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SUMMARY – Fat (%F) and protein (%P) contents, and the ratio between both (F/P) regarding bulk milk of commercial flocks of Latxa breed have been analysed. An increase of %F and %P throughout the milking season was observed in the different groups of flocks formed according to the characteristics of the lambing distribution. Nevertheless, milk produced by flocks with more scattered lambings tended to maintain a more constant composition. Those with more concentrated lambings, which were located in the highlands of the Basque Country, produced less concentrated milk ($p<0.05$), especially at the beginning of the milking season. The main management traits related to bulk milk composition, its evolution throughout the milking period, and differences between groups are discussed.

Key words: Milk, dairy sheep, milk composition, flock characteristics.

RESUME *– "Relation entre les caractéristiques des troupeaux de race Latxa et la production de lait pendant toute la période de lactation". La composition, taux butyrique, protéique et sa relation, chez le lait des troupeaux (lait du tank) commerciaux de brebis Latxa ont été étudiés. Les troupeaux ont été classés en accord avec la distribution des mises bas, dans tous les cas pendant l'automne et l'hiver. Avec des évolutions similaires entre groupes de troupeaux, on trouve une tendance à une plus grande homogénéité dans la composition de ceux-ci avec une distribution des mises bas plus large. Les groupes avec mises bas plus concentrées, et trouvés dans les zones plus hautes et dans le versant méditerranéen, produisent un lait avec un taux butyrique et protéique inférieur ($p<0,05$) dans la période initiale de la saison de traite, hiver. Les facteurs de production et de conduite des groupes de troupeaux liés à la composition du lait du tank sont présentés.*

Mots clés : *Lait, brebis laitière, composition chimique, caractéristiques des troupeaux.*

Introduction

From a quantitative point of view sheep milk can be considered a minor production, since it only means 1.5% of total cattle milk production within the EU. This can be observed even in those regions with an important tradition in this kind of livestock, like the Basque Country, where it means 5.1% of cattle milk production. Therefore, the importance of milk sheep comes from its differential feature and its orientation to the elaboration of high-quality products, such as cheese. Consequently, the need to know the characteristics of milk produced and the main factors that take part in this process arises precisely from such orientation.

Flock management can be regarded as one of the main factors that affect milk quality, especially in less-intensified systems, where the influence of the environment is greater. Its effect is not only related to the practices developed during the milking period, but also to those that take place during other stages of the productive cycle. In this sense, lambings distribution has an important effect on the later evolution of milk production (Fraysse *et al.*, 1996).

The aim of the current work is to study the incidence of management factors on the evolution of milk composition, mainly fat and protein contents, throughout the milking period in Latxa flocks.

Material and methods

Data was collected on 70 flocks, included in the milk recording and selection program of the Latxa breed. In this study, lactations in the years 1994-95, 1995-96 and 1996-97 were considered. Every lambing season, or level of flock-year, was assigned to one of the four typologies previously defined

according to lambing distribution (Ruiz *et al.*, 1997), by means of a discriminant analysis (SAS, 1990). Three lambing season were not considered because of the partial lack of the required information. Four groups (Group 1, 2, 3, and 4), with 24, 91, 62 and 30 flock-year respectively, were formed.

For every milking campaign, individual records (test day data) per sheep were available throughout the lactation period. Flock production (bulk tank milk) per test day was estimated from individual records. Data related to milk composition (g/100 ml) in terms of fat (%F) and protein (%P), and the relationship between both of them (F/P), were also recorded.

These parameters relating to flock production were analysed by means of general lineal models procedures (SAS, 1990) according to the following model:

$$y_{ijk} = a + bxAMP + G_i + M_j + G_ixM_j + P_k(G_i)$$

where: y refers to the parameters that define milk composition; AMP is the average milk production (l/day) of the productive ewes in the test day; G_i is the Group (i = 1 to 4); M_j is the month, which in a first analysis was defined by the correlative number of test day (j = 1 to 7), and in a second one by the month of the year when such recording was done (j = December to July); P_k is the flock-year (k = 1 to 207).

Results and discussion

Considering either the control number or the month of the year, most of the factors included in the analysis had a significant effect ($p<0.001$) on %F, %P and F/P ratio. Only when the month of the year was included in the model, the Group showed a lower level of significance ($p<0.05$) and group-month interaction have not a significant effect ($p>0.05$) on F/P ratio.

