended to avoid conflicts of interest by clarifying voting rights of members. Refer to 4 Governance. Amended to include a section giving context. Refer to 2 Context. Amended to include a section dealing with relationships with other ICAR Groups. Refer to 7 Relationships with Other ICAR Groups. Include updated priorities from Feb. 2018 report to ICAR Board. Extend ToR to cover all Camelids by removing reference to “small” Camelids in relevant places.</td>
</tr>
<tr>
<td>August 2018</td>
<td>Edits based on feedback from chair of SGC-WG. Updating expert advisory group descriptions in section 4 to ensure appropriate coverage for big and small camelid for milk, fibre and meat. Prepared for Board consideration.</td>
</tr>
</tbody>
</table>
SGC-WG : membership

- Large Camelids included in the Working Group => new EAG with 2 members:
  - Elena Ciani (Italy)
  - Pamela Burger (Austria)

- EAG Milk:
  - Danijel Mulc (Croatia) resigned

- EAG Fiber:
  - Jilin Louyujie (China) retired
  - Fabio Pilla (Italy) resigned

- Proposition to remove Juan Manuel Serradilla & Silverio Grande?
- Question about Alessia Tondo (replaced by another people from AIA)?
- From Sheep Ireland: Eamon Wall or Kevin McDermott?
- Find someone from South Africa?
- Find someone from a less developed nation?
Highlights since last session in NZ

Meat/Reproduction

- Preparation draft guidelines on meat and reproduction traits in small ruminants
  - Meeting in Auckland (Joanne Conington, Sharon McIntyre, Sheryl-Anne Newman, Daniel Brown)
  - Preparation draft: Joanne C. et al for reproduction, growth and carcass traits.

Milk

- Valorization of the on-line survey (dairy sheep and dairy goats)
Highlights since last session in NZ

Fiber

- Meeting in Rome 13 Mar 2019 Jean-Michel, Marco

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Actions completed/in-progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set up survey on wool recording and evaluation</td>
<td>Preparation questionnaire on wool: to be finalized at Prague meeting</td>
</tr>
<tr>
<td>Marco produces a draft guidelines on collection center for wool</td>
<td>Draft is in-progress. Should be proposed to WG in Sept.</td>
</tr>
<tr>
<td>Presentation state of the art on fiber/wool within ICAR (Prague - session 8)</td>
<td>Marco cannot come … presentation cancelled</td>
</tr>
</tbody>
</table>

Collection center = center to collect the wool and sort it according to quality + way to improve management of flock before shearing and also during shearing. Rules to produce the fleece.
Highlights since last session in NZ

Large camelids

- Introduction of camelids in WG (update of terms of reference)
- Preparation questionnaire on large camelids: circulate in English, French, Arabic … Great support of ICAR Secretariat on that
- Presentation state of the art on large camelids within ICAR (Prague - session 8)
The Working Group was endorsed at the 40th ICAR Biennial Session held in Puerto Varas and it is the result of the merging of three previous Working Groups (Performance Recording of Dairy Sheep WG + Goat Performance Recording WG + Animal Fibre WG).

In 2018, following a decision of the Board, the Working Group was enlarged to include Large Camelids (Dromedaries and Bactrian Camels). The new Terms of Reference for the newly-named “ICAR Sheep, Goat and Camelid Working Group” are available here.

This page shows introductory information about the Sheep, Goats and Camelids Working Group (in short SGC WG), the composition of the Working Group and documents related to the carried out activities.
ICAR website

Page dedicated to the SGC-WG

Chairperson

• Jean-Michel Astruc, Institut de l’Elevage (IDELE), France

Members

• Jean-Michel Astruc – French Livestock Institute – France
• Marco Antonini – ENEA – Italy
• Daniel Brown – AGBU – Australia
• Antonello Carta – AGRIS Sardegna – Italy
• Joanne Conington – SRUC – UK
• Silverio Grande – AIA – Italy
• Valerie Loywyck – French Livestock Institute – France
• Sharon McIntyre – Beef and Lamb Genetics – New Zealand
• Pera Herold – University of Hohenheim – Germany
• Juan Manuel Serradilla – University of Cordoba – Spain
• Mojca Simčič – University of Ljubljana – Slovenia
• Alessia Tondo – AIA – Italy
• Eva Ugarte – NEIKER – Spain
• Danijel Mulc – Croatian Agency for Agriculture and Food – Croatia
• Eamon Wall – Sheep Ireland – Ireland
ICAR website

Page dedicated to the SGC-WG

Guidelines and survey

The SGC WG has created three Expert Advisory Groups (EAG) to provide specialist and expert advice on topics of relevance to achieving the objectives of the Group:

- EAG on sheep and goat milk recording
- EAG on sheep, goat and small camelid fiber recording
- EAG on sheep and goat meat, reproduction and maternal traits recording
- EAG on large camelid recording

The SGC-WG maintains, updates, promotes and extends the following section of the guidelines:

- Section 14 – Alpaca and Goat Identification and Fibre
- Section 16 – Dairy Sheep and Goats

The SGC WG is currently working on establishing a section of the guidelines on meat, reproduction and maternal traits recording

Also, the SGC WG conducts and reports the results of the international survey on sheep and goats performance recording
ICAR website
Page dedicated to the SGC-WG

Documents related to the Working Group

For this Working Group, the following documents are available:

- Terms of Reference
- Pictorial summary of the organization of the group and the members

Documents produced during the ICAR Conferences

Auckland 2018

- Agenda of the ICAR SGC WG meeting held in Auckland on 9 February 2018
- Minutes ICAR SGC WG meeting held in Auckland on 9 February 2018
- Meat Trait Recording By Daniel Brown
- Sheep and Goats: Meat And Wool International Survey By Joanne Conington

Edinburgh 2017

- Slides presented at the meeting of the WG in Edinburgh “…” of the meeting of the WG in Edinburgh on 12th June 2017
- Minutes of the meeting of the WG in Edinburgh on 12th June 2017
- WG meeting held in Edinburgh: Presentation by Zdravko Barac on the “Report on the survey on goat meat recording”
- WG meeting Edinburgh: Presentation by Joanne Conington on “Meat sheep (??+goats?) performance recording guidelines”

Puerto Varas 2016 (Chile)

- Meeting of the WG in Puerto Varas on 25th October 2016 (Minutes – Slides)
Activities of the meat/reproduction recording EAG
Guidelines on reproduction, maternal and meat trait recording in sheep and goats

Feb 20th 2019, draft
May 20th 2019 draft #2

Draft #2 sent by Joanne on May 20th 2019
Circulated among working group on May 20th 2019
Guidelines draft

Next step?

Actions:
-take into account suggestions of the WG meeting
  WHO?
-re-reading:
  WHO?
    xxxxxxxxxx

-end of year (November): propose to ICAR Secretariat for editing
Agenda 4

Activities of the fiber recording EAG

Apologies from Marco who should come initially

Update members of the EAG fiber

IN

Marco Antonini – ENEA Camerino / Roma – Expert in fiber
Hugh Galbraith - Animal fibre biologist and expert in Angora and cashmere goat production
Claudio Tonin – Researcher in natural textile fibre
Rodolfo Marquina-Bernedo – Alpaca production expert
J.P. Gutierrez – Geneticist in animal production
Sun Haizhou - Expert in Cashmere production (Inner Mongolia Acad. Agric. & Anim. Sc.)

OUT

Lou Yujie – Prof in Jilin Agricultural University - cashmere production system - RETIRED
Fabio Pilla - University of Molise, Italy – FOLLOW ACTIVITIES WITHOUT BEING IN THE EAG
Activities of the fiber recording EAG

Preparation of the survey on wool

First draft produced after meeting with Marco Antonini in Rome on 13\textsuperscript{th} of February … not finalized in-between … to be finalized in Prague

Principle: use the result of general survey on meat and wool made in autumn 2017 and presented in Auckland in Feb 2018. Go into more details.
Wool survey

Survey on sheep wool

Page 1: Organisation's profile

1. Please provide information about you and your organisation

   Name and Surname
   Organisation
   Country
   Email Address

Next

This survey is powered by surveymethods.com
## Survey on sheep wool

### Page 2: Sheep population

2. Please provide some basic information about the total size of the wool sheep population

| Total size of the population |  |
| Population in performance recording on wool |  |
| Number of farms with performance recording on wool |  |

This survey is powered by surveymethods.com
3. Please provide information about the 1st sheep breed

Name of the breed

Size of population

Population in performance recording on wool

Number of farms with performance recording on wool

5 breeds possible
8. Please provide information for the performance recording of fleece weight

Is fleece weight recorded (Y/N)

Who collects the data (farmer, technician, ...)

