Country report of Turkey on small ruminant production with special reference to the selection programme for increasing milk production in dairy goat flock of University of Çukurova

Güney O., Cebeci Z., Torun O., Biçer O.

in

Gabiña D. (ed.).
Strategies for sheep and goat breeding

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 11

1995
pages 185-192

Country report of Turkey on small ruminant production with special reference to the selection programme for increasing milk production in dairy goat flock of University of Çukurova

O. GÜNEY
Z. CEBECI
O. TORUN
DEPARTMENT OF ANIMAL SCIENCE
FACULTY OF AGRICULTURE
ÇUKUROVA UNIVERSITY
ADANA
TURKEY

O. BIÇER
DEPARTMENT OF ANIMAL SCIENCE
FACULTY OF AGRICULTURE
MUSTAFA KEMAL UNIVERSITY
ANTAKYA
TURKEY

SUMMARY - Turkey is the leading sheep and goat rearing country in Europe, ranking 5th or 6th in the world with about 52 million head of small ruminants. On the contrary, their production performance is rather low. They are mainly kept on permanent grazing land and dry steppe areas with poor nutritive values in an extensive production system. In recent decades, although there is an attempt to improve their production performance and to develop more sophisticated breeds and genotypes, due to lack of a breeding strategy on a national scale, inadequate nutrition and not having performace recording, there is a big gap between the potential and realized performance of native breeds. This paper deals with the present situation of small ruminants in Turkey and a project proposal in order to improve milk production performance of dairy goat flocks of Çukuroka University and breeding stock, providing possibilities of the flock to the goat farmers in the Çukurova region. The strategy followed is that of a selection programme based on progeny testing.
Key words: Small ruminant, sheep, goats, German Fawn x Hair backcross, selection programme, progeny testing

RÉSUMÉ *- La Turquie est le premier éleveur de chèvres en Europe et se place au cinquième ou sixième rang dans le monde avec environ 52 millions de têtes de petits ruminants. Toutefois les performances de production sont plutôt faibles. Ceci vient principalement de la faible valeur nutritive des prairies permanentes et des zones de steppe sèche dans un système de production extensif. Durant les dernières dizaines d'années, bien qu'il y ait une volonté d'augmenter les performances de production et de développer des hybrides et des génotypes sophistiqués, du fait du manque de stratégie d'amélioration à l'échelle nationale, de la nutrition inadaptée, il y a un grand fossé entre le potentiel de production et les performances réalisées sur les races natives. Ce travail présente la situation actuelle des petits ruminants en Turquie ainsi qu'un projet de l'Université de Çukurova qui a pour but d'augmenter les performances de production de lait de chèvre et d'examiner les possibilités d'amélioration de production de lait de chèvre chez les producteurs de la région de Çukurova. La*

stratégie que nous préconisons de suivre est un programme de sélection basé sur les tests de descendance.
Mots-clés : *Petits ruminants, ovins, chèvres, German Fawn x Hair backcross, sélection, tests de descendance.*

INTRODUCTION

The importance of sheep and goats to people and their role in farmers in Turkey is well documented (Anonymous,1969; Sönmez,1973; Yalçın,1985; Pekel *et.al.*,1993). There are about 3.6 million agricultural enterprise in Turkey and 86% of them occupied with horticulture, crop production and animal production; 11% with only horticulture and crop production and the remaining 3% is dealing with only animal production. Sheep and goat are multipurpose animals that provide milk, meat, fibre and skins for human needs and manure for the land in Anatolia since centuries. The production level in this items is usually low. Small ruminants (SR) could for various reasons play an important role for the country since they do not require costly inputs. Their meat, milk and the converted dairy products are valuable goods in Turkey. Other SR products such as wool, skin are considered of secondary importance because of economic reasons. SR farming forms an integral part of agricultural production system. They are the main source of animal protein for people particularly live in rural areas. SR convert otherwise unusable vegetation on non cultivated poor grazing lands and pasture to milk, meat, fibre and skins (Yalçın, 1985). Especially , goat meat and goat milk are the main sources of animal origin protein for the inhabitants in the mountainous region. SR contribution into total red meat and milk production of Turkey is 47.5 and 32.5%, respectively. The income - demand relationship for SR meat production is significantly positive due to low input request of extensive production system practised. Demand for SR meat has always been high and its export share has also increased markedly after 1980.

A large part of SR is raised under extensive conditions. Most of the breeds kept are native ones with low producing capacity. The most known sheep and goat breeds, their production levels and share in population are given in Table 1 and 2. Most of the native sheep breeds are fat tailed (85%) and remaining part of population are thin-tailed native ones (10%) and crossbred genotypes (5%).

