

Determination of Milk Production Costs on the Member Farms of Sheep and Goat Breeders' Association in Canakkale

¹Duygu Akturk, ²Fusun Tatlidil and ¹Ferhan Savran

¹Department of Agricultural Economics, Faculty of Agriculture,
University of Canakkale Onsekiz Mart, Canakkale, Turkey

²Department of Agricultural Economics, Faculty of Agriculture,
University of Ankara, 06110, Ankara, Turkey

Abstract: In this study, economic structures of 24 member farms of the sheep and goat breeders' association were examined and cost items of goat milk production having been determined, per unit milk production cost was calculated. About 58, 20.19, 18.58 and 3.23% of the herd size of the member farms of the association consist of goats, kids, yearlings and male goats, respectively. About 64.83 and 35.17% of the production costs on the farms studied are composed of variable costs and fixed costs, respectively. The average amount of milk produced per farm is 26,493.75 kg. About 65.46, 33.33 and 1.21% of the gross production value on the farms from milk goat breeding are composed of milk revenues, increase in productive fixed asset value and manure revenues, respectively. Production cost of 1 kg milk was calculated as 0.29 \$ on the farms investigated.

Key words: Milk goat, milk production cost, production costs, gross production value

INTRODUCTION

Ecological structure of Turkey enables animal husbandry in all agricultural regions when animal production is concerned. Specialized livestock production is performed on 2.36% of 3,075,516 farm holdings in Turkey, while both crop production and livestock production are performed on the remaining 67.42% of them (Anonymous, 2003).

According to 2002 data, there are 1,201,765 farms in total in Turkey, which are engaged in ovine animal breeding and 31,953,800 ovine animals are bred in total on these farms. About 6,780,094 goats are bred in Turkey, 96.15% of which is composed of hair goats (Anonymous, 2003).

As a result of both its natural structure (about 53% of its area is composed of forest areas) and its agricultural structure, Canakkale is a province where goat breeding is intensively carried out. It is no doubt that Canakkale people's demand for goat cheese and kid meat in particular is influential in this respect. While, hair goat is dominant in the forest areas of the province, herds are observed to be composed predominantly of malta×hair goat hybrids towards bottom lands of the coastal areas. Share of the hair goat in Canakkale's total livestock asset is 20.7%, while, it is 24.8% in its ovine animal asset (Anonymous, 2004). Therefore, it is possible to say that Canakkale province has an important place goat breeding.

The aim of this study, is to perform an economic analysis of milk goat breeding activities on the member farms of Canakkale sheep and goat breeders' association, to determine their physical input usage and to calculate per unit milk production cost.

MATERIALS AND METHODS

The material of this study, consisted of the data gathered through a survey conducted on 24 milk goat-breeding farms in total, which are members of the sheep and goat breeders' association in Canakkale province.

Through the face to face survey, carried out with the owners of the all farms where information was collected on these farms population, labor force and usage, capital structures relevant to milk goat breeding, livestock assets, physical usage status, product and input prices, production costs, grazing periods, milking periods, useful life of animals, incentives (milk premium, incentive premiums for artificial insemination and fodder crop production) allocated to production activities in milk goat breeding, status of milk production and usage.

Household population and labor force assets as well as active population in the milk goat breeding activity were established and calculated in person equivalent (Erkus *et al.*, 1995).

Livestock assets owned by the farms were expressed in Livestock Unit and the following coefficients were used for conversion into Livestock Unit (Erkus *et al.*, 1995; Tuncel and Rehber, 1995):

Goat: 0.10, Yearling: 0.08, Kid: 0.05

Capital relevant to milk goat breeding activity was established by taking end of year values into account. The value of buildings was calculated by taking into account the cost value for newly-built ones and by taking into account the present condition for older ones and deducting accumulated depreciation from their reconstruction costs. The value of livestock was calculated by taking into consideration animals' purchase and sale prices prevailing in the market. In the calculation of machinery and equipment value, purchase prices were taken into account for new ones, while actual purchase-sale prices were taken into account for older ones.

For buildings, depreciation rates of 2.5, 2, 4 and 1% were applied for brick and briquette buildings over their new values, stone and concrete building, adobe and wooden buildings and asbestos-concrete roofing materials and wire netting, respectively.