Method used

Material/device used

Unit of expression of the trait
### Page 9: Fleece quality performance recording

**9. Please provide information for the performance recording of fleece quality**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is fleece quality recorded (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Who collects the data (farmer, technician, ....)</td>
<td></td>
</tr>
<tr>
<td>Method used</td>
<td></td>
</tr>
<tr>
<td>Material/device used</td>
<td></td>
</tr>
<tr>
<td>Unit of expression of the trait</td>
<td></td>
</tr>
</tbody>
</table>

This survey is powered by surveymethods.com
### Wool survey

#### Page 10: Clean fleece weight or yield recording

10. Please provide information for the performance recording of clean fleece weight or yield

<table>
<thead>
<tr>
<th>Description</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is fleece weight or yield recorded (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Who collects the data (farmer, technician, ....)</td>
<td></td>
</tr>
<tr>
<td>Method used</td>
<td></td>
</tr>
<tr>
<td>Material/device used</td>
<td></td>
</tr>
<tr>
<td>Unit of expression of the trait</td>
<td></td>
</tr>
</tbody>
</table>

*This survey is powered by surveymethods.com*
Survey on sheep wool

**Page 11: Fiber diameter performance recording**

11. Please provide information for the performance recording of fiber diameter

Is fibre diameter recorded (Y/N)  
Who collects the data (farmer, technician, ....)  
Method used  
Material/device used  
Unit of expression of the trait  

(previous)  (next)
12. Please provide information for the performance recording of the colour

- Is colour recorded (Y/N)
- Who collects the data (farmer, technician, ....)
- Method used
- Material/device used
- Unit of expression of the trait
13. Please provide information for the performance recording of the colour

- Is staple length recorded (Y/N)
- Who collects the data (farmer, technician, ...)
- Method used
- Material/device used
- Unit of expression of the trait
14. Please provide information for the performance recording of the colour

- Is staple strength recorded (Y/N)
- Who collects the data (farmer, technician, ....)
- Method used
- Material/device used
- Unit of expression of the trait
Page 15: Other recorded traits

15. Please describe in few words which traits and methods, not listed in the present survey, that are used to measure/collect?
Survey on sheep wool

Page 16: Performance recording for traits that require a sample of wool

16. For traits requiring a sample of wool, please detail:

   How many samples are collected

   On which part of the body is the sample collected?
Wool survey

Survey on sheep wool

Page 17: Genetic evaluation - 1st trait

17. Please describe the 1st trait

Name of the trait

Which computation form raw data

Previous  Next

This survey is powered by surveymethods.com

10 traits possible
### Page 27: Subindexes on wool

27. Is there one or more subindex on wool?

<table>
<thead>
<tr>
<th>Name of the subindex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the subindex 1</td>
<td></td>
</tr>
<tr>
<td>Name of the subindex 2</td>
<td></td>
</tr>
<tr>
<td>Name of the subindex 3</td>
<td></td>
</tr>
<tr>
<td>Name of the subindex 4</td>
<td></td>
</tr>
<tr>
<td>Name of the subindex 5</td>
<td></td>
</tr>
</tbody>
</table>

28. Weight of elementary traits for the above subindexes that you listed in the previous question

<table>
<thead>
<tr>
<th>Weight of elementary traits for subindex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of elementary traits for subindex 1</td>
<td></td>
</tr>
<tr>
<td>Weight of elementary traits for subindex 2</td>
<td></td>
</tr>
<tr>
<td>Weight of elementary traits for subindex 3</td>
<td></td>
</tr>
<tr>
<td>Weight of elementary traits for subindex 4</td>
<td></td>
</tr>
<tr>
<td>Weight of elementary traits for subindex 5</td>
<td></td>
</tr>
</tbody>
</table>
Survey on sheep wool

Page 28: Results for trait 1

29. For the trait 1, please provide an answer to the following questions:

- Name of trait
- Average phenotype (year)
- Estimated annual genetic trend (in genetic standard deviation)
- Genetic parameters (genetic variance, heritability)

10 traits possible
39. Please leave any comment that you believe useful for the completeness of this survey
Wool survey

Additional question proposed by Marco

“Useful to add some information on no-genetic data? For example where the flocks are bred, how many pasture is available etc. or type of shearing, if the farmers apply the wool grading and classification etc”
Wool survey

recipients of the survey

All ICAR members?

<table>
<thead>
<tr>
<th>Organization which answered the wool part in the meat survey in 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep Genetics - A business unit of Meat and Livestock <strong>Australia</strong></td>
</tr>
<tr>
<td>Instituto Nacional de Investigación Agropecuaria - INIA <strong>Uruguay</strong></td>
</tr>
<tr>
<td>Beef + Lamb Genetics <strong>NZ</strong></td>
</tr>
</tbody>
</table>

Add: Argentina, USA, South Africa
Activities of the large camelids recording EAG
Survey on large camelids

Pamela’s presentation
Agenda 6

Activities of the milk recording EAG
Guidelines update

Methods Z & Y in goats + recording interval

- Methods Z & Y in goats + recording intervals
  - Updates adopted at GA in Auckland (Feb. ’18)

- Proposition to extend the same methods to dairy sheep (cf. Auckland meeting)
New methods in goats:

**Z**: alternate scheme, with milk yield from the two daily milking and only one-milking sampling alternately the morning and the evening on the next recording visit. As the alternate scheme is realized, there is no obligation to correct daily contents in order to calculate fat yield and protein yield for the whole lactation.