Average milk production in the test day (AMP) affected negatively %F and %P. The influence on %F was even more marked; the values of b were –1.48±0.17 and –0.41±0.07 for %F and %P respectively, when the test day was considered in the model. As a consequence, the effect of AMP on the F/P ratio was also negative (–0.24±0.03).

Average evolution of %F and %P in the different groups of flocks according to the number of test day can be observed in Fig. 1A and 1B, respectively. Fat content was lower ($p<0.05$) during the early controls in the flocks of Groups 1 and 2 in relation to those of Groups 3 and 4 (Fig. 1A). Non significant differences ($p>0.05$) between Groups 1 and 2, or between Groups 3 and 4 were found. Similar traits were found for the %P (Fig. 1B), even though differences were lower and non-significant ($p>0.05$) between Group 3 and Group 1 (1st test day) or between Groups 3 and 2 (2nd test day). On the contrary, on the latest test days or months the %F and %P tended to be higher ($p<0.05$) in Groups 1 and 2.

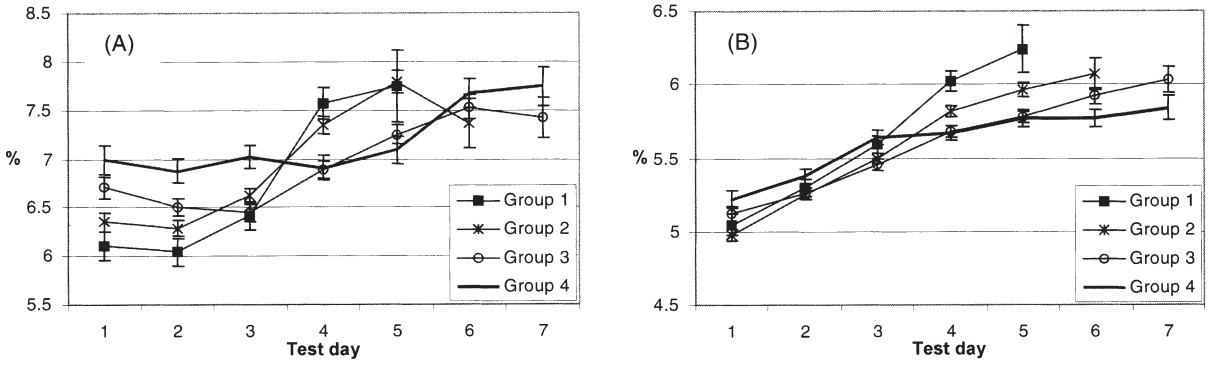

Fig. 1. Milk composition (least squares means) evolution in the different typologies (groups), in terms of fat (%F) (A) and protein (%P) (B), according to the milk test day.

Considering the month of the year (Fig. 2), differences among groups were more marked and Groups 1 and 2 tended to produce less concentrated milk. Differences between Groups 1 and 2 in relation to Groups 3 and 4 were significant ($p<0.01$) until the month of May. Except for the Group 1, in which %F in February was lower ($p<0.05$) than those observed in March and April, the tendency was to maintain the fat content until April (Fig. 2A), beginning then an increasing trend. The phase of stability was shorter in the case of %P and began to increase from February on (Fig. 2B). This tendency of an earlier increase of protein in relation to fat has been reported for the Latxa breed at the individual level (Maria, 1989).

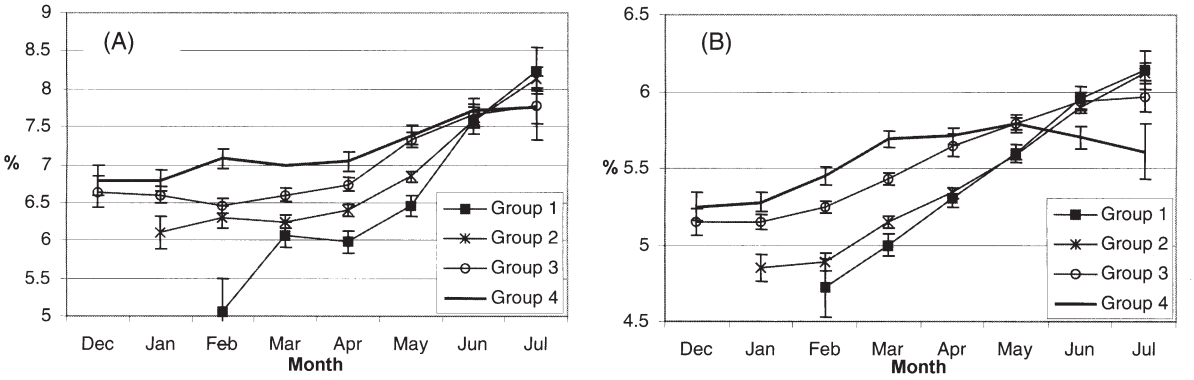

Fig. 2. Milk composition (least squares means) evolution in the different typologies (groups), in terms of fat (%F) (A) and protein (%P) (B), according to the month of year.

