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Analysis of the feed self-sufficiency as indicator of the durability of the *Majorera* breeding goat systems in the Canary Islands

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Abstract. The *Majorera* goat is a native breed of the Canary Islands and an excellent milk producer whose production is associated with the protected designation of origin "Majorero Cheese". Although its origin arises from Fuerteventura Island, it is the most extended goat breed in the entire archipelago, exerting a very important function from a social, economic and environmental point of view. With a focus on the environmental indicators, the present work aimed to study how the feed self-sufficiency degree of farms contributes to their sustainability. Data from a sample of 38 farmers were treated by a multivariate analysis (SPSS V.21.). The different kinds of production, availability of pasture and fodder crops, as well as their influences on the sustainability of the systems were studied. This work concluded that systems with a higher use of available feed present a higher total sustainability. Equally, the most intensive systems are more vulnerable in terms of sustainability and they do not always seem to have the greatest degree of profitability.

Keywords. Dairy goats – Multivariate analysis – Sustainability.

Analyse de l´auto-suffisance alimentaire comme indicateur de la durabilité des systèmes d´élevage de la chèvre « Majorera » dans les îles Canaries

Résumé. *La chèvre Majorera est une race originaire des îles Canaries et une excellente productrice de lait dont la transformation est associée à l'appellation d'origine protégée « fromage Majorero ». Même si son origine provient de l'île de Fuerteventura, c'est la race caprine la plus répandue dans l'ensemble de l'archipel, exerçant une fonction très importante d'un point de vue social, économique et environnemental. En mettant l'accent sur des indicateurs environnementaux, ce travail vise à étudier la façon dont le degré d'autosuffisance alimentaire des fermes contribue à leur durabilité. Les données d'un échantillon de 38 agriculteurs ont été traitées par une analyse multivariée (SPSS V.21.). Les différents types de production, la disponibilité en pâturages et en cultures fourragères, ainsi que leur influence sur la durabilité des systèmes ont été étudiés. Ce travail a conclu que les systèmes avec une plus grande utilisation des aliments disponibles présentent une durabilité totale plus élevée. De même, les systèmes les plus intensifs sont plus vulnérables en termes de durabilité et ils ne semblent pas toujours avoir le degré de rentabilité le plus élevé.*

Mots-clés. *Chèvre laitière – Analyse multivariée – Durabilité.*

I – Introduction

Majorera goat is an autochthonous Spanish breed from Fuerteventura Island (Canary Islands) with excellent adaptation to the semi-arid environment characteristic of its region of origin. It is

the goat breed with the larger census in the whole archipelago (represents 70% of total count). Adding to this, there exist the possibility to transform the milk into a widely recognized quality cheese, the Protected Designation of Origin (PDO) "Majorero Cheese". These facts allow the *Majorera* goat to gain a special place for the local development, not only in economic terms but also in the social and environmental areas. A recent study on the characterization of the *Majorera* goat sector within the Canary Islands (Navarro *et al.*, 2011) showed that an important amount of goat producers were also making cheese, and this situation helped them to increase considerably their income due to the added value associated to the selling of cheese, largely contrasting with those producers of goat meat. Besides this, many of the goat-and-cheese producers were selling directly their products, thus increasing the return margin and consolidating their enterprises. However, that study proved that these goat-and-cheese producers were spending a lot of money in feeding costs, since, in spite of the great potential in natural pastures and agricultural land to feed the animals, they put their trust in intensive production systems, heavily depending upon great amounts of subsidized imported feedstuffs. With this background, this study aimed to show how the feeding self-sufficiency indicators of the goat and milk production systems in the Canary Islands have an important role in the measuring of the degree of sustainability, and also to make evident how the utilization of the available natural resources where these enterprises are located can be the key factor to end up this significant weakness of the goat production sector.

II – Materials and methods

Details on the initial census prior to the beginning of the study, the survey design, sampling procedures and data collection, can be found in Navarro *et al.* (2011). Field work was undertaken in 2009.