**Y**: milk yield from the two daily milking and only one-milking sampling that occur at any milking at each recording visit; this scheme implies to use a correction method among those described to estimate the daily fat and protein contents.

**Correction method**:

- Different correction methods may be listed in the guidelines (ex. Liu method).

- It is up to the ICAR member to describe precisely the correction method in its own situation.
Yearly enquiry on-line

YELLOW: ICAR countries having submitted data to the database in 2017-2018

- Official ICAR publication with raw data
- Biennial synthetic report done by WG (tables and figures) for the years 2015-2016 available on the web

DAIRY SHEEP
Year 2017-18
Prague, Czech Rep., 2019

6 submissions in 2018 (+1 in 2017)
## Recorded population - countries

*(ICAR Prague 2019)*

<table>
<thead>
<tr>
<th>Countries</th>
<th>Size of population</th>
<th>Recorded population (official milk recording)</th>
<th>% recorded population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#flocks # ewes</td>
<td>#flocks # ewes</td>
<td></td>
</tr>
<tr>
<td>Italy (2018)</td>
<td>[5,130,000 ¹] 1,011 163,415</td>
<td>1,011 163,415</td>
<td>3.2%</td>
</tr>
<tr>
<td>France (2018) ²</td>
<td>4,397 1,398,300 768 328,392</td>
<td>768 328,392</td>
<td>23.5%</td>
</tr>
<tr>
<td>Spain (2016) ³</td>
<td>&gt;10,776 &gt;1,272,900 [2,273,000 ¹]</td>
<td>423 275,196</td>
<td>12.1%</td>
</tr>
<tr>
<td>Greece (2013)</td>
<td>[6,862,000 ¹] 459 85,345</td>
<td>459 85,345</td>
<td>1.2%</td>
</tr>
<tr>
<td>Portugal (2018)</td>
<td>431 50,079 [340,000 ¹] 283 18,052</td>
<td>283 18,052</td>
<td>5.3%</td>
</tr>
<tr>
<td>Slovak Rep (2017)</td>
<td>[188,200 ¹] 80 6,151</td>
<td>80 6,151</td>
<td>3.3%</td>
</tr>
</tbody>
</table>


² 542,616 in D recording

³ exogen breeds are missing
## Recorded population - countries
(ICAR Prague 2019)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Size of population</th>
<th>Recorded population</th>
<th>% recorded population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>#flocks</td>
<td># ewes</td>
</tr>
<tr>
<td>Croatia (2018)</td>
<td>124,000</td>
<td>77</td>
<td>6,226</td>
</tr>
<tr>
<td>Slovenia (2018)</td>
<td>[2,679 †]</td>
<td>41</td>
<td>2,455</td>
</tr>
<tr>
<td>Czech Rep (2018)</td>
<td>[81,300 †]</td>
<td>31</td>
<td>1,410</td>
</tr>
<tr>
<td>Germany (2015)</td>
<td></td>
<td>34</td>
<td>932</td>
</tr>
<tr>
<td>Canada (2016)</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>3,213</td>
<td>888,269</td>
</tr>
</tbody>
</table>

Evolution of number of recorded ewes in some ICAR countries (ICAR Prague 2019)

Decrease in Spain. Collapse in Italy

Including D method
Evolution of number of recorded ewes in some ICAR countries (ICAR Prague 2019)
Yearly enquiry on-line

**RED**: ICAR countries having submitted data to the database in 2017-2018

- Official ICAR publication with raw data

6 submissions in 2018 (+3 in 2017)

- Biennial synthetic report done by WG (tables and figures) for the years 2015-2016 available on the web

