Sustainability analysis of small ruminant farms involved in the conservation of natural resources

Mena Y., Castel J.M., Jiménez R., Ruíz F.A.

in

Bernués A. (ed.), Boutonnet J.P. (ed.), Casasús I. (ed.), Chentouf M. (ed.), Gabiña D. (ed.), Joy M. (ed.), López-Francos A. (ed.), Morand-Fehr P. (ed.), Pacheco F. (ed.). Economic, social and environmental sustainability in sheep and goat production systems

Zaragoza : CIHEAM / FAO / CITA-DGA
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 100

2011
pages 119-124

Sustainability analysis of small ruminant farms involved in the conservation of natural resources

Y. Mena*, J.M. Castel*, R. Jiménez* and F.A. Ruiz**

*Área de Producción Animal, Dpto Ciencias Agroforestales, EUITA, Universidad de Sevilla, Ctra Utrera km. 1, Sevilla (Spain)
**Área de Economía y Sociología Agrarias, IFAPA Centro "Camino de Purchil", Junta de Andalucía Camino de Purchil s/n, Apdo Correos 2027, 18080, Granada (Spain)
e-mail: yomena@us.es

Abstract. The Environment Department of the Government of Andalusia (Spain) has recently assumed the responsibility of integrating extensive livestock grazing as a tool for fire prevention. The present study aims to analyse the sustainability of 60 farms (mainly small ruminant farms) belonging to the *Andalusian Network of Grazed Fuel breaks*. Farms are located mainly in Natural Areas of Eastern Andalusia. 9291 goats, 24491 ewes and 170 cows grazed in 260 km of fuel breaks. 27 farms have only sheep (mainly meat purpose), 18 only goats (mainly dairy purpose), 10 goat and sheep, 3 small ruminants and suckling cows and 2 small ruminants, suckling cows and Iberian pigs; only 4 goat farms produce cheese. Meat and milk production has a marked seasonal variation. The feed supplied in the manger is relatively high, especially in goat herds. Hard work, small farm profitability and lack of assurance of farm continuity are the most important aspects that negatively affect the sustainability of these farms. For improving sustainability, farmers are to be able to exploit strengths, absorb shocks, adjust following a disturbance and transform their farm to take advantage of new opportunities.

Keywords. Viability – Goat – Sheep – Fire prevention – Grazing systems – Ecosystem.

Analyse de la durabilité des exploitations de petits ruminants impliquées dans la conservation des ressources naturelles

Résumé. *Le Département de l'Environnement du Gouvernement de l'Andalousie (Espagne) a récemment pris la responsabilité d'intégrer le pâturage extensif dans la prévention des incendies. La présente étude analyse la viabilité de 60 exploitations (surtout des petites exploitations de ruminants) qui appartiennent au Réseau Andalou des Exploitations Collaboratrices au Pâturage des Coupe-feux. Les fermes sont situées principalement dans les Parcs Naturels de l'Est de l'Andalousie. 9291 chèvres, 24491 brebis et 170 vaches sont en pâturage dans 260 km de coupe-feux. 27 exploitations ont seulement des ovins (surtout d'aptitude viande), 18 ont seulement des caprins (surtout d'aptitude laitière), 10 ont des ovins et caprins, 3 ont des petits ruminants et des bovins et 2 ont des petits ruminants, des bovins et des porcins de la race Ibérique ; il n'y a que 4 fermes qui fabriquent du fromage. La production de viande et de lait sont très saisonnières. Les apports d'aliments à l'auge sont relativement élevés, en particulier dans le cas des chèvres. Les aspects plus négativement influents sur la durabilité des exploitations sont: la pénibilité du travail, la faible rentabilité des petites exploitations et le manque d'assurance de la continuité des exploitations. Pour améliorer la durabilité des ces exploitations, les éleveurs devraient valoriser les points forts des systèmes d'exploitation, résister aux difficultés, faire des ajustements après une perturbation du système et faire des changements dans les exploitations afin de profiter des opportunités.*

Mots-clés. *Viabilité – Chèvres – Brebis – Prévention des incendies – Systèmes de pâturage – Écosystème.*

I – Introduction

Small ruminant systems have traditionally been related to grazing. Controlled grazing has several positive effects on the environment, as it favours a wide variety of vegetation, the conservation of a heterogeneous landscape and the prevention of soil loss and forest fires, among others. In economically depressed areas, small ruminant farming also has an important

social function regarding fixing the population and maintaining traditions (Cavallero and Ciotti, 1991).