The project proposed will be based on Hair goat in order to improve their production performance. In 1983, the joint-venture between Hohenheim University-Çukurova University has been commenced, and by using German Fawn bucks as sire breed for crossbreeding with hair goat and prototype dairy goat is obtained in 10 years of project. At this stage of work, selection programme will be conducted to those crossbred genotype by means of progeny testing. This proposal is involved as a genetic improvement programme of Hair goat and details is given within text.

The dominant goat breed which raised all over Turkey is Hair goat (Kıl Keçi). Although there is a decline in the number of Hair goat in the last decade, its population is still about 9.5 million head. Hair goat is managed in transhumant and nomadic system with a flock size of 50-300 animals. In nomadic system, flocks

Table 1. Production performance of sheep breeds and their proportion in the population.

Breed	Number (million)	Proportion (%)	Milk yield (kg)	Live W. (kg)	Fleece W. (kg)
Fat-tailed					
White Karaman	23.2	47.6	50-55	40-45	1.5-2.0
Red Karaman	9.0	18.5	55-60	40-45	1.2-1.5
Daglıç	7.4	15.2	40-50	35-40	1.8-2.0
Awassi	1.1	2.2	100-155	40-45	1.8-2.2
Thin-tailed					
Kıvırcık	3.8	7.8	70-90	40-42	1.3-1.7
Turkish Merino	1.4	2.9	55-60	50-55	3.0-3.7
Karayaka	1.2	2.4	40-45	38-40	2.0-2.5
Imroz	.07	0.14	70-100	35-40	1.6-2.0
Chios	0.01	0.05	120-180	40-45	1.6-2.0

As it is seen in Table 4, there has been steadily decreasing trend in number of SR and meat production performance of sheep and hair goat. On the other hand an increment is observed in red meat production of Angora goat may be associated with decreasing goat number. In contrast, milk and fibre production of this breed is decreased markedly. Although Mohair is an important commodity, fluctuation and insufficient price in mohair market leads the farmers shifting their production goals follow the seasonal of vegetation in a migration from lowland in winter to highland pastures and grazing in summer. They are almost totally depend on shrubs and bushes on grazing areas for their nutrition. The production performance of native goat breeds are given in Table 2. As it is seen in the table, Hair goat is a low producing breed even under semi-intensive conditions. The production performance and rate of differences in number of SR and their production levels between 1985-91 are given in Table 3 and 4.

Table 2. Goat breeds kept in Turkey and their production performances.

Breed	Number	Lactation Number	Lactation Length	Milk yield (kg)	Litter Size	Location
Hair	9.5	1-2	157.6	87.8	0.65	İzmir
Hair	9.5	1	213.9	133.5	1.00	Adana
Kilis		1	204.5	231.1	1.10	Adana
Damascus		1-2	230.2	311.9	1.50	Adana
Maltese		1-2	170.3	226.0	1.30	İzmir
Angora	2.8	-	165.0	80.0	0.90	Ankara

from fibre to meat. Mohair has always been an important export commodity but there has been a decreasing trend in its exportation in recent years. For instance mohair export of 3890 tons in 1987 has fallen to 1340 tons in 1989. Furthermore, in the last year mohair export of country was realised only 250 tons.

Table 3. Annual production of sheep and goat products in Turkey[1]

Species	Number of Animal	Meat Prod. Total (ton)	Meat Prod. Average (kg)	Milk Prod. Total (ton)	Milk Prod. Average (kg)	Wool-Mohair prod. Total (ton)	Wool-Mohair prod. Average (kg)
Sheep	40433000	128625	16.23	1127430	48.55	44690	1.10
Angora goat	1185000	1415	16.24	12665	21.03	1370	1.15
Hair goat	9579000	18155	16.34	322120	61.06	3960	0.41

[1] Official figures except rural area.

Table 4. Differences rate of number of SR and production level between 1985-1991(%)

Species	Number of SR	Meat Prod.	Milk Prod.	Fibre Prod.
Sheep	-4.86	-23.56	+5.11	-6.66
Angora goat	-43.65	+25.11	-38.13	-39.67
Hair goat	-14.74	-13.53	-6.07	-11.23

Main Problems and Some Prospects

Regarding the low production performance of SR, the problems, constraints in breeding and nutrition and proposals to overcome these problems can be summarised as follows:

i. There is not a breeding strategy at national level in order to determine production performance of native breeds. They have not been studied systematically, therefore production potential of SR breeds has not been fully exploited.