**DAIRY GOATS**
Year 2017-18
Prague, Czech Rep., 2019
<table>
<thead>
<tr>
<th>Countries</th>
<th>Size of population</th>
<th>Recorded population (official milk recording)</th>
<th>% recorded population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># herds</td>
<td># does</td>
<td># herds</td>
</tr>
<tr>
<td>France (2018)</td>
<td>[845,000 ¹]</td>
<td>2,000</td>
<td><img src="image" alt="image" /></td>
</tr>
<tr>
<td>Italy (2017)</td>
<td>[583,000 ¹]</td>
<td>676</td>
<td><img src="image" alt="image" /></td>
</tr>
<tr>
<td>Spain (2016)</td>
<td>[1,260,000 ¹]</td>
<td>180</td>
<td><img src="image" alt="image" /></td>
</tr>
<tr>
<td>Switzerland (2015)</td>
<td>35,700</td>
<td>2,760</td>
<td><img src="image" alt="image" /></td>
</tr>
<tr>
<td>Portugal (2018)</td>
<td>387</td>
<td>30,884</td>
<td>176</td>
</tr>
<tr>
<td>Germany (2015)</td>
<td>[39,000 ¹]</td>
<td>186</td>
<td><img src="image" alt="image" /></td>
</tr>
<tr>
<td>Canada (2016)</td>
<td>-</td>
<td>-</td>
<td>32</td>
</tr>
</tbody>
</table>

¹ figures 2017 from FAOSTAT
<table>
<thead>
<tr>
<th>Countries</th>
<th>Size of population</th>
<th>Recorded population</th>
<th>% recorded population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># herds</td>
<td># does</td>
<td># herds</td>
</tr>
<tr>
<td>Czech Rep (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Croatia (2018)</td>
<td>350</td>
<td>27,800</td>
<td>70</td>
</tr>
<tr>
<td>Serbia (2017)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latvia (2018)</td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Slovenia (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovak Rep (2017)</td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 figures 2017 from FAOSTAT
Yearly enquiry on-line

ICAR countries having submitted data to the database in 2017-2018 in SHEEP & GOATS (ORANGE), only SHEEP (YELLOW), only GOATS (RED)

DAIRY SHEEP & GOATS
Year 2018-19
Prague, Czech Rep, 2019
Certified milk meters sheep and goats

**NEW**: mounting position for which the meters has been ICAR-approved is specified in the list of certified meters

**Years of approval 2007-2008**

- Afifree 155 & 155i
  - S & G
  - low line
- MM25 SG (DeLaval)
  - S & G
  - low line
- LactoCorder WMB
  - G
  - low line

**Year of approval 2016**

- LactoCorder-S
  - S & G
  - low line/high line
- LactoCorder T-T
  - S & G
  - low line/high line

Reminder: Sheep and goats: Meters in use before 1 January 1995 that have been accepted by the ICAR member organization, can be used after this date.
Certified milk meters sheep and goats

<table>
<thead>
<tr>
<th>#</th>
<th>Brand</th>
<th>Device</th>
<th>Meter</th>
<th>Species</th>
<th>Mounting position</th>
<th>Picture</th>
<th>Year of approval</th>
<th>Notes</th>
<th>Routine check</th>
<th>User manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>289</td>
<td>Afimilk</td>
<td>Afifree</td>
<td>Goats</td>
<td>Low Line</td>
<td></td>
<td></td>
<td>2008</td>
<td></td>
<td>open</td>
<td>open</td>
</tr>
<tr>
<td>290</td>
<td>Afimilk</td>
<td>Afifree</td>
<td>Goats</td>
<td>Low Line</td>
<td></td>
<td></td>
<td>2008</td>
<td></td>
<td>open</td>
<td>open</td>
</tr>
<tr>
<td>297</td>
<td>DeLaval AB</td>
<td>MM25 SG</td>
<td>Goats</td>
<td>Low Line</td>
<td></td>
<td></td>
<td>2008</td>
<td>Contains SCR Engineers LTD Free Flow Meter Technology</td>
<td>open</td>
<td></td>
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Agenda 7

SMARTER project
SMARTER: a European project on selection on efficiency and resilience in small ruminants with strong ICAR commitment and implication


ICAR 2019: Prague, Czech Republic, 17-21 June 2019
H2020-SFS-2016-2017
Research and Innovation Action
SMAll RuminanTs breeding for Efficiency and Resilience

Project period: Nov 2018 to Oct 2022
Coordination: INRA Toulouse (Carole Moreno-Romieux)

26 partners, 13 countries (10 EU + Uruguay + Canada + China), 50% of non–academic partners

Coordinator, partners, stakeholders (to implement)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Grant Agreement n°772787
SMARTER is structured around 2 definitions of RESILIENCE and EFFICIENCY

RESILIENCE

The ability of an animal/system to maintain or revert quickly to high production and health status when exposed to a diversity of challenges, with a focus on nutritional and/or health challenges.