The different variables for analysis considered in this article refer to the following information groups: (i) technical indicators related to the flock, (ii) technical indicators related to the territorial base, and (iii) productive and economic indicators. The design of the survey was based on the most recent progress obtained from the methodology established by the FAO-CIHEAM sub-network on production systems for sheep and goats, related to the utilization of technical-economic indicators for the analysis of small ruminant's production systems (Toussaint *et al.*, 2009). A multivariate statistical analysis was conducted with the numeric variables, preceded by a factorial analysis of principal components (PCA). The method for sample suitability was Kaiser-Meyer-Olkin (KMO), and the Varimax orthogonal rotation was applied. Factorial numeric results were calculated by K-means cluster analysis in order to classify groups of producers according to the considered variables, and finally, once the groups of producers were established, an analysis of variance (ANOVA) was performed to identify those significantly different ($P<0.05$). Statistical analyses were done using IBM SPSS v.21 software.

III – Results and discussion

The PCA yielded four principal components (PCs) that explained 75.35% of variance. Table 1 shows the principal components selected. Based on the correlations between the PCs and the original variables, their interpretation is as follows: PC 1 is an indicator of land extension associated to farming activities; PC 2 is an indicator of cheese-making activities; PC 3 informs about those farms that do not produce cheese but utilize natural pastures for animal feeding; and PC 4 is an indicator of those farms that grow grass to feed the animals. It is noteworthy to say that the variable feeding cost-per-goat per-day does negatively correlate with those indicators related to the use of land to feed the animals. On the contrary, it correlates positively with the indicator of farms producing cheese (PC 2). From the resulting factors it can be deducted that the aspect related with cheese-making, and the aspect of land area and its use, are the fundamental aspects that differentiate the distinct groups of farmers in this study.

Table 1. Principal components (PCs) selected, the explained and accumulated variances, and squared multiple correlation coefficients of the indicators with the different PCs

	Explained variance %	Accumulated variance %	Indicators and correlations with the PC	
PC 1	25.186	25.186	Rented land (ha)	0.993
			Total area per goat	0.976
			Cereal crops total area	0.986
			Daily feeding expenses per goat (€)	-0.463
PC 2	19.924	45.110	Goat cheese (kg)	0.778
			Cheese sales income (%)	0.909
			Daily feeding expenses per goat (€)	0.490
PC 3	17.168	62.278	Natural pasture area (ha)	0.964
			Meat sales income (%)	0.542
			Daily feeding expenses per goat (€)	-0.521
PC 4	13.074	75.352	Cultivated pasture area	0.925
			Daily feeding expenses per goat (€)	-0.498

These factors were utilized in the present study to classify the simple of farmers in groups. Two of them were obtained: Group 1 (14 farmers) clearly gathers the cheese-making enterprises. These farmers stake for an intensive production model which makes them heavily dependent to the acquisition of imported feedstuffs, in spite of having natural pastures and the possible (but discarded) utilization of cultivated pastures. On the other hand, as it is shown in Table 2, farmers in Group 2 have their major income from the sales of milk. The table shows those variables that resulted significantly different between both groups, except for the variable 'total natural pasture area', with a large but not significant difference. Because of these significantly different variables, it is possible to identify that those farmers who do not make cheese are cultivating pastures to feed the animals, which in turn significantly brings down the feeding costs, in contrast with the cheese-making farmers.

Table 2. Means and significance levels (ANOVA) of the quantitative variables by farmer group

Variables	Group 1 (n = 14)		Group 2 (n = 24)		Signif.
	Mean	SD	Mean	SD	
Cultivated pasture area (ha)	0.00	0.00	0.03	0.05	0.050†
Milk income (%)	2.49	8.22	65.91	45.89	0.049†
Cheese income (%)	60.91	41.90	6.80	25.46	0.000†
Daily feeding expenses per goat (€)	0.40	0.28	0.09	0.18	0.000†
Natural pasture area (ha)	2.02	5.58	15.70	30.38	0.070

† $p \leq 0.050$.