Nevertheless of the public aids and despite the positive aspects mentioned, small ruminant grazing systems rapidly tend to become intensified. Among the reasons for the decrease of ruminant grazing systems are the following: the lack of shepherds, the rising land prices and the overwhelming emphasis on production and efficiency. *Resilience thinking*, an approach based on an understanding of the world as a system that is both complex and adaptive, where change is only constant (Rammel *et al*., 2007), proposes that to achieve sustainability, a farm must be able to take advantage of current opportunities (Darnhofer *et al*., 2010). In this sense, the socially and economically recognition of pastoralism as a tool for the management and conservation of forest and rangelands can be a source of income for livestock breeders that collaborate on the conservation of the natural resources (Ruiz-Mirazo *et al*., 2009).

The Environment Department of the Government of Andalusia (Spain) has recently undertaken this question and since 2006 they pay to shepherds (which are integrated in the *Andalusian Network of Grazed Fuelbreak*) for the responsibility of integrating extensive livestock grazing as a tool for fire prevention. Actually 69 farmers are implicated with 31,990 animals grazing in 2346 ha distributed in 225 fuelbreak. A preliminary economic study unveils that the application of this prevention system cost only an average of 23% of the alternative manual clearing fuelbreaks (Valera-Redondo *et al.*, 2007). These results show the interest of the continuity of these farms for the environmental sustainability of the territory, but, are their farms sustainable?

Definitions of sustainable agriculture usually include references to financial, environmental, ethical, and social issues. In addition, product quality and animal welfare should be taken into account. The evaluation of sustainability of farms should include agro-ecological, economic and political-social domains (Darnhofer *et al*., 2010).

The aim of this study is to do a preliminary analysis of the sustainability of farms integrated in the above-mentioned Network, as a previous step of a more complete analysis of the sustainability of the Network itself.

II – Methodology

A survey was carried out in order to obtain valuable information about the viability of farms. 78% of the 69 farmers belonged to the *Andalusian Network of Grazed Fuelbreaks* was interviewed. 6 farms, which probably will soon joint to the network, also were included. Information relative to 48 variables was collected. Variables were organized into 7 sections: surface, socioeconomic, animals, equipments and infrastructures, feeding and grazing, reproduction and production and personal opinion. Field work was realized from May to June 2010 with the help of technicians of the Environment Department involved in this project.

III – Results and discussion

1. General description of farms

Majority of farms are located in east of Andalusia and they are mainly integrated in Natural areas: 1 National Park, 9 Nature Reserves, 5 Reserves of Biosphere and 1 Park around the city. Pasturing area has a medium-high scope, with natural Mediterranean vegetation, where brushes are dominant. 75% of farms do not have cultivated areas. 87% of farmers have rented lands, 5% have owned land and 8% use lands without cost.

27 farms have only sheep (mainly meat oriented), 18 only goat (mainly milk oriented), 10 goat and sheep, 3 goat and/or sheep and suckling cows and 2 all cited species and pigs. The

average size of flock (adult females) is: 553 ewes, 282 goats, 61 cows and 85 sows. Main income is given by ewes or by goats (45% and 35% of farms respectively). Sheep and goats have similar importance in remaining farms. Any farm has other animal species or agriculture as main income. All farms are familiar enterprises, 15 farms have some kind of organic production and only 4 farms make and sell artisanal cheeses.

2. Preliminary analysis of farms sustainability

A. Environmental analysis

The number of grazing animals has decreased in mountainous areas of Andalusia, which constitute a real threat for the maintenance of the ecosystem. For this reason, the promotion of grazing has been well accepted for numerous natural areas managers. At the moment of the interview, 9291 goats, 24491 ewes and 170 cows grazed in 260 km of fuelbreaks. Undoubtedly, the consumption of the vegetation in fuelbreaks will lessen the amount of burnable biomass and, consequently, will comply with fire prevention. But the fuelbreaks surface is not the more important pasturing surface in 65% of farms which used other grazing areas near to the fuelbreaks. In these areas, pasturing supervised by shepherds is realized thought the year. If pasturing is adequate (since a quantitative and qualitative point of view) it constitutes a benefit not only for fire prevention but also for maintenance of ecosystem. In this sense, it should be said that most of shepherds are vocational extensive breeders and animal stock rate is, in general, well suited to ecosystem carrying capacity (most of the farms have between 0.1-0.3 LU/ha).

