Report of the ICAR Working Group on Milk Recording of Sheep

J.M. Astruc[1], F. Barillet, A. Carta, M. Fioretti, E. Gootwine, D. Kompan, F.J. Romberg & E. Ugarte

[1]*Institut de l'Elevage, BP 27, 31326 Castanet-Tolosan, France*

Summary

The report of the working group on milk recording in sheep presents an overlook of its activities over the last two years, in relation with the terms of reference of the group. The main activities have concerned the on-line enquiry, which has been implemented and is now available to 39 ICAR members. The report focuses on the valorization of the database, using data from 13 countries. Emphasis is given on the increasing use of simplified methods of quantitative and qualitative recording. The other important activity is the co-operation with other bodies of ICAR, especially in relation with recording and analysis devices, the purpose being to take into account the specificities of dairy sheep production and sheep milk when establishing the requirements for the guidelines.

***Key words**: Enquiry, Guidelines, Qualitative recording, Breeding schemes.*

Introduction

The terms of reference of the Working Group on Milk Recording in Sheep (MRS WG) may be synthesized in four main items: evolution of the guidelines, cooperation with relevant bodies of ICAR, dairy sheep enquiry, contact with non-ICAR organizations in the dairy sheep field. Several updates of the guidelines, prepared between 2000 and 2004, have been approved in Sousse in 2004. No update is planned at the moment. The main activities of the MRS WG during the last 2 years have focused, firstly on the cooperation within ICAR, especially with working groups or sub-committees involved in recording devices and analysis devices, secondly on the on-line enquiry implemented since May 2006. A first valorization of this on-line enquiry, following 7 biennial surveys "on paper" carried out between 1988 and 2004 is presented in this report, permitting to establish the state of the art on different topics related to the terms of reference of the working group. Basically, a key objective of the group is to spread simplified methods of recording, especially qualitative recording, while keeping the relevance of the measures for genetic purposes.

Main activities of the WG in the last two years

Renewing the members of the Working Group

After some "historical" members have left the Working Group, it was important to introduce new participants in order to keep the balance between dairy sheep production regions, and also to maintain a critical mass for the efficiency of the work of the group. The current members are:

- Jean-Michel Astruc, Institut de l'Elevage, France.
- Francis Barillet, INRA, France.
- Antonello Carta, IZCS, Italy.
- Mauro Fioretti, AIA, Italy.
- Elisha Gootwine, Volcani Center, Israel.
- Drago Kompan, University of Ljubljana, Slovenia.
- Franz-Josef Romberg, Dienstleistungszentrum Ländlicher Raum Westpfalz, Germany.
- Eva Ugarte, Neiker, Spain.

Meetings involving the Working Group of Milk Recording in Sheep

- *Meetings of the Working Group* - The last meeting of the MRS WG was held in Kuopio (Finland) on 6 June 2006 with only 4 participants. The main issues of the agenda were the dairy sheep enquiry on-line, the position of the group about the requirements of recording devices in dairy sheep, the perspectives concerning the WG. The next meeting will be held in Niagara Falls on 17 June 2008. Between two biennial sessions, the exchanges are mainly done by e-mail.
- *Meeting of the ICAR Board with Chairperson in Verona on 30th May 2007* - Presentation of the work of the group, reviewing the main items of the terms of reference: guidelines, co-operation within ICAR, yearly enquiry, contact with non-ICAR organizations in the dairy sheep field.
- *Meeting with ICAR bodies* - Participation at the first meeting of the working party on On-farm Milk Analysis (WP OMA) which was held in Roma on 27 November 2008 (see below).

Updating the ICAR Guidelines of sheep milk recording

The last evolutions date back to 2005 and are reported in the guidelines published in the booklet "International Agreement of Recording Practices" (ICAR Guidelines, 2007), in the section 2.2. The emendations concerned the systematization of the classification of the methods of milk recording, the introduction of the D and E designs and the clarification of the terms for milk yield in dairy sheep. No update is planned at the moment. It is intended to develop, if necessary, a glossary of the main terms specifically related to dairy sheep.