So far, the research works done on this subject considered as scientific experiment and results obtained could not be transferred to practise. The introduction of exotic breeds into Turkey for pure breeding and/or crossbreeding purposes has been mostly problematic. This is related to the absence of a proper breeding strategy according to the characteristics of different native breeds and different climatic regions. This is one of the most serious constraints to SR

production in Turkey. Emphasis must be put on this subject to develop nation wide project. Experimental stations and research units of universities will have to be covered for this aim.

ii. Lack of recording is also very crucial problem that occurs in SR production. Without recording practices, the data and results obtained in experimental works are useless for any selection programme. Therefore a strong co-operation is needed between research units of universities and related ministries with extension service of Ministry of Agriculture.

iii. Inadequate nutrition at different stage of production and unorganised marketing of live animals and their products, also forms the bottleneck of SR at the moment.

iv. Insufficient financial resources and support for research and development on SR production.

v. Overstocking of SR on permanent grazing land and pasture. As it is mentioned before, sheep and goats are raised under extensive production system. The grazing capacity of the land is not assessed logically and no legislative steps have been taken to take off the pressure off the grass lands.

A SELECTION PROGRAMME FOR INCREASED MILK PRODUCTION IN DAIRY GOAT FLOCK OF ÇUKUROVA UNIVERSITY

As it is summarised in the first part of paper, missing of performance recording is one of the main constraints in SR production. However, performance recording is strictly practised on the sheep and goat flocks of the Research Farm of the Faculty of Agriculture of Çukurova University (RFCU). Therefore a genetic improvement programme can be realised in this flock. In this part of the paper outlines of a progeny test programme is discussed.

The experiment will be conducted at the RFCU which is situated in the subtropical part of Anatolia, the Çukurova plain. It is 40 m in altitude (36 59' N, 35 18'E) and mean temperature in the region is 18.8 °C. January is the coldest month with 9°C, August is the hottest with 28°C. Annual precipitation is 646 mm and relative humidity is 66%.

The German Fawn x Hair (native goat breed) crossbred goats will form the animal material of project. They were obtained as a result of a crossbreeding experiment which was started in 1983 in order to develop a new dairy goat type. Crossbreeding went on until backcross to German Fawn does and bucks are obtained and then the crossbred flock was closed. This synthetic goat type will be used for the selection programme.

Composition and production performance of RFCU flock

The total number of does was 228 which comprise 157 older and 71 yearling does. Nine mature bucks were available for mating and also 17 yearling bucks were kept as supplementary. The production values for milk yield in RFCU flock for the last. four years are summarised in Table 5.

Table 5. The production values from years 1990 to 1993.

	Production years				Last
	1990	1991	1992	1993	4 years
Number of does	87	153	199	125	-
Milk yield (kg)	239	269	235	318	263
Lactation length (days)	252	217	215	231	225
Minimum yield (kg)	98	160	103	125	122
Maximum yield (kg)	490	512	499	502	501

As it is seen in Table 5, annual averages and variation between years was nearly similar to each other, except year 1993. In this year since a strong culling was practised due to some management reasons, annual average was observed higher than those of the previous years but phenotypic variation was slightly differed. From the values it can be said that there is a considerable phenotypic variation in the flock and it was estimated approximately 40 kg.

Breeding objectives

In the last decades, the increasing demand for breeding animal with high milk production has been popular within the farmers in the highlands and plain areas of Çukurova region of Turkey. The only source of breeding animals for these farmers is the dairy goat flock kept at Faculty of Agriculture, Çukurova University (RFCU). To provide with high producing breeding animals to goat keepers, it becomes a necessity to start a genetic selection programme for increased milk yield and multiply the breeding stock.

In the selection programme proposed, the part lactation of 100 days of does will be used as selection criteria. In most of studies it was reported that part lactation records can be efficiently utilised for selection goals. Thus, generation interval can be shortened and genetic improvement per year increased.

Progeny test scheme

The pre-selection of test bucks will be practised on the basis of their pedigree indexes. At the end of progeny test, the best two proven bucks will be used as sires of test bucks. Twenty top does selected according to their own breeding values will be buck dams. Hence, theoretically, 10 young male kids will be available for testing aims. The final selection rates are 20% and 8.77% for the sires and dams of test bucks, respectively.

For predicting the breeding values of test bucks, nearly 10 does per buck which are mainly yearlings, will be used as testing does. In this case the proportion of does used for test matings is 43.85% and testing capacity is about 5 daughters per test buck.

