Description and typology of dairy goat farms in Greece

GEORGIOS ARSENOS[1], ATHANASIOS GELASAKIS, SOPHOCLES PINOPOULOS,
REBEKKA GIANNAKOU, IOANNIS AMARANTIDIS

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Abstract

The national flock of dairy goats in Greece comprises genetically diverse populations that take advantage of semi-mountainous or mountainous regions, where they are traditionally fed on natural pastures and scrublands under varied climatic conditions. The dominant system is the semi-extensive and milk production is the key objective. Considering their role in rural development of Greece, goats represent an appropriate model of low input farming systems.

Introduction

Dairy goat farming is one of the earliest agricultural activities dating back to ancient Greece. It has played a vital role in maintaining rural tradition and self-sufficiency of population in poor rural areas. The latter explains the stability of the goat national flock in Greece which is ranked first with 39.8% of the total EU goat census. The indigenous Greek goats comprise genetically diverse populations and in 2011, the national flock reached 5 million heads spread over 120,000 farms. The latter are mainly mixed flocks with dairy sheep whereas only 65,031 farms raise exclusively dairy goats (see Table 1). The overall annual goat milk production is about 420,000 tons, representing about 22% of the total milk production in Greece. The traditional goat farming system is the semi-extensive where the kidding season coincides with the emergence of grazing resources and goats as fed on natural pastures and scrublands under varied climatic conditions. The latter is the dominant system in semi-mountainous or mountainous regions that have low income indices and relatively low population density engaged mainly in agriculture. The common production objective of goat farming is milk, but the extended geographical distribution of flocks as well as the diversity of the management strategies contributed to the lack of knowledge about the typology and the characteristics of those systems (Gaspar et al. 2011). Hence, the description and typology of a random sample of farms was set as our first objective within the SOLID project, considering the importance of goat farming for the future of rural development in Greece.

Material and methods

The available database of registered sheep and goat farms in Greece (Hellenic Ministry of Rural Development and Food, 2011) was initially assessed to get information about the status of dairy sheep and goat farming in Greece. A total of 103 dairy goat farms from all over Greece were randomly selected and assessed using the designated questionnaire. The questionnaire was designed for in depth interviews of farmers and farm assessment. The survey was conducted over the last two years and data were collected by the same veterinarians during extended on-farm visits (3-5 hours). The questions were selected to obtain a general description of farm characteristics and overall management practices and included information about: a) farm location and land use b) flock size and structure, c) facilities and equipment, d) feeding management, e) reproduction and breeding strategies, f) labour force and g) milk production. The variables used for statistical analysis were: i) livestock units, ii) average milk yield, iii) cultivated land per livestock unit, iv) average grazing speed, v) concentrates per livestock unit, vi) roughages per livestock unit, vii) livestock units per labour unit, viii) total facilities score, and ix) yearlings:goats ratio (as indicator of the goats replacement rate). Data analysis was performed using the SPSS 21® software. The ideal number of clusters was decided using the hierarchical cluster analysis based on Ward's method. In this analysis Euclidean distance was used as a clustering measure. Thereafter, K-means clustering was used as the most appropriate partitioning method of farms in the 3 predefined clusters. Finally, the existence of statistically significant differences between those groups was tested with ANOVA and Least Significant Difference test was used as a post hoc test.

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[1] Laboratory of Animal Husbandry, School of Veterinary Medicine, Aristotle University of Thessaloniki, Greece,
http://zootexnia.vet.auth.gr/, email: arsenosg@vet.auth.gr

Results

We used data from the 2011 census to classify the national flock of dairy goats in Greece according to flock size and farm numbers. The results are presented in Table 1. As shown in Table 1, the majority of flocks (63%) have less than 400 animal and only 13% of flocks are large flocks. It is also important that 22% of flocks have less than 100 animals. Figure 1, illustrates the arrangement of the clusters produced by hierarchical clustering. The minimum cutting height was 3 because that was the point at which the total number of clusters decreased dramatically and hence the most suitable number of valid clusters appeared to be 3.

Table 1:   Description of dairy goat farms in Greece

Flock size	Number of Flocks	Goat numbers
>1000	58	73.156
901-1000	38	37.337
801-900	59	50.633
701-800	110	82.408
601-700	250	162.061
501-600	479	262.498
401-500	1.008	452.836
301-400	2.416	746.694
201-300	3.924	967.273
101-200	7.278	1.062.095
81-100	2.122	193.394
61-80	2.841	199.865
41-60	4.301	214.403
21-40	8.803	253.415
11-20	10.727	162.904
0-10	20.617	103.974
Total	**65.031**	**5.024.946**

Table 2: **Means ± SE of variables selected for the characterization of goat farms in 3 clusters and comparisons between them**