The differences among groups (in %F or %P) were always favourable to Groups 3 and 4, those with a scattered and early beginning of lambing season. It has been observed in the Latxa production system that ewes with early lambings undergo greater body reserves mobilisation (Oregui, 1992), which would contribute to higher milk fat level in those flocks. Moreover, it should be taken into account that the scattering of the lambing season is related with the location of the lambings in different dates according to ewe's age, being adult and older ones those that tend to lamb earlier (Ruiz, 2000). Since ageing animals tend to produce more concentrated milk (Maria, 1989), this would also contribute to differences observed among types of flocks.

Flocks of Groups 1 and 2, those with later and more concentrated lambings, were mainly located in the highlands of the Basque Country, where climatic conditions in winter are usually more severe, and a lesser grazing possibility. In this kind of flocks, supplementation with concentrates has been reported to be higher (Oregui *et al.*, 1997), especially in the early lactation. This could negatively affect the %F during such period, tending to increase from April on, as the importance of grazing increases. Other feeding practices like the use of silage could also be considered. Within a closely analysed smaller sample of these flocks, it was observed that 80% of those with higher %F provided animals with silage during the indoors feeding period. The positive effect of silage on milk fat content has already been described for other dairy sheep systems (Barillet *et al.*, 1998).

When the test day was considered, %P increased from the first control onwards (Fig. 1B). As in dairy cattle, sheep milk %P appears to be positively related to the feeding level (Oregui *et al.*, 1995). For the Latxa breed, Oregui (1992) reported that on average body condition score begins to improve 30-45 days after lambing, which could reflect the improvement of feeding level of animals. Nevertheless, in that work it was also pointed out that the beginning in the increase of body condition score delays as ewes lamb earlier. According to this, the %P was similar within groups until March ($p>0.05$), independently of the beginning of the milking season, so it was delayed in the Groups 3 and 4 with an earlier beginning of the lambing season.

The differences in %F and %P evolution between Groups 3-4 and Groups 1-2, could also be related to those observed in the structure of flock milked along the season. Due to a more scattered lambing season, new sheep entered the milking flock during a longer period of time in Groups 3-4, being progressively younger (Ruiz, 2000). At the same time, the percentage of low production sheep

that do not reach the end of the milking season was higher in the flocks of these groups. Both factors could explain the delay in the beginning of %F and %P increase and the slighter slope in Groups 3 and 4, which led to a less concentrated milk at the end of the milking season.

The differences in evolution of %F and %P explain the evolution observed in the F/P ratio considering test day or month (Fig. 3). This ratio tended to decrease ($p<0.05$) during the firsts recordings (Fig 3A), except for Group 1 ($p>0.05$).

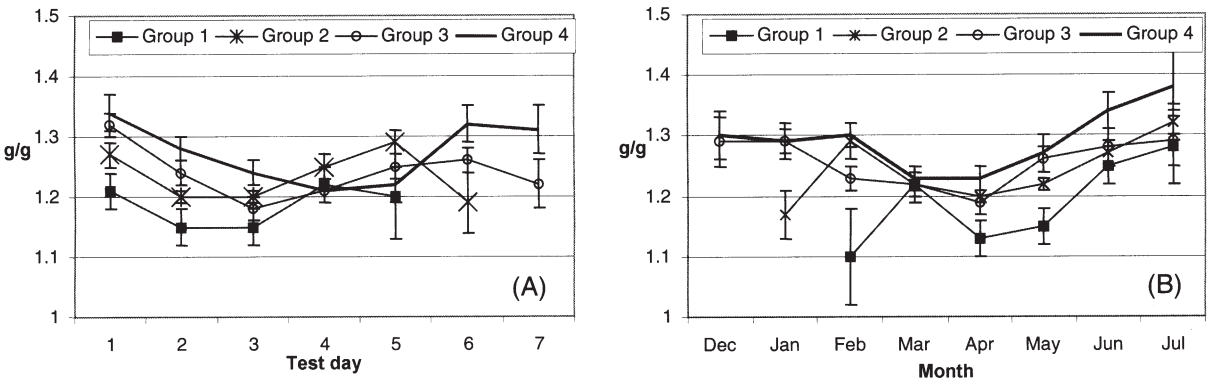

Fig. 3. Milk fat/protein ratio (least squares means) evolution along milking season in the different typologies (groups), according to the test day of milk control (A) or the month of the year (B).