EFFICIENCY

Considered as the efficiency of feed resource use by animals: feed efficiency, the dynamics of body tissue mobilization and its impact on the environment. Focus on agro-ecological issue: competition with human nutrition (grains), water consumption, greenhouse gas emission.
SMARTER has its counterpart in cattle: GenTORE

“GENomic management Tools to Optimize Resilience and Efficiency”

“Resilience is the capacity to safeguard future ability to continue contributing genes to the next generation when confronted with environmental perturbations.”

“Efficiency is the ratio of energy in the product to the energy ingested to achieve that production, measured over a time period that is relevant to ensure that an efficiency gains are sustainable.”
What are resilience and efficiency traits studied in SMARTER?

**Resilience**
- **Disease resistance**: parasite, footrot, mastitis
- **Longevity / Survival**: lamb & embryo mortality, functional longevity
- **Trade-Off between** parasite resistance, longevity, production, feed efficiency and resource allocation when disease and/or nutritional challenge

**Efficiency**
- **Feed efficiency**: concentrate/hay/grazing, new predictors
- **Resource allocation**
- **Microbiota**: to predict GHG emission
- **Gas emission**: new tools

But also at the system level ...
Some figures to appreciate the impact of SMARTER

- 5,000 farmers, 1,500,000 ewes/goats will be directly targeted by SMARTER
- HD data set (existing or newly generating): 500,000 phenotyped + 70,000 genotyped animals
- 46 breeds in SMARTER = 20% of the sheep and goat populations in EU but via our non-academic partners 70% of the EU populations will be impacted

19 meat sheep breeds

13 dairy sheep breeds

14 dairy goat breeds
Organization of SMARTER project

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Grant Agreement n°772787
ICAR committed in WP6 “Practical Selection Tools to Benefit from International Cooperation”

Task 1: HARMONIZATION: phenotypes, genotypes, pedigree

Task 2: INTERNATIONAL EVALUATION: genetic, genomic

Task 3: PRACTICALITIES of international evaluations

Task 4: ASSESS BENEFIT: modelled benefit of harmonization of phenotyping & int’l evaluation on long-term genetic gain
ICAR committed in WP6 “Practical Selection Tools to Benefit from International Cooperation”

Guidelines

- Recommendations to measure efficiency and resilience traits in a similar way in each country => facilitate possible future common evaluation
- Suggest/define recording of new environmental effects
- Add a new brick to the section of the guidelines of the SGC WG

*SMARTER - a European project on selection on efficiency and resilience in small ruminants with strong ICAR commitment and implication*
ICAR committed in WP6 “Practical Selection Tools to Benefit from International Cooperation”

Across-Countries genetic & genomic evaluation

Is it worth carrying out multi-country evaluation in small ruminants?
Background = few exchanges, low connectedness, small reference population in most countries, genotyping costs

- 3 pilots studies to assess feasibility

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Breed(s)</th>
<th>Countries</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy sheep</td>
<td>Manech &amp; Latxa</td>
<td>FR, SP</td>
<td>A Legarra</td>
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<tr>
<td>Dairy goats</td>
<td>Alpine &amp; Saanen</td>
<td>FR, CN, IT, UK, CH</td>
<td>H Larroque, L Brito</td>
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<tr>
<td>Meat sheep</td>
<td>Charollais, Vendéens, Texel, Suffolk</td>
<td>IR, UK, FR, UY, HU</td>
<td>D Berry</td>
</tr>
</tbody>
</table>

=> Common int’l pedigree file, file formats for exchanging genot/phenot/pedigree
=> Practical and cheap community SNP panels in a common and agreed format
ICAR committed in WP6 “Practical Selection Tools to Benefit from International Cooperation”

Across-Countries genetic & genomic evaluation

Towards a routine multi-country evaluation in small ruminants?

- Practicalities of international evaluation
  - Propose specification for routine evaluation in an organized international framework (cf. Interbull?, Interbeef?, alternative model?)
    - Agreement, data sharing acceptability
    - Technical issues
    - Business model, profitability
    - Needs (or no) from the countries
  - Business Plan & business model
ICAR committed in WP6 “Practical Selection Tools to Benefit from International Cooperation”

Reference center

Define, propose, conceive what could be a zootechnical reference center in small ruminants

- In cattle, Interbull is now the European Union reference centre for performance testing/genetic evaluation in bovine. What about in sheep and goats?
  - cf. EU Regulation on Animal Breeding 2016/1012 (article 29)
  - SMARTER could help to define the outline of Reference Centre for performance testing/genetic evaluation in sheep & goats
ICAR committed in WP8 “Dissemination, training and stakeholder’s engagement”

Task 1: stakeholder’s engagement through stakeholder platform and ICAR/EAAP network