		Cluster 1 (n=27)		Cluster 2 (n=10)		Cluster 3 (n=66)	
	Characteristic	Mean	SE	Mean	SE	Mean	SE
Staff	Owner's age	45	2.2	44	3.4	48	1.4
	Years on goat breeding	21	2.6	17	2.8	26	1.6
	Labour units	2.9	0.22	2.8	0.47	2.9	0.15
Animals	Livestock units	64	12.5	53	14.3	70	5.6
	Livestock units / labour unit	20	2.3	18	3.4	24	1.4
	Adult goats, n	341	67.5	282	81.4	386	30.9
	Milking goats, n	312	66.0	262	77.9	328	26.3
	Bucks, n	21	3.5	20	5.2	29	2.9
	Yearlings, n	75	13.7	57	12.1	76	7.8
	Goats:bucks ratio	17	1.5	14	2.0	17	0.9
	Goats replacement rate	0.15 [a]	0.010	0.16 [a]	0.014	0.13 [b]	0.027
	Bucks replacement rate	0.30 [a]	0.013	0.31 [a]	0.035	0.25 [b]	0.010
	Yearlings:goats ratio	0.3	0.06	0.3	0.06	0.2	0.03
	Age at first mating, mo	9.3	0.70	9.8	0.75	9.0	0.52
Productivity	Milk production / goat, kg	270 [a]	8.6	478 [b]	22.9	141 [c]	5.3
	Prolificacy	1.7 [a]	0.04	1.8 [a]	0.07	1.5 [b]	0.03
Land use	Cultivated surface, ha	39	17.3	27	11.8	23	7.3
	Irrigated surface, ha	1	2.9	6	10.3	2	6.2
	Non irrigated surface, ha	37	17.2	22	12.0	21	7.1
	Cultivated pasture surface, ha	16	7.8	6	3.5	11	5.4
	Cultivated land / livestock unit	0.5	0.15	0.6	0.34	0.3	0.06
Nutrition and management	Concentrates / livestock unit	1.4 [a]	0.14	3.1 [b]	0.95	0.9 [a]	0.07
	Roughages / livestock unit	1.2 [a]	0.23	2.2 [b]	0.71	0.5 [c]	0.07
	Average daily grazing time, h	7.4 [a, b]	0.56	5.9 [a]	1.20	8.5 [b]	0.27
	Average daily grazing distance, km	6.0 [a, b]	0.98	3.6 [a]	0.71	7.7 [b]	0.52
Score	Total facilities score	6 [a]	0.4	7 [a]	0.7	4 [b]	0.2

[a, b, c] Means within a row with different superscripts differ ($P < 0.05$).

Discussion

Based on existing information (Escareño et al. 2012, Gelasakis et al. 2012) and knowledge of dairy sheep and goat production it seems that the typology of flocks generated in the present study is representative of dairy goat sector in Greece. The latter is supported by the results shown in Table 2, which confirms the typology in statistical terms. However, as shown in Table 2, there were not any significant differences in some of the variables (i.e. regarding staff and livestock), which although are distinctive of some flocks in the clusters, they are not suitable to differentiate them. A key difference between clusters was the total facilities score. The latter was the lowest in Cluster 3 that accounted for 64% of the flocks and is indicative of the traditional low input system. Cluster 1, comprises 26.2% of the farms and represents those farms that are in the stage of transforming from the traditional semi-extensive system to semi-intensive system of production. Cluster 2 accounts for 9.7% of the farms and typologically is composed of middle size farms with a complementary agricultural activity. As mentioned above, Cluster 3, is the most representative of the traditional semi-extensive commercial system of dairy goat farming in Greece. The variables used in the current study are those that in our view best fit the reality of existing goat production systems in Greece and at the same time show low variability over time. In conclusion the present study is the first step for the overall assessment the goat sector in Greece and provides the basis to explore its strengths and weaknesses.

Suggestions to tackle with the future challenges of organic animal husbandry

The obtained typology enable an objective description of organic and low input dairy goat farms in Greece and indentifies their strengths and weakness. The data can be used as indicators to analyze the diversity of dairy goat farming practices. Moreover the obtained information can be used for future profitability analysis among different clusters.

Acknowledgement

References

Escareño, L., Salinas-Gonzalez, H., Wurzinger, M., Iñiguez, L., Sölkner, J., Meza-Herrera, C. 2012. Dairy goat production systems: status quo, perspectives and challenges. Tropical Animal Health & Production 45(1):17-34.

Gaspar, P., Escribano, A.J., Mesías, F.J., Escribano M., Pulido, A.F. 2011. Goat systems of Villuercas-Ibores area in SW Spain: Problems and perspectives of traditional farming systems. Small Ruminant Research, 97:1-11.

Gelasakis, A.I., Valergakis, G., Arsenos, G. and Banos G. 2012. Description and typology of intensive Chios dairy sheep farms in Greece. Journal of Dairy Science, 95:3070–3079.

Hellenic Ministry of Rural Development and Food, 2011. Annual census of Sheep and goats.