It can be established, then, that the main weakness factor within the *Majorera* goat and cheese farm-operations in the Canary Islands, these being the most cost-effective enterprises because of the cheese sales income, is precisely the elevated cost of feeding that they need to afford. Besides, this situation makes these farmers highly vulnerable to sudden increases in the cost of feedstuffs, due to market impacts or to the end of subventions. The utilization of direct marketing channels for the sale of cheeses gives these farmers an edge to stabilize their enterprises and to increase their self-esteem (Bernués *et al.*, 2011); moreover, feed self-sufficiency can be a help for uncertain and volatile markets. Also, low off-farm input dependence (variable costs per animal) and enhanced feed self-sufficiency is crucial for labour profitability for animal farming of

autochthonous breeds in less favoured areas (Ripoll-Bosch *et al.*, 2013).It is therefore, the policy to intensify the farm operations, and the lack of use of natural resources that do exist in the environment for pasture or for cultivation of animal feedstuffs, send them away of a true sustainability strategy that could be solved with the promotion of agricultural policies which would turn around these tendencies by promoting the utilization of the natural resources.

IV – Conclusions

Majorera goat and milk operations that also make cheese are the larger proportion of farmers, and they obtain the best results represented by a larger income per-goat and per-year. Many of them sell their products directly, which in turn gives them an even larger profit margin and converts them into a group of successful and more consolidated farmers with greater expansion possibilities. However, as it is shown in the results of this study, their production model is clearly oriented to intensification, making them heavily dependent upon the purchasing of feedstuffs or the acquisition of subsidized feeds for the animals coming from the Continent. This situation significantly increases the feeding costs, as compared with those farmers which make use of their natural resources to cultivate all or part of the feeding requirements. This circumstance turns the meat and cheese farms into very vulnerable operations in the face of very fluctuating feeding costs.

As it can be expected, the possibility for the subvention policies to change by reducing or eliminating such grant to the import of conserved feedstuffs is not foreseen, and thus the risk of speculation with the price of imported feedstuffs from the Continent will continue. In spite of the subvention granted to the import of conserved feedstuffs from the Continent, results of the present study show that there exists a significant difference in feeding costs in favour of those farmers with a large territorial base which utilize their natural resources to feed their animals, which in turn means that there is great potential for the availability of pasture and crop land to feed the flocks. This is why the authors suggest that the subventions to the milking-goat sector should be always headed to the promotion in the utilization of natural and local resources where these operations are found, with the objective to reduce or even to eliminate the large vulnerability within the meat-and-cheese operations, which affects their cost-effectiveness. In this way, there would be large and beneficial synergies within the livestock-environment systems, as a result of the natural resources being put to the service of livestock development, and this in turn favouring the conservation of the natural environment, with a long term benefit to the sustainability of the rural areas.

References

Bernués A., Ruiz R., Olaizola A., Villalba D. and Casasús, I., 2011. Sustainability of pasture-based livestock farming systems in the European Mediterranean context: Synergies and trade-offs. *Livest. Sci.,* 139: 44-57.

Navarro-Ríos M.J., Fernández G. and Perezgrovas R., 2011. Characterization of *Majorera* goat production systems in the Canary Islands. *Options Méditerranéennes, Série A*, 100, p. 205-210.

Ripoll-Bosch R., Joy M and Bernués A., 2013. Role of self-sufficiency, productivity and diversification on the economic sustainability of farming systems with autochthonous sheep breeds in less favoured areas in Southern Europe. *Animal*, doi: 10.1017/51751731113000529.

Toussaint G., Morand-Fehr P., Castel Genís J.M., Choisis J.P., Chentouf M., Mena Y., Pacheco F. and Ruiz F.A. 2009. Méthodologie d´analyse et d´evaluation technico-économic des systêmes de production ovine et caprine. *Options Méditerranéennes, Série A*, 91, p. 327-374.