Another environmental benefit of these farms is the maintenance of indigenous animal breeds and landscape. Concerning to the former, animals present in the farms are: Malagueña, Murciano-Granadina and Payoya goats, and Segureña and Merina sheep, but usually breeds are crossed among them. In relation to the landscape, the presence of animals and the conservation of old stables ("apriscos") represent an important value.

B. Social analysis

From the social point of view, the implication of shepherds in the maintenance of fuelbreaks has some strengths and weaknesses. Among the formers is the recognition of the shepherd´s work as something useful and desirable for the ecosystem and the society. It should be noted that all farmers said they like their work, although 65% of them say they are dissatisfied with their work. Other strength is the contribution to fix rural population (16 farmers have their homes joint to farm, and for others, average distance from their home to the farm is only 8.2 km) and to generate work in rural areas (there is an average of 1.9 person per farm, 75% of them males).

There are two main weaknesses. The first is the hardness of the pasturing: shepherd are with grazing animals between 9-10 moths at year, during 9.3 hours/day (84% of this time is in fuelbreaks); average fuelbreaks surface is 40 ha and its slope is medium or high in 72% of farms. The second is the lack of continuity: 50% of farmers will not continue with the activity in the medium term, due to the lack of profitability and/or their advanced aged (52% are older than 50 and only 7% are less than 30 years old).

C. Technical and economical analysis

The analysis of this domain of the sustainability requires more accurate information, which should be obtained by a periodical monitoring. Anyway, some general ideas can be said from this interview. Animal management is similar to that documented for goats and sheep farms located in natural areas of south of Spain (Gaspar *et al*., 2008; Ruiz *et al*., 2008). Males and females are together only during mating season in 75% and 86% of goat and sheep flocks, respectively. As consequence, parturitions are irregularly distributed among months (Fig. 1). In general, and although animals graze almost all the time, feeding supplementation indoor is high (Table 1), which increases the cost of product.

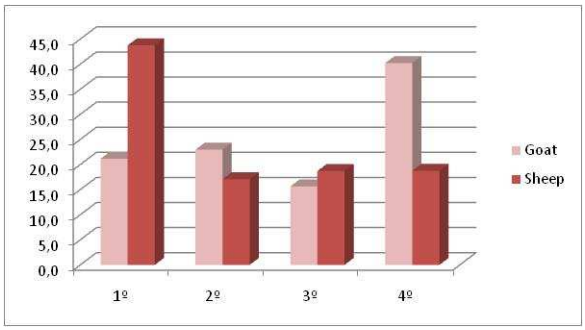

Fig. 1. % of farm which has the highest number of births in this trimester of year.

Table 1. Information for farms integrated in the *Andalusian Network of Grazed Fuelbreaks*

	Main economical activity of the farm†			
	MSR	**DSR**	**M&DSR**	**Several**
Number of farms	32	18	5	5
Surface of fuel break (ha)	42	40	36	26
Feeding indoor > 8 months per year (% goat flocks)	100	71	60	80
Feeding indoor > 6 months per year (% sheep flocks)	90	100	20	20
Has suitable animal housing (% farms)	18	33	20	20
Has water supply (% farms)	32	72	40	60
Has electricity supply (% farms)	43	89	80	100
Financial support for organic production (% farms)	22	11	0	100
Financial support for indigenous breeds (% farms)	16	6	0	20
€/farm received annually for grazing in fuelbreak	2253	1970	2259	1856

†Meat oriented small ruminants (MSR), dairy oriented small ruminants (DSR), orientation half meat and dairy (M&DSR) and several animal species (Several).

Differences among farm classified following the criteria "main economical activity of the farm" can be observed in Table 1. Infrastructures (electricity and water) are suitable for milk oriented farms (mainly goat farms) but not for the meat oriented ones (mainly sheep farms). Stables are very simple in all farms, they are used for shelter animals and they should to be improved in majority of cases. In goat farms, milking facilities are suitable: 82% of farms have mechanical milking and 68% refrigeration tank.

