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Evolution of the goat feeding advisory plan in Murcia: Structure and follow-up

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SUMMARY – The goat feeding advisory plan of Murcia (PAAC), has permitted the establishment of feeding patterns for the Murciano-Granadina goat breed, on the basis of the production systems and the products used as feeding complement to shepherding. The proposed feeding strategy is based on the periodic calculation of rations to complement grazing while shepherding in private goat breeding farms in the Murcia Region, and its later follow-up. The work carried out in different private farms has revealed numerous particularities of a practical nature in the handling of the Murcia milk-goat feeding.

Key words: Goat, Murciano-Granadina, feeding, Murcia.

RESUME – *"Evolution du plan de restructuration de l'alimentation caprine à Murcie : Structure et suivi". Le plan de restructuration de l'alimentation caprine de Murcie (PAAC) a permis d'établir des modèles d'alimentation pour la race caprine Murciano-Granadina, sur la base des systèmes de production et des produits utilisés comme complément alimentaire en élevage. La stratégie alimentaire proposée est basée sur le calcul périodique des rations pour compléter le pâturage tandis que l'élevage a lieu dans des fermes privées de caprins dans la région de Murcie, avec un suivi ultérieur. Le travail exécuté dans différentes fermes privées a révélé de nombreuses particularités de nature pratique dans la conduite alimentaire des chèvres laitières de Murcie.*

Mots-clés : Caprin, Murciano-Granadina, alimentation, Murcie.

Introduction

The milk-goat sector is of long-standing tradition in Murcia, where is now experiencing an expansion and reshaping process. Production of the Murciano-Granadina breed has reached today 439 kg of milk, with a 3.75% protein content (Rabal *et al.*, 1996). These results are due to the improvements carried out in the sector's health, selection and structuring areas. The interest in developing feeding strategies adapted to the characteristics of our caprine breed and its environment has been fostered by the above mentioned good results.

The PAAC was born in 1996, as a result of the cooperation between the Secretary for Agriculture of the Murcia Region and the Association of Breeders of the Murciano-Granadina Goat Breed (ACRIMUR). The objectives of the PAAC are to carry out Research and Development (R+D) in matters of goat feeding, one of the sectors of the regional caprine livestock that had not been dealt with heretofore in a serious or planned manner.

Material and methods

In order to study the present status of goat herd feeding in Murcia, 22 surveys were performed in 1995, in private Granadino-Murciana pure breed goat farms, under different production systems. This information, together with feeding tests carried out in 5 private goat breeding farms between 1995 and 1996, have been the basis for the design of a global feeding strategy, adapted to our Region (Falagan and Haba, 1999). The PAAC was planned to cover the September 1997-August 1998 and September 1998-September 1999 production cycles.

A total of 14 farms have participated without interruption with the PAAC. According to the production system, 12 farms follow the semi-extensive model described by Falagan (1988 and

1996), and two farms breed their animals in an indoors regime. The size of the semi-extensive herds is of around 130 goats. These farms are managed by families. In this type of production system, the main characteristic of the feeding pattern is the use of year-round additions to the herds grazing. The basis of these rations is the use of products with high nutritional value, farm and industrial by-products and fodders. Year-round outdoors grazing is intermittent for these herds, depending on the availability of grazing land. A certain evolution towards intensification, or indoor rearing, has been observed in these semi-extensive systems, with a generalized reduction of grazing, as well as improvements in the facilities and larger herds.

The sizes of the two indoors-reared herds are 350 and 500 goats respectively, with paid labour and feeding based on highly nutritious mixed products, such as cereals or pulse seeds, complemented with hay or forage, or with complete rations of the "unifeed" type.