Co-operation with the relevant SCs and WGs of ICAR

The MRS WG co-operated over the last 2 years with the following bodies of ICAR:

- Cross-participation with the WG on Milk Recording in Goats, the chairman of each group participating at the work of the other group.
- Close co-operation with the Sub-Committee on Milk Recording Devices about the requirements for sheep. The main decision was, on the one hand, that ICAR give a separate approval for the devices for sheep and goats, given the differences of fat and protein content in both species, on the other hand, that the guidelines for sheep were relevant and therefore should not be relaxed. Currently, two meters have been tested over the last years for sheep, the main difficulty to fulfill the requirements being for bias and standard deviation for fat. One meter

has up to now a provisional agreement. The chairman of the WG was invited at the meeting of the Sub-Committee in Kuopio during the last biennial session to present the position of the group.

- The MRS WG is represented in the working party on On-farm Milk Analysis, created in summer 2007, and which a first meeting was held on 27 November 2007 in Roma. This working party deals with the issue of analysis de-localized on the farm with on-farm milk analyzer (at-line or in-line milk analyzer). The aim is to propose recommendations and requirements to be fulfilled by manufacturers with regards to analytical devices, milk producers with regard to use, milk recording organizations with regard to external control of routine analysis.

Dairy sheep enquiry on-line

As the survey on the situation of milk recording in sheep, with extension to connected issues such as breeding schemes, selection criteria, molecular information in sheep, recording devices, is one of the main terms of reference of the MRS WG, we proposed, with the help of ICAR Secretariat, to develop the possibility to fill in the questionnaire on-line. This on-line enquiry has been ready to accept submission of data since May 2006. The dairy sheep enquiry can be filled in on the ICAR website, in the space dedicated to the yearly milk enquiries.

The dairy sheep enquiry is divided in 7 tables, representing 7 different topics.

- Basic information on population, recording methods and percentages.
- Milk yield: type of lactation calculation + milk yield results.
- Optional test for milk composition.
- Recording of non-milking traits.
- Milk recording equipment used in case of machine milking.
- Breeding programs using insemination (AI).
- Molecular information.

It was too early at the Kuopio Session to present the first results of this new modality for the enquiry. Up to now (May 2008), 12 countries have answered the on-line enquiry, a 13th country sending information without using the ICAR site. We may be quite disappointed by the fact that countries with substantial population of dairy sheep did not answer the questionnaire, despite sometimes several recalls. We also would suggest that even countries with very small dairy sheep population (even if there is no recording) should at least give the information of the number of flocks and ewes of dairy sheep, as well as the breeds present in the country.

The main results of the on-line enquiry are described below. Additional tables which could not be included in this report are available on the ICAR website.

Dairy sheep enquiry on-line

Situation of milk recording in dairy sheep

The table 1 summarizes the impact of milk recording in the countries having answered the on-line enquiry over the last 3 years.

Official milk recording is carried out in every country. If we look at the countries with the largest dairy sheep population, all situated in the Mediterranean area (Greece, Italy, Spain, France), the impact of milk recording is quite different: high in France (59% on the whole, 20% when considering only official milk recording), medium in Spain and Italy (respectively 12.8 and 7.8%), low in Greece (less than 1%). Italy, France and Spain represent 90% of all the animals in official milk recording.

In the other countries, with smaller population, milk recording represents few flocks and ewes, from 160 in Canada to 18 600 in Israel.

However, as shown in the table 2, the impact of official milk recording has steadily increased in most of the countries, especially when the countries have adopted simplified design of official milk recording, such as AT or AC method. Whereas in 1988, 2 countries only used simplified method (France with AC method, Spain with AT method in Latxa breed), this number reached up to 6 countries in 1998, and 7 countries in 2008. The Working Group has surely contributed to this evolution, since it has been one of its main tasks to promote simplified methods of milk recording. Indeed, fixed costs are high in sheep compared to cattle and simplified methods are

Table 1. Size of population of dairy sheep, impact of quantitative recording in ICAR member countries.

Countries	Year	Size of population	Quantitative recording (official milk recording)		Methods used Yes/Not
			Number of recorded ewes	% recorded ewes	
Belgium	2007	1 000	200	20.0	AT
Canada	2005		160	-	AT
Croatia	2006	34 270	5 361	15.6	AT
Czech Rep.	2007		443	-	AT (part), E (part)
France	2007	1 483 000	302 199[1]	20.4	AC
Germany	2007	9 000	705	7.8	A4 (64%), AT (8%), E (28%)
Greece	2006	12 000 000	70 658	0.6	A4
Israel	2007	35 000	18 600	53.1	On-farm, daily basis
Italy	2007	6 150 000	482 698	7.8	AT, AC
Slovak Rep.	2004	216 000	12 869	6.0	AC
Slovenia	2007	4 900	3 396	69.3	AT
Spain	2006	1 739 000	222 358	12.8	AT (80%), AC (20%)
Sweden	2006	10-15 flocks		-	

In addition, 570 755 ewes are recorded with D method (non official milk recording) without qualitative recording

Table 2. Evolution of official milk recording over the last 20 years in ICAR member countries.

