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*in*

Gabiña D. (ed.), Bodin L. (ed.).  
Data collection and definition of objectives in sheep and goat breeding programmes: New prospects

Zaragoza : CIHEAM

Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 33

1997

pages 153-156

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=97606003>

To cite this article / Pour citer cet article

Analla M., Serradilla J.M. **Problems of selection criteria and genetic evaluations of the goat population in the north of Morocco**. In : Gabiña D. (ed.), Bodin L. (ed.). *Data collection and definition of objectives in sheep and goat breeding programmes: New prospects* . Zaragoza : CIHEAM, 1997. p. 153-156 (Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 33)



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## Problems of selection criteria and genetic evaluations of the goat population in the north of Morocco

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**SUMMARY** - The goat population in northern Morocco is very heterogeneous, with influence of some Spanish as well as French breeds. The preliminary economic studies suggest that goat breeding should be oriented towards milk production for cheese making. Thus, selection criteria should be chosen according to this objective. Concerning the genetic evaluation procedure, the possibility to include doe longevity as a measure of their adaptation and overall resistance to diseases, should be considered. Moreover, non additive genetic effects, likely to be very important due to heterogeneity of the goat population, should be accounted for during routine genetic evaluations.

**Key words:** Goats, milk, genetic evaluation, selection criteria.

**RESUME** - "Problèmes concernant les critères de sélection et les évaluations génétiques chez la population de chèvres au nord du Maroc". La population caprine du nord du Maroc est très hétérogène, avec l'influence de certaines races espagnoles ou françaises. Des études économiques préliminaires ont démontré que la production caprine devrait s'orienter vers la production de lait pour faire du fromage. Concernant les procédures d'évaluation génétique, la possibilité d'inclure dans le modèle d'évaluation la longévité des chèvres comme mesure de leur adaptation et de leur résistance aux maladies, doit être considérée. Par ailleurs, les effets génétiques non additifs, qui doivent être très importants à cause de la grande hétérogénéité de la population, sont à prendre en considération dans les évaluations génétiques de routine.

**Mots-clés :** Caprins, lait, évaluation génétique, critères de sélection.

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### Introduction

The north of Morocco is made up of four provinces: Tétouan, Tangier, Chefchaouen and Larache. Except for Larache where lands are of better quality with intensified agriculture and an irrigated area; the other provinces are rather marginal regions with poor lands and very uneven topography. This constitutes a special environment where goats breeding can give rise to some benefits. The animal population is very heterogeneous, no standardised breed is known. Although, the origin of the animals is of Nubian type (Bel Hassan, 1976), there is a great influence of Spanish breeds like Malagueña and Murciano-Granadina (Akhazzan, 1992). Lately, animals from French breeds like Alpine and Saanen have been introduced. Kid meat is consumed almost entirely in the rural areas, and it accounts for more than one third of the total meat produced in these provinces. The goat milk production represents only 5% of the total milk produced (Benlakhel and Kabbaj, 1989). The average production per doe is about 50 kg (Bouaissa, 1989) under harsh conditions, and 200 kg per lactation, under good conditions (Akhazzan, 1992). Moreover, goat skin is very demanded for craft making of leather products; about 11% of leather comes from goat skin (Bentouhami, 1989). In a typical farm with 30 does, milk, if sold, would represent about 60% of the total incomes (Benhaj-Soulami, 1993).

## Actions for production improvement

After managing, feeding and health conditions have been improved, and the animals arrive to express all their production potential, breeders should think in increasing this potential by increasing the animal genetic capabilities of production. This can be achieved through crossings with a more productive breed. Several attempts have been carried out to import animals with a higher level of production, from France (Alpine and Saanen) and from Spain (Malagueña and Murciano-Granadina). This is the simple way but not the best, because it is expensive and might pose problems of interactions between genotype and environment. From our point of view the best alternative is to establish a selection scheme of local animals, since they are already adapted to their very harsh environment.

## Selection criteria and genetic evaluation

As said in the previous paragraphs, all goats products are commercialized: meat, milk and skin. But 60% of the total income of a goat farm comes from milk sold. So, selection schemes should be oriented towards milk production improvement. Milk should be entirely used for cheese making, in order to maximize the profit margin. Thus, objectives should be carefully chosen in order to increase the production of a milk suitable for cheese making, i.e., with high percentage of protein while maintaining fat content; or a higher milk production maintaining fat and protein contents. Since fat and protein contents are correlated positively, and both are negatively correlated with milk yield (Iloeje *et al.*, 1981; Boichard *et al.*, 1989; Analla *et al.*, 1996), a selection index based on milk yield or protein yield with the restriction that protein and fat percentage are kept above a minimum, is likely to be a good criterion. To decide between milk yield or protein yield, will depend on the heritability of these traits. Apparently, the relative genetic variability of both traits is similar (Boichard *et al.*, 1989). But, sometimes the heritability is higher for milk yield (Bouloc, 1987; Boichard *et al.*, 1989), sometimes is lower (Ricordeau and Bouillon, 1975; Ricordeau *et al.*, 1979; Rabasco, 1989). The selection criterion could not be decided until estimates of genetic parameters of such traits are available in Moroccan goats populations.

On the other hand, we should not forget the environment where animals produce, and we should try to favour their adaptation. The environment is very harsh with presence of several diseases, paratuberculosis, aglaxia and enterotoximeia among others. It is very difficult to define a selection criterion for resistance to diseases. Moreover, clinical detection will increase heavily the costs of production, and it will reduce benefits, particularly taking into account the very uneven topography of the region concerned. In cattle breeding, Beaudeau *et al.* (1995) have shown that diseases increase non voluntary culling of animals. Therefore, some capability of resistance to diseases would be accounted for when considering females longevity. The approach used by Beaudeau *et al.* was based on the concept of probability of a cow to be culled according to a Weillbull model (Ducroq *et al.*, 1988; Ducroq, 1994). A more simplistic approach was used by Jairath *et al.* (1993) applying a mixed linear model to production traits for animal lifetime, to reflect the profitability of the cow connected with its longevity. But they concluded that due to the low heritability estimates obtained, selection would be very slow. Then, research should be oriented towards finding some early indicators of longevity or lifetime profitability of the animals. In goats breeding almost all the culling is non voluntary, due to diseases and death. In an extremely harsh environment, as the north of Morocco, solution to the problem of doe longevity improvement, is crucial for the viability of any project based on goat production.

Finally, as Moroccan goats population is not homogenous, non additive genetic effects are likely to be very important. Therefore, variance components estimation and routine genetic evaluation should account for these effects as recommended by Uimari and Mäki-Tanila (1992) among others.

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