Expected genetic improvement

The expected genetic progress can be predicted by mean of following well-known formula (Lerner, 1950): $DG = i\sigma_p h^2$. According to Stahl *et al.*(1969), the standardised selection differential for breeding animals can be calculated by use of corresponding proportions of selected anımals. Hence the standardised selection differential for buck sires and buck dams becomes 1.3998 and 1.7815, respectively. The average selection differential for both sexes equals 1.5907. When assuming the heritability is 0.20 , since estimated phenotypic variation is nearly 40 kg, genetic progress per generation can be expected 12.73 kg per generation (DG = 1.5907 * 40 * 0.20 = 12.73).

Estimation of breeding values

Breeding values, simply , will be estimated as product of related regression coefficient with the difference between daughters average of a buck for their contemporaries average (Schimidlin, 1990). When assuming heritability is 0.20, breeding value of a test buck becomes :

BV = (2n / n +19) (DA-CA)

Where , DA, CA and n respectively are daughter average, contemporary average and number of daughters. Since each buck will be tested by about 5 daughters performance, the first term of formula (regression) can be reduced to 0.42 for simplicity in computing.

Since the progeny test comprise single flock, the only environmental effect on daughters ' performance comes from age of dams. Thus precorrections will be made for only age of dam.

The animal material will be kept under intensive feeding and management conditions with the rest of experimental flock RFCU. Flushing and steaming up are regularly practised during the mating season and late pregnancy. Veterinary services are available for the flock. Does are herded for about 6-8 h during day, then confined to modern semi-open barns. They will be fed 500 g/day concentrates during lactation plus alfalfa hay and silage as roughage.

Natural mating is practised in the breeding season which is August onwards. Does will be teased twice a day (morning and evening) to detect oestrus and animals in heat will be hand-mated by bucks according to the progeny test application schema.

Laboratory, office, computing and vehicle requirements will be provided by the Faculty of Agriculture. There is no need for qualified manpower for the project because it is already available at the RFCU.

On the other hand, the project will be supported scientifically by the experts of Departments of Animal Science of Çukurova University, Faculty of Agriculture and Mustafa Kemal University, Faculty of Agriculture.

As it is mentioned in the first part of paper, there is not performance recording organisation and recording is not practised extensively except the research units in Turkey. Therefore the Departments named above will be the responsible organisation of performance recording and selection. The records which must be

taken in the progeny test such as growth performance and lactation performance will be determined periodically. ICAR regulations (Method A) for milk recording in goats will be followed in determining lactation performance. The project will be financially supported by the Faculty of Agriculture of Ãukurova University. The surplus male breeding stock obtained in the project will be sold to the goat keepers in the region in order to improve the milk production of their goat flock.

DISCUSSION

Although the proportion of does used in test mating is relatively high, number of daughters for each buck among the others is the main factor that limits the genetic improvement. The present testing capacity can be increased by expanding the project to farmers' flocks in the area. For this purpose some farmers from Antakya province will be chosen and the does will be mated with the proven bucks. This part of the project will be prepared in details according to the first year results of progeny test.

Within this project, it is very crucial to establish a co-operative breeding scheme who will overtake the responsibility of recording and testing practices on farmers flock. This body may be formed in future by the goat keepers with leadership of the extension service of Ministry of agriculture . In all stages of the project, scientists at research and researchers from both university can advise and support the breeders for developing breeding programmes.

REFERENCES

Anonymous (1969). *The projection in agricultural production of Turkey (1968-2000).* Turkish Ministry of Agriculture, Ankara, Turkey.

Lerner,I.M. (1950). *Population genetics and animal improvement.* XVIII + 342, Cambridge University Press.

Pekel,E., Yalçın,B.C., Güney,O., Biçer,O. and Torun,O.(1993). Sheep Production in Turkey in *Proc. of Production of hides, skins, wool and hair symposium.* EAAP Pub. No.56, Pudoc Scientific Publishers, Wageningen.

Sönmez,R. (1973). Studies on developing the sheep production of Turkey (Türkiye koyunculuğunu geliştirme ve ıslahı çalışmaları). IV. Science Cong. 8-9 November 1973, Ankara.

Stahl,W., Rasch,R., Siler,R.,Vachal,J., (1969). *Populations genetik fur Tierzüchter* ss 359. Landw. Staatsverlag Prag.

ICRPMA (1990). *International regulations for milk recording in goats.*

Schimidlin,J. (1990). Problems in evaluation of milk productions in goats in *Abs. of 41st Annual Meeting of EAAP*, Tolouse, 9-12 July, France.

Yalçın, B.C., 1985. *Sheep and Goats of Turkey.* FAO.