Respect to the month of the year the F/P ratio showed a similar decrease in all groups reaching a minimum in April. Only in the Groups 1 and 2, as a consequence of the low %F pointed out, the ratio F/P showed lower values in the first month of milking (Fig. 3A), which reinforces the idea of a management problem in these type of flocks. Nevertheless, the ratio of the Group 2 did not show significant differences ($p>0.05$) from the second recording (or from February) in comparison to the Groups 3 and 4. It was the Group 1 which showed the lowest values in every moment, being significantly different ($p<0.05$) during a great part of the milking period, and below 1.2 during spring months (April and May). Despite the lack of information available relating to the optimum ratio for Idiazabal cheese-making, it is considered (Otxandorena, pers. comm.) that values under 1.15 may affect negatively this process.

Conclusions

Milk composition at the beginning of the milking period, in terms of fat and protein contents, tends to be higher in the flocks characterised by a scattered lambing season. Moreover they show a milk production more homogeneous in relation to those constituents throughout the productive season.

References

Barillet, F., Astruc, J.M., Bocquier, F., Jacquin, M., Fraysse, J., Laggriffoul, G., Marie, C., Pellegrini, O. and Remeuf, F. (1998). Influence des facteurs de production sur la composition chimique du lait valorise en fromage: Le cas du lait de brebis. In: *Basis of Quality of Typical Mediterranean Animal Products*, Flamant, J.C., Gabiña, D., and Espejo Diaz, M. (eds). EAAP Pub. No. 90. Wageningen Pers, Wageningen, pp. 128-144.

Fraysse, J., Laggriffoul, G., Bocquier, F. and Barillet, F. (1996). Brebis laitières: Impact de la structure de troupeau et autres facteurs d'élevage sur la composition chimique du lait livré. *INRA Prod. Anim.*, 9: 201-210.

Maria, G.A. (1989). *Estudio y puesta a punto de un método simplificado de control lechero cualitativo en la raza ovina Latxa y su inclusión en el plan de selección.* Servicio Central de Publicaciones del Gobierno Vasco, Serie Tesis Doctorales No. 2, Vitoria-Gasteiz.

Oregui, L.M. (1992). *Estudio del manejo de la alimentación en los rebaños ovinos de raza Latxa y su*

influencia sobre los resultados productivos y de producción de leche. Servicio Central de Publicaciones del Gobierno Vasco, Serie Tesis Doctorales No. 18, Vitoria-Gasteiz.
Oregui, L.M., Bravo, M.V., Arranz, J. and Urarte, E. (1995). *Efecto del aporte de concentrado y de la condición corporal sobre la ingestión de forraje y la producción lechera en ovejas de raza Latxa*. Rapport Scientifique Final, CAMAR 8001-CT 91-0113, 12 pp.
Oregui, L.M., Garro, J., Vicente, M.S. and Bravo, M.V. (1997). Estudio del sistema de alimentación en las razas ovinas Latxa y Carranzana: Utilización de pastos comunales y suplementación en pesebre. *ITEA,* 93A: 173-182.
Ruiz, R. (2000). *Análisis de los factores de explotación que afectan a la producción lechera de los rebaños de raza Latxa de la CAPV*. Servicio Central de Publicaciones del Gobierno Vasco, Serie Tesis Doctorales No. 39, Vitoria-Gasteiz, 328 pp.
Ruiz, R., Oregui, L.M. and Bravo, M.V. (1997). Productive characteristics of dairy ewe flocks in the Basque Country. In: *Livestock Farming Systems: More than Food Production*, Sørensen J.T. (ed.). EAAP Pub. No. 89. Wageningen Pers, Wageningen, pp. 42-47.
SAS (1990). *SAS Procedure Guide*. SAS Institute Inc., Cary.