Task 2: dissemination and training for scientific community

Task 3: dissemination and training for stakeholders

Task 4: dissemination tools

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Grant Agreement n°772787
ICAR committed in WP8 “Dissemination, training and stakeholder’s engagement”

Network

Stakeholders’ platform – ICAR in charge of this task

- **Provides the participatory framework through a stakeholder’s platform**
  - Platform composed of researchers, representatives of industry, farmer’s organisations, policy makers/regulators at national & EU level
- **Dialogue between SMARTER partners & stakeholders**
  - Platform plays a key role in dissemination & exploitation of results
  - Platform gives feedback to SMARTER with external points of view.
- **Interbull invited to be stakeholder**
ICAR committed in WP8 “Dissemination, training and stakeholder’s engagement”

Network

Dissemination & training for stakeholders – ICAR in charge of this task

- Presentation to stakeholders at conferences such as in ICAR 2020 (the Netherlands) and ICAR 2022 (Canada).
- National seminars and conferences
- Organisation of (national) stakeholders round table sessions in 10 local countries
Participation of the WG to SMARTER

Among the partners / third parties of SMARTER: ICAR (ICAR Secretariat – Martin Burke and Cesare Mosconi), IDELE (Jean-Michel Astruc & Valérie Loywyck), SRUC (Joanne Conington), AGRIS Sardinia (Antonello Carta)

Involve as much as possible all member of the SGC WG:

✓ Information through ICAR meeting and newsletter.
✓ Specific session in ICAR meeting (the Netherlands / Canada)
✓ Participation to elaboration of guidelines (as for current sections).
✓ Feedback on reflection/thoughts on business plan for international evaluation
✓ Feedback on reflection/thoughts on reference center
Thank you for your attention

www.smarterproject.eu
### Agenda 8

**Thursday 20 June 11:00 – 13:00 – Technical Session 8**

**New developments in Sheep, Goat and Camelids within ICAR**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 11:00-13:00| Technical Session 8  
New developments in Sheep, Goat and Camelids within ICAR  
Chairperson: Jean Michel Astruc |
| 11:00-11:20| S08(T)-OP-1 Guidelines for meat and reproduction recording in small  
ruminants  
Jean-Michel Astruc  
Joanne Conington |
| 11:20-11:40| S08(T)-OP-2 Current state of pheno and genomic resources in large  
camelids  
Pamela Burger |
| 11:40-11:55| S08(T)-OP-3 New developments on fiber recording in sheep, goat and  
camelids within ICAR  
Jean-Michel Astruc |
| 11:55-12:10| S08(T)-OP-4 Factors affecting wool quality of Jezersko-Solčava sheep in  
Slovenia  
Mojca Simčič |
| 12:10-12:25| S08(T)-OP-5 Life on the Edge of Earth (An Overview of Threatened Nomadic  
Culture of Changthang Ladakh)  
Feroz Sheikh |
| 12:25-12:40| S08(T)-OP-6 Dairy sheep udder measurements and assessments in the  
Czech Republic  
Michal Milerski |
| 12:40-12:55| S08(T)-OP-7 SMARTER – A European project on selection of efficiency and  
resilience in small ruminants with strong ICAR commitment and implication  
Jean-Michel Astruc |
### New developments in Sheep, Goat and Camelids within ICAR

<table>
<thead>
<tr>
<th>Paper title</th>
<th>Presenting author</th>
<th>Time</th>
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<tr>
<td>0 Introduction</td>
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<tr>
<td>1 Guidelines for meat and reproduction recording in small ruminants</td>
<td>Joanne Conington</td>
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<td>2 Current state of pheno and genomics resources in large camels</td>
<td>Pamela Burger</td>
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### Session 8

**Thursday 20 June 11:00 – 13:00 – Technical Session 8**

**New developments in Sheep, Goat and Camelids within ICAR**

<table>
<thead>
<tr>
<th>Electronic Posters</th>
<th>S08(T)-PP-1</th>
<th>Exploration of Climate Resilient Sheep Genomic Traits Based on SNP Technique and Feeding Resources Using NIRS</th>
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<tr>
<td></td>
<td>Kapa Sarjan Rao</td>
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<td>S08(T)-PP-2</td>
<td>Variability in some morphological traits of indigenous nigerian and sudanese goat breeds</td>
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<td>Danlami Moses Ogah</td>
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<td>S08(T)-PP-3</td>
<td>A comparison of reproductive traits of Dazu black and Inner Mongolia cashmere goat does with the same service bucks under subtropical monsoonal climate</td>
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<td>Yongju Zhao</td>
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<td>S08(T)-PP-4</td>
<td>Does standardization of ewe milk MIR spectra require specific set of coefficients?</td>
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<td>Clément Grelet</td>
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<td>S08(T)-PP-5</td>
<td>Cold and heat climatic variations reduce goat birth weight and enhance mortality in subtropical monsoon region (Southwest China)</td>
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<td>Yongju Zhao</td>
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<td>S08(T)-PP-6</td>
<td>Genetic Diversity Study using Microsatellite Marker in Changthangi Pashmina Goats of Ladakh</td>
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<td>Feroz Sheikh</td>
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<td>S08(T)-PP-7</td>
<td>In vivo ultrasound measurements of muscle depth and back-fat thickness of lambs in the Czech Republic</td>
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<td>Michal Milerski</td>
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Next meeting