Forty percent of farmers belong to an association different to a sanitary one. Commercialization of meat and milk is realized through cooperatives only for 13% of farmers and only three of them make and sell cheese. Nevertheless, the majority of farmers answered affirmatively when asked if they wanted to make cheese or slaughter animals in the farm. Milk and meat have low prices (like in all pastoral farms of the zone and they are poorly valorized; grazing is not take account). Remuneration in exchange for the service provided is considered acceptable by 56% of farmers. Almost 100% of farms received PAC subsidies, but very few of them receive other type of financial aids (Table 1).

3. Some proposals to improve sustainability

In the *resilience thinking* framework, for increasing sustainability, farmers are to be able to exploit strengths, absorb shocks, adjust following a disturbance and transform their farm to take advantage of new opportunities. According to that, sustainability of *Andalusian Network of Grazed Fuelbreaks* could be improved if:

(i) Animal breeds are improved and farmers avoid crossings among them. A flock composed by pure breeds allows farmers to get specific financial support from Government.

(ii) Traditional knowledge about grazing is recovered and transmitted. In this sense, the first Andalusian Shepherd School has been recently created. A good adjustment of stocking rate and a reproductive planning may be done, which can reduce the dependence of external feed and, consequently, the cost of the product.

(iii) An increase of the amount remunerated for grazing fuel-breaks should be considered, taking account the less cost of this fire prevention system compared with manual clearing.

(iv) Some technology, like the use of GPS for grazing animals control, could be used to reduce the hardness of this activity.

(v) An integral extension services is in development. It will improve management and economical margins, the farmer quality of life and spare time for farmers to dedicate to transforming their products and obtain more economical benefits.

(vi) Association among farmers and between farmers and cheese makers are increased, which could improve the valorization and price of grazing milk and meet. More flexible standards for traditional cheese factories are, at least, published. These last points will, undoubtedly, increase the interest of young people for this activity and assure the continuity of farms.

IV – Conclusions

The implication of shepherds in the maintenance of ecosystem is necessary, but important sociological and economical weaknesses and threats were detected. Hardness of work, small farm profitability and lack of assurance of farm continuity are the most important.

To keep these systems from disappearance, all people of the sector, technical, political and farmers must assume the challenge of making them more sustainable. For reaching this goal, the following commitments should be accepted: consumers paying fair prices for grazing products, government supporting effective plans for the development of the rural sector, farmers and trainers using resources rationally, and finally, researchers and teachers working integrally on the current and future needs of pastoral farming.

Acknowledgements

Authors wish to acknowledge to all members of EGMASA and Environmental Department of Andalusia Government implicated in this study (especially to Rogelio Jiménez, Jaime Montes, José Caballero and Fidel Delgado).

References

Cavallero A. and Ciotti A., 1991. Aspetti agronomici dell'utilizzazione dei prati e dei pascoli. In: *Riv. di Agron.,* 25, p. 81-126.

Darnhofer I., Fairweather J. and Moller H., 2010. Assessing a farm´s sustainability: insights from resilience thinking. In: *International Journal of Agricultural Sustainability,* 8(3), p. 186-198.

Gaspar P., Escribano M., Mesías F.J., Rodríguez de Ledesma A. and Pulido F., 2008. Sheep farms in the Spanish rangelands (dehesas): Typologies according to livestock management and economic indicators. In: *Small Ruminant Research*, 74(1), p. 52-63.

Ramel C., Stagl S. and Wilfing H., 2007. Managing complex adaptative systems – A co-evolutionary perspective on natural resource management. In: *Ecological economics,* 63, p. 9-21.

Ruiz F.A., Castel J.M., Mena Y., Camúñez J. and González P., 2008. Application of the technico-economic analysis for characterizing, making diagnoses and improving pastoral dairy goat systems in Andalusia (Spain). In: *Small Rumin. Res.,* 77, p. 208-220.

Ruiz-Mirazo J., Robles A.B. and González-Rebollar J.L., 2009. Pastoralism in Natural Park of Andalusia (Spain): A tool for fire prevention and the naturalization of ecosystems. In: *Options Méditerranéennes,* A, 91, pp. 141-144.

Varela-Redondo, E., Calatrava-Requena,J., Ruiz-Mirazo, J., Jiménez-Piano, R., González-Rebollar, J.L., 2007. Valoración económica del pastoreo en términos de costes evitados en labores de prevención de incendios forestales. In: *Wildfire* 2007, Seville.