

Rare indigenous sheep breeds of Greece

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Of the 6400 documented farm animal breeds, about one third is threatened by extinction (Scherf, 2000). Unlike in general biology, the focus in farm animal biodiversity is not on species, but on breeds within species. While species are clearly defined, breeds are not. Some definitions are based on arguments from population genetics while others also include sociological and cultural considerations. An exhaustive survey, lasted over 3 years, was undertaken by the Department of Animal Breeding & Husbandry of AUA, in an attempt to identify and describe the rare indigenous sheep breeds of Greece. According to this study, there were totally 17 sheep breeds identified. In terms of census population size, the status of these indigenous sheep populations could be characterized as critical i.e. close to extinction ($N < 300$), endangered ($300 < N < 1000$), vulnerable ($N = 1,000 - 5,000$) or insecure ($N = 5,000 - 10,000$) (Bodo, 1989, modified). It should be, however, noted that these are general guidelines; knowledge of the effective population size (N_e) is more important because it is directly associated with the genetic variation of a population. In breeding populations, N_e can be dramatically smaller than the census one because it is strongly affected by the ratio of males to females, selection and non random mating. The major morphological and (re)production characteristics of the 17 rare sheep breeds are presented in Table 1.

Table 1. Rare indigenous sheep breeds in Greece

Name	Location	Number of animals	Wither height (cm)		Adult Body weight (kg)		Commercial Milk yield (kg)	Litter size (number of lambs born per year and ewe)
			Rams	ewes	rams	ewes		
Chios ^I	Chios island, northern Greece	6500	84	76	87	66	180-250	1.7-1.9
Anogia ^I	Crete	5000	-	57	-	27	low	Low
Kalaritiki ^V	Hepirus	2800	67	60	64	45	80-100	1.2-1.3
Asterousia ^V	Crete	2500	-	57	-	33	low	Low
Kefalonia ^V	Kefallonia Island	2000	65	60	58	44	150-170	1.1 – 1.3
Skopelos ^V	Skopelos island	1800	66	60	64	51	160-190	1.6 – 1.8
Katsika ^V	Hepirus	1500	70	61	69	50	110-130	1.2 – 1.4
Piliou ^V	Central Greece	1200	63	58	59	44	110 - 140	1.1 – 1.3
Kokovitiki ^E	Peloponnesus	700	63	55	56	41	60-80	0.9 – 1.1
Florina ^E	Northwestern Greece	650	72	66	76	60	90 - 110	1.2 – 1.5
Zakinthos ^E	Zakynthos island	600	83	75	80	75	150 - 180	1.5 – 1.7
Kimi ^E	Eyboia island	600	69	65	73	66	180 - 200	1.4 – 1.7
Agriinio ^E	Western Greece	450	76	67	72	60	120 - 150	1.1 – 1.3
Sarakatsaniki ^C	Central Greece	200	65	56	69	41	40 - 50	0.9 – 1.1
Thrace ^C	Eastern Greece	120	63	57	47	33	50 - 70	1.0 – 1.1
Argos ^C	Peloponnesus	110	85	70	70	59	140 - 160	1.5 – 1.8
Ikaria ^C	Ikaria island	30	73	65	60	40	90 - 150	1.3 – 1.5

^Iinsecure, ^Vvulnerable, ^Eendangered, ^Ccritical

The above sheep breeds are distributed in all over the country and in a wide range of ecological and geographical conditions. They are generally characterized by high adaptability under harsh environmental conditions, high survival ability under restricted feed and water supply and disease resistance. Some of the breeds display unique phenotypic characteristics such as the wool type of Asterousia, the earless in Piliou, the high body size in Zakynthos and the tail shape of the Argos breed. In terms of (re)production, some breeds i.e. Skopelos, Chios, Zakynthos, Kimi and Argos have high or relatively high milk yield

while Chios, Skopelos, Kimi and Argos are considered prolific breeds (Table 1). Some other less productive breeds are clearly associated with the ecosystem in which are kept (Asterousia, Katsika) or are of great historical value (Kalaritiki) and of cultural importance (Sarakatsaniko). Results of genetic protein polymorphism analysis showed that some breeds are closer related than others, forming clusters, e.g. Asterousia and Anogia in Creta, Zakynthos and Agrinio in western part of Greece and Chios and Skopelos, probably due to common origin (Figure 1). Breeds of Crete (Asterousia and Anogia) are clearly differentiated from other island (Chios, Skopelos, Kimi, Kefalonia) and continental breeds (Florina, Katsika, Kalaritiki). Furthermore, there were three major clusters of breeds formed, each one located in the western, eastern and southern part of the country, respectively (when breeds Kefalonia and Florina are not taken into account).

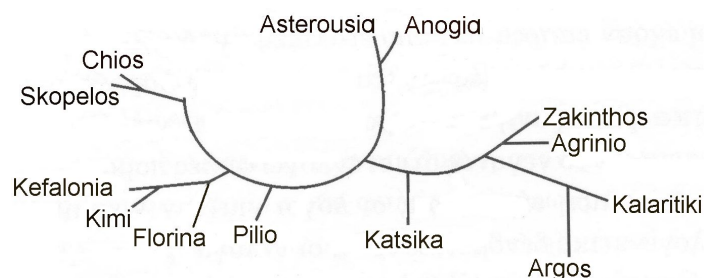


Figure 1. Phylogeny of 13 rare sheep breeds of Greece

In most cases, the status of the sheep breeds is either critical (Ikaria, Argos, Thrace, Sarakatsaniki) or endangered (Agrinio, Kimi, Zakynthos, Florina, Kokovitiki) implying that intervening actions for *ex situ* (Ikaria, Argos and Thrace breeds) or *in situ* conservation (for the endangered breeds) programs should be directly undertaken. In the case of *in situ* conservation, actions should include collection and freezing of semen, ova, embryos and DNA segments and/or keeping captive breeding animals in zoos or institutions. In the case of *in situ* conservation programs, measures should aim at ensuring an adequate effective population size (around 500) to minimize loss of genetic variation due to genetic drift and maintain constant genetic variance (Franklin, 1980). Conservation of the sheep genetic diversity is a composite objective because it aims at maintenance of diversity of both within and between breeds i.e. prevention of breed extinction. It should be very clear, however, that prevention of breed extinction and management of within breed genetic variation are related but different objectives. In any case, maintenance of genetic diversity is only one aspect, economic viability, cultural values and ecological and socio-economic functions are of similar importance. Decision support tools which integrate all relevant aspects still need to be developed.

Acknowledgments

All agricultural scientists and farmers participating in this study are gratefully acknowledged for their contribution.

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