	1988			1998			2008		
	Recorded ewes (official)	%	method	Recorded ewes (official)	%	Method	Recorded ewes (official)	%	Method
Italy	140 000	2.8	A4	331 024	5.0	A4	482 698	7.8	AT/AC
France	202 000	16.8	AC	281 070	20.9	AC	302 199	20.4	AC
Spain	110 000	2.8	AT	141 044	6.2	AT	222 358	12.8	AT/AC
Greece	37 000	0.5	A4	26 600	0.3	A4	70 658	0.6	A4
Portugal	7 600	1.5	A4	38 571	15.2	A4/AT			
Israel				6 200	12.4	B4/AC	18 600	53.1	
Slovak R.				5 100	2.3	A4/AC/AT	12 869	6.0	AC
Slovenia				1 474	19.8	A4	3 396	69.3	AT
Germany	356	2.2	A4	836	3.3	A4/B4	705	7.8	A4/AT/E
Czech R.				177	35.0	AT	443		AT/E
Total	496 956			832 096			1 113 926		

the way to increase and develop milk recording in dairy sheep. Among the countries with large population, Greece still uses the standard A4 method and, therefore, remains with a low impact of milk recording, less than 1%.

The use of the D method, which is a non-official milk recording, is described only in France. In France, the D method is a very simplified method consisting in 2 to 4 flock-visits per year, whatever the visit intervals (monthly to bimonthly), in order to get 2 to 4 test-day per ewe. This design is applied to the flocks out of the nucleus scheme, in order to help the breeder to optimize culling and replacement. Therefore, the D method is used in addition to the official design, which is implemented only in the nucleus flocks. D method is a quantitative recording. In France, D method represents roughly two-third of the recorded ewes.

The additional tables, available on the ICAR website, show that four breeds are up to 100 000 recorded ewes: Sarda and Valle de Belice (Italy), Lacaune and Manech Red Face (France).

Simplification of qualitative recording in dairy sheep

Conversely to dairy cattle, qualitative milk recording is optional in official milk recording in sheep, as established in the ICAR guidelines (ICAR guidelines, 2007), considering that the cost of qualitative milk recording may be crippling. Qualitative recording becomes useful and necessary when selection on milk yield is efficient. Its cost-effectiveness is based upon the implementation of a simplified design. The main features of the table 3 can be summarized as following:

- The impact of qualitative recording among the recorded population is high only in countries with a quite small population (from 37% in Croatia to 100% in Czech Republic and Germany.

Table 3. Qualitative recording in ICAR member countries.

	Qualitative recording				
Countries	Yes/Not	Recorded ewes	% of the recorded ewes	Method used	Categories of ewes (lactation)
Belgium	No	-	-		
Canada	No	-	-		
Croatia	Yes	2 000	37%	AT	
Czech Republic	Yes	443	100%	AT/E	
France	Yes	84 000	28%	Part-lactation sampling (AC)	Lacaune: L1/L2 Pyrenean breeds: L1
Germany	Yes	705	100%	A4/AT/E	
Greece	Yes	?	?		
Israel	No	-	-		
Italy	Yes	24 642	5%	Part-lactation sampling (AC)	Sarda: L1
Slovak Republic	Yes	6 870	53%	AC	L1/L2/L3
Slovenia	Yes	3 396	100%	AT	
Spain	Yes	119 500	45%	AT,AC	Churra: AI ewes Manchega: all Latxa: some flocks / L1/L2
Sweden	No	-			

- In countries with a large population, the impact reaches 45% in Spain, 28% in France and 5% in Italy. Qualitative recording concerns only some breeds, some parities (lactation 1 or lactation 1 and 2). It is implemented within a simplified design of milk recording, with one sample per test-day (AC or AT method).