Breeders' statements were taken for the basis in the determination of building repair and maintenance costs. Interest on building investments was determined by applying 5% interest rate over half of end of year reconstruction costs of the buildings. In case that straight line method is used for depreciation calculation, half value of buildings and machinery was taken into account in the calculation of interest.

In the calculation of depreciation for machinery and equipment, annual depreciation cost was calculated according to the following formula (Kiral *et al.*, 1999):

$$\text{Depreciation cost} = \frac{(\text{Purchase value}-\text{Salvage value})}{\text{Useful life}}$$

Interest on machinery and equipment was calculated by applying 5% interest rate over half of their end of year values.

Depreciation cost for milk goat was calculated in compliance with;

$$\text{Depreciation cost} = \frac{(\text{Breeding value}-\text{Meat value})}{\text{Useful life (year)}}$$

Interest, on the other hand, was calculated according to the following formula (Kiral and Rehber, 1986; Kiral *et al.*, 1996; Dellal, 2000):

$$\text{Interest on animals} = \frac{(\text{Breeding value}-\text{Meat value})}{2 + \text{Meat value}}$$

Since, values of milk goats are established according to end of year prices, 5% was taken for interest rate, which is real interest rate.

Actual expenses were taken into consideration in the calculation of fodder, veterinary, medicine, water, illumination and other expenses.

Works such as milking, feeding, watering, lactating kids, rearing, cleaning and grazing are realized by family members and wage compensation for unpaid family members, the wage payments for casual workers, were taken into account.

Gross production value consists of product sales increase in inventory values and manure.

In the calculation of the increase in inventory values, livestock on the farms were evaluated in line with beginning and end of year prices, values stemming from price increases were not taken into account. Movements emerging during the year having been taken into consideration (Kiral *et al.*, 1999).

Overhead costs were calculated by taking 3% of total variable costs. Per unit milk production cost was calculated according to joint cost allocation method and manure value and milk incentive premiums were taken for by-product revenues. By-product revenues were deducted from total production costs and cost of 1 kg milk was calculated by dividing the remaining cost by share for milk the total amount of milk produced.

RESULTS AND DISCUSSION

Average land operated by the farms under the scope of this study is 286.73 decares, in 118.79 decares of which fodder crop production is performed. In other words, 41% of the total land fodder crop production is carried out.

Average labor force of the farms is 3.71 man power unit, 82% of which falls 15-49 years of age group. About 13% of the remaining labor force is composed of people over 50, while 5% is composed of people in 7-14 years of age groups.

On average, the total livestock number in the member farms is 124.20. Goats represent 58% of this number. Value of the livestock on the farms was calculated to be 20649.37 \$ (Table 1). Proportions of milk goats, yearlings, kids and male goats in the herd were found out to be 68.60, 16.32, 10.36 and 4.72%, respectively.

The objective of feeding milk livestock should be meeting animals fodder requirements in a balanced manner and protect their health by minimizing live weight loss and digestion troubles. In goat breeding, goats fodder requirements vary greatly from the beginning of lactation, to the end this period. In feed ration concentrate/fodder

Table 1: Average livestock numbers and values in the farms studied

Livestock	No. Head	(%)	Value (\$)	(%)
Male goat	4.00	3.23	975.66	4.72
Goat	72.04	58.00	14164.85	68.60
Young goat	23.08	18.58	3369.14	16.32
Goat kid	25.08	20.19	2139.72	10.36
Total	124.20	100.00	20649.37	100.00

Table 2: Technical data relevant to goat breeding on the farms studied

Technical data	Average
Total fodder consumption (kg/bovine animal unit/year)	378.04
Fodder	194.30
Concentrates	183.74
Milk production (kg/unit/day)	2.20
Number of animals milked	60.25
Average milking period (month)	8.39
Useful life (year)	6.87
Birth rate (%)	138.00
Grazing period (months)	7.00

ratio in the ration should be 65:35 (Cakir *et al.*, 1995). This ratio was calculated to be 51:49 on the farms studied. Milk goats were determined to be grazed for 7 months on average on the given farms (Table 2).