43rd ICAR Conference : Leeuwarden (The Netherlands) 8-12 June 2020

44th ICAR Conference : Toledo (Spain) 7-11 June 2021
45th ICAR Conference : Canada 2022
Any other business?
Closure
WP1: novel traits to improve resource use efficiency

J.J. Arranz – University of León

Identification of new phenotypes
Experimental populations (GRE,FRA,ESP,URU)
Residual feed intake (concentrate + forage), metabolic profiles, rumen microbiota, methane emissions, NIRS from faeces, novel biomarkers => proxies for farms

Analysis of the genetic determinism of feed efficiency
Commercial farms populations: through proxies proposed by task 1

Genetic relationships btw efficiency and production

GxE interaction for the resource use efficiency related phenotypes
Dairy sheep Lacaune FRA x GRE
Meat sheep Romane extensive x intensive
Alpine/Saanen goats intensive vs extensive & season vs out of season breeding
WP2: novel traits to improve health and welfare
J. Conington – SRUC

Health & resistance to disease
*Resistance to internal parasites, footrot, mastitis in meat sheep*

Foetus and young survival / lamb vigour – Welfare indicators

Behaviour *(artificial rearing, extensive grazing, shelter-seeking activities, milking learning)*

Longevity, culling causes

Expe (seeking novel traits/indicators) on-farm populations (genetic parameters)
WP3: genetics of trade-offs and synergies between resilience and efficiency related traits

R. Rupp – INRA

Identify trade-offs & synergies among traits under genetic control
Review of genetic correlations between efficiency and resilience traits
Meta-analysis

Experiments
Nutritional and infectious challenges (parasites, protein restriction, inflammatory challenge)
Epigenetics: methylation data on goat experiment

Modelling
Prediction models to manage trade-offs & optimise R&E in challenging conditions
WP4: genomic characterization of hardy or underutilised breed’s environmental adaptation using existing and newly generated data

B. Servin – INRA

Data Management and Production
Sampling, genotyping, phenotyping
more than 20 breeds (ex. breed reportedly resistant to parasites, breeds adapted to mountain pastures ...), around 50 animals per breed

Genetic Diversity and Demography
Merge data from above task with publicly available data

Signatures of Selection and Adaptation
Identify genomic regions involved in the adaptation
WP5: genomic/genetic modelling and methods of selection for resilience and efficiency traits

R.Pong-Wong – Roslin
A.Legarra - INRA

Novel methods for efficiency and resilience
Random regression / reaction-norm models

Data mining of longitudinal data and characterise events of environmental challenges
From longitudinal data (milk): can the environmental challenge be identifiable? heritable? selected for resilience against? Climate data?

Genomic prediction methodology
Metafounders
Quantify the bias in genomic prediction (method LR)
Create an indicator of the quality of prediction from one population to the other

Improve management of genetic diversity with genomic data
Region related with inbreeding depression ... Tools for disassortative mating to maximize heterozygosity ... Optimum contributions method to maximize genetic gain and manages genetic diversity at specific critical regions of the genome
WP6: practical selection tools to benefit from international cooperation

J.M. Astruc – IDELE
D. Berry - TEAGASC

See slides thereafter
WP7: balanced breeding goals for agro-ecological resilience

T. Byrne - Abacusbio
V. Thénard - INRA

Agro-ecological impacts of breeding at farm level
Include new R&E traits identified in WP1 & 2 ... impact on sustainability ... farm model

Breeders & farmers preferences for R&E breeding, acceptability of new techniques and willingness to share information
Interviews (farmers & breeding organisations) => farmers’ breeding decisions, practices to improve flock’s R&E, may use genomics, agree to share data across countries

Economic, environmental and social value of traits
Mathematical modelling of income & labour, Multi-criteria analyses, Choice modelling to estimate weights for R&E

Balancing breeding goals
Assess the economic and other impact of the different indexes according to the breed and the environment