The PAAC programme is structured around a series of periodic visits to the farms, in order to adjust the rations of the different lots of the herds, depending on the evolution of nutritional needs of the animals, on the products available for their feed (grazing and complementary rations) and on the breeders' preferences. Morand-Fehr and Sauvant (1988) have described the nutritional variations along the production cycle of high-yield milk-goats. These authors have established the definition of the more crucial moments in these animals' feeding, in order to establish a feeding strategy which prepares the goats for these more demanding times of their productive cycle (Morand-Fehr, 1997). These authors have differentiated the following stages, from the point of view of feeding: onset of lactation, full lactation, end of lactation, drying-out period and end of gestation. The particular details of some of them may be influenced by factors such as the genetic characteristics of the breed, or the production system under which the animals are reared. A working plan and monitoring of results were designed taking into account the production cycle dynamics of the Murciano-Granadina breed (Falagan and Haba, 1999). Basically, this consists in the use of rations suited to the peculiarities of each farm, and its later follow-up through the official milk control data, body condition, feeding behaviour and the onset of any pathologies related to feeding. The food rations were calculated using the VIOLETA computer programme (Rigalt, 1989), adapted to the particular features of the Murciano-Granadino breed and to the pasture land and fodders in the south-east of Spain.

There are two periods in the PAAC programme, corresponding to the two aforementioned production cycles:

(i) PAAC development programme during the 97-98 productive cycle.

- A survey to breeders, in order to know the feeding management of their herds and products used for complementary rations (Falagan and Haba, 1999).
- A study of each herd's feeding, to detect any nutritional unbalance and to perform the first adjustment of rations, on the basis of PDI, UFL, FB, MS, ULO, Ca and P.
- Periodic follow-up visits to the farms, to adjust the calculated rations.
- Telephone contacts to adjust rations in cases of any variation of the grazing activities or of the products available for complementary rations.
- Monthly follow-up of production-reproduction results, through milk controls and through the information supplied by farmers.
- A survey to breeders about the results obtained (September, 1998).

(ii) PAAC development programme during the 98-99 production cycle.

- This has been a continuation of the rations' calculation, including new nutritional parameters: long fiber, energy concentration, non-degradable protein, starch and percentage of fat in the ration.
- Follow-up of production results, based on milk controls.
- Monthly follow-up of body condition in five farms.
- Survey to breeders about the results obtained.

Results

Description of problems associated to grazing

The adjustment between the complementary ration and grazing poses many difficulties in the case of spontaneous grazing lands in Spain's south-east, due to the great heterogeneity of the species, the fast evolution of their nutritional value, the energy expenditure derived from the grazing activity and the selection capacity of grazing goats (Robles, 1990; Meuret *et al.*, 1991).

In Murcia, the availability of grazing lands depends on the spring and autumn rainfall. In the practice, the herds studied maintain their grazing activity almost year-round. The nutritional value of spontaneous grazing lands is interesting only during the months of April, May and June. In the summer, grazing is done in cereal stubble and small irrigation fodder plots (mainly fodder sorghum). During the two-year study, a severe drought has prevented the harvesting of cereal crops, which meant that a large amount of spikes and hay stubble to be used for live-stock. Grazing times in non-irrigated pastures vary between 2.5 and 3 hours a day, almost always in the afternoon. The indirect estimation of the nutritional value of intake from spring-time spontaneous pastures varies between 0.8 FU and 80-100 g of PDI per animal and day, given the previously shown grazing times (Table 1).

In irrigated sorghum, rye grass or alfalfa pastures, the farmers try to take maximum advantage of their small surface (0.5 ha to 1.5 ha), and limit grazing time (20 to 30 minutes) to prevent treading from damaging the land; alternatively, they may also mow the fodder, and give it to the stabled animal.

Table 1. Feeding of PAAC herds under semi-intensive system (12 herds), depending on the season

Dry	Land grazing [†]	Herds	Irrigated	Land grazing	Herds
Cereal stubble	V,O	7	Fodder sorghum	V,O	5
Vines	O	4	Rye grass	I,P	2
Veza-green oats	I,P	2	Alfalfa	P,V,O	2
Horticultural crop	P,V,O	1	Veza-oats	I,P	1

[†]P: Spring; V: Summer; O: Autumn; I: Winter.