Definition of milk traits (see additional table on www.icar.org)

The guidelines specify the different terms of lactation calculation, in relation with the specificities of dairy sheep about the management of the lactation. In most breeding systems, the lactation is divided in a suckling period followed by a milking-only period after the weaning of the lamb(s). In this case, ICAR recommends to compute the lactation at the milking-only period (TMM = total milked milk). Nevertheless, some countries continue to implement a calculation at the whole lactation (TSMM = total suckled and milked milk). In some breeding systems (Israel or Germany), the lambs are removed from the ewe very soon after lambing, so that the whole lactation is exploited by milking. In this case the calculation is the TMY (total milk yield).

Milk recording equipment (see additional table on *www.icar.org*)

ICAR has recently agreed on-farm milk meters for sheep. No portable meter has been agreed until now. The enquiry does not allow to have a comprehensive overview of the impact of this new agreed meters. According to the enquiry, we observe a wide variety of devices (jars or meters, measuring volume or weights, with or without sampler), which most often are portable and used by a field technician.

Other additional tables (*www.icar.org*) present information about the following topics: molecular information in sheep and recording of other traits.

Breeding schemes, objective and selection criteria

Breeding programs based on progeny-test of rams by AI or by combining AI and controlled natural mating are implemented in a few breeds, in France, Italy and Spain (table 3). AI remains not very widespread, probably due to the same reason of cost as milk recording. AI is practiced in sheep mostly with fresh semen (except for half of the AI of the Churra breed in Spain) with a low dilution, with synchronization of the heat (one AI per ewe, whatever the result, the return being realized by natural mating). The diffusion rate of a ram is at least 100 to 1000 times lower than a bull. As the table 4 shows, the selection criteria are still based on milk yield on most situations, with, in addition, fat, protein, udder morphology. Only the Lacaune breed has included in its selection criteria somatic cell count (SCC) and udder morphology in addition to the production traits, giving the same weight on the one hand to production traits and on the other hand to udder functional traits (SCC and udder morphology).

Given the difficulty and cost to implement an efficient breeding program for local breeds, some breeds are currently spread in more and more countries: East Friesian in the northern and central European countries, Assaf particularly in Spain and Portugal and Lacaune everywhere. If the situation, through the ICAR enquiry is well known for the local breeds, the whole population and the recorded population remains almost unknown for this exogenous breeds out of their area of origin.

Table 4. Importance of breeding programs and selection criteria[1].

Country	Breed	AI progeny-tested rams	AI	Selection criteria[2]
France	Lacaune	479	387 000	(FY+PY+1/16F%+1/8P%) + .5 SCC + .5 Udder
	Manech Red face	135	57 400	FY+PY
	Manech Black face	37	9 300	FY+PY
	Basco-Béarnaise	43	13 800	FY+PY
	Corse	29	6 700	MY
Italy	Sarda	60	13 500	MY + Udder
Spain	Latxa blond faced	38	13 300	MY
	Latxa black faced	60	16 800	MY
	Karrantzana	8	234	MY
	Manchega	130	34 000	MY
	Churra	48	15 250	MY + P%

[1]MY=milk yield, FY=fat yield, PY=protein yield, F%=fat content, P%=protein content, SCC=somatic cell count, Udder=udder morphology.
[2]Most of the breeding schemes include selection for scrapie resistance (PrP gene).

Conclusion

The constitution of the MRS WG has been updated in 2008 and two new members have replaced resigned or retired members. Over the last two years, the MRS WG has mainly focused on the on-line enquiry and its valorization, and on the co-operation with other parties of ICAR, in the field of recording devices and analysis devices. The issue of on-farm devices (for recording and / or analysis), which is a current concern for cattle, must also be faced in sheep. The challenge of the group will be both to continue to promote simplified methods of recording, especially for qualitative recording, while keeping enough relevance to each individual measure. It is important that ICAR continues to take into consideration the specificity of small ruminants, particularly with regards to the high cost of milk recording, compared to cattle. The on-line enquiry is a useful tool to follow the recommendations suggested by the MRS WG, through different topics such as methods of milk recording used in ICAR member countries, devices used for recording and analysis, breeding programs. The MRS WG will encourage, with the help of ICAR secretariat, each ICAR members to fill in the enquiry regularly, as it is done for cattle.

Recording of functional traits exists in some countries (udder traits, reproduction traits). Defining these functional traits in the guidelines, given the specific dairy sheep situation, should be a task of the working group in the next years.

List of references

ICAR guidelines, 2007. International Agreement of Recording Practices. Guidelines approved by the General Assembly held in Kuopio, Finland on June 2006. Section 2.2, pp.55-65.

ICAR website. *www.icar.org.*