Description of complementary rations

Every one of the herds are supplied, year-round, with complementary rations which the goats eat when stabled. These rations include highly nutritious products (cereals, pulse grain, cereal by-products and oil-seed cakes, etc.), forage (alfalfa hay and cereal straw), by-products of the preserving industry (preserved artichoke by-products, citrus pulp), and agricultural by-products (olive leaves and almond shells) (Falagan and Haba, 1999). The nutritional value of these complementary rations varies between one half and practically all of the goat's nutritional needs.

Problems linked to goat feeding in Murcia

The application of PAAC in 14 goat farms has brought to light some of the practical problems that may crop up when designing a feeding strategy adapted to a specific situation. These conditionants or factors may be grouped into four categories:

(i) Factors linked to homogeneity of goat lots.

- Deficiencies in the facilities. Very often, when trying to group the animals into lots according to their nutritional needs, limitations in the facilities became evident. Often, drying-out goats are grouped with pregnant goats, or pregnant goats are grouped with replacement female kids.
- Reproduction management determines the formation of groups. Most farms (12) group

servicings, to achieve a specific parturition time, which usually coincides with the Fall. This way, feeding management is greatly simplified, since every doe is in the same productive moment. Another reproductive management modality is continuous, year-round birthing season (2 farms). These cases do not plan their serves, and lot formation is based on the production levels of the animals, with the associated back-and-forth movement of the goats from one lot to another, bringing about sudden feeding changes and hierarchic problems, which may affect the consumption of the rations.

- Genetic variability of herds. Formulation of a ration depending on the average production of the herd may limit expressing the genetic potential of the best milk producers.

(ii) Factors linked to raw materials used in complementary rations.

- Local markets only provide a scarce variety of forages, whose cost is high in comparison to other products, such as cereals, which means that the complementary rations have a minimum level of fiber and a high starch content. This situation tends to worsen with the progressive abandonment of grazing practices, which allow the goats to obtain the level of fiber that is best for them.
- Levels of by-products added to complementary rations. There are not many data as yet about the long-term effects of Murcian agricultural and industrial by-products in high production goat feeding. In lots of goats whose nutritional needs are high, caution and moderation should be exerted.

(iii) Factors linked to the ration management by the breeders.

- Depending on their facilities, number of workers and preferences, the breeders have decided the way in which the complementary ration is to be stored and distributed in the goat pens. The different possibilities are listed below.
 - Σ Separate storage of different raw materials. Every day the breeders, in accordance with the formula supplied to them, prepares the complementary ration on a scale or by means of volumetric measurement.
 - Σ Purchase of a highly nutritious mix of raw materials. In this case, the breeder asks the supplier to mix the raw materials, thus simplifying the weighing and mixing tasks. These mixes may include every one of the products of the complementary ration, or exclude some of them, to be fed in the milking room (very often these are soya flour or commercial brand concentrates). Due to the different sizes of its components, the homogeneity of the mixes may sometimes be reduced during their unloading.
 - Σ Purchase of complete mixes. The breeders buy complete mixes based in dry products with molasses added, which may be stored for up to one month. The small size of these farms makes it impossible for them to purchase their own mixing devices.

(iv) Factors linked to the production system.

- Semi-extensive system: one of the main difficulties in this context is the estimation of nutritional values of grazing pastures. When adjusting complementary rations for these cases, special attention must be given to production fluctuations and to the body condition of the goats. For irrigated pastures, the adjustment is more accurate, since the nutritional value of the land is known, as is the length of the grazing period, thus allowing for an estimation of consumption.
- Intensive system: feeding mistakes derived from the incorrect organization of the lots may cause problems of metabolic diseases, such as toxemia or rumen acidosis. In these cases, the lack of physical exercise may worsen the evolution of these diseases.

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