Number of the livestock milked on the member farms is 60.25; these livestock are milked for 8.39 months. Daily milk production is 2.2 kg head⁻¹. Useful life and birth rate of the goats on the member farms are 6.87 and 138%, respectively.

Daily works carried out under goat breeding activity are divided into 7 groups, which are watering, milking, rearing, lactating kids, cleaning and grazing. Amount of labor force used on the member farms for the daily works is 7.13 h. Amount of per labor force used per Large Animal Unit (LAU) is 2.55 h day⁻¹.

Per LAU production costs on the farms studied is 148.49 \$. of which 24.47, 23.57 and 57.66 \$ LAU⁻¹ are composed of roughage, concentrate fodder and labor costs, respectively.

Production cost items relevant to milk production activity on the farms member to the sheep and goat breeders' association are given in Table 3. Total production costs on the farms are 12846.37 \$; 64.83 and 35.17% of which are composed of variable costs and fixed costs, respectively. Fodder costs lead total production costs with the highest share of 35.32%, followed by labor costs with 25.58%. Fodder costs (54.48%) and labor costs (39.46%) represent the highest shares in variable costs. Interest on goat value represents the highest share (10.16%) in fixed costs, followed by regular labor costs with 7.56%.

Gross production value was calculated by taking milk, manure and increase in inventory value into consideration in the farms under the scope of this study. Gross production value per LAU was calculated to be 201.88 \$.

Table 3: Milk production costs of the farms

Cost items	Costs		
	\$	(%)	(%)
Variable costs			
Feed			
Concentrates	2,258.69	17.58	27.12
Fodder	2,278.56	17.74	27.36
Casual labor	3,285.74	25.58	39.46
Salt (licking stick)	22.58	0.18	0.27
Veterinary and medicine	341.59	2.66	4.10
Water	25.49	0.20	0.31
Electricity	41.51	0.32	0.50
Bedding	21.85	0.17	0.26
Cleaning stuff	43.70	0.34	0.52
Variable costs for machinery and equipment	8.01	0.06	0.10
Total variable costs (A)	8,327.72		100.00
Fixed costs			
Overheads	249.83	1.94	5.53
Regular labor costs	971.11	7.56	21.49
Building depreciation	164.63	1.28	3.64
Interest on buildings	175.79	1.37	3.89
Building repair and maintenance	92.56	0.72	2.05
Goat depreciation	1,100.24	8.56	24.35
Interest on capital invested in goats	1,305.03	10.16	28.88
Machinery and equipment depreciation	350.33	2.73	7.75
Interest on machinery and equipment	109.13	0.85	2.42
Total fixed costs (B)	4,518.65		100.00
Total production costs (A + B)	12,846.37	100.00	

Milk produced in the farms studied is sold to dairies. The policy instruments the most used by the state with a view to supporting the agricultural sector were subsidies and incentives. Of the incentives and subsidies applied to animal husbandry in the agricultural sector, the farms studied, too, benefited from milk and fodder crop production incentive premiums. Farms receive milk incentive premiums of 0, 007 \$ kg⁻¹. Fodder crops subject to incentives are clover, sainfoin, vetch, silage maize, triticale and sorghum; incentives allocated to which are, respectively 41.95, 18.55, 10.2, 17.57, 7.87 and 14.94 \$ day⁻¹.

The average amount of milk produced per farm is 26, 493.75 kg, 65.46, 33.33 and 1.21% of the revenues obtained on the farms from milk goat production are composed of, respectively milk revenues, increase in inventory value and manure revenues (Table 4). In the calculation of milk's share in total production costs, milk's share in total revenues was taken into account (Erkus *et al.*, 1995; Kiral *et al.*, 1996).

In the calculation of the cost of 1 kg milk, manure revenue that is secondary product revenue and milk incentive premium were deducted from total production costs and the remaining value was divided by the amount of milk produced. Cost of 1 kg milk was calculated to be 0.29 \$ on the farms. When 0.44 \$, which is the price of 1 kg goat milk, is taken into consideration, the farms were established to be making an average profit of 0.15 \$ kg⁻¹. Proportion of the profit obtained/unit product to production costs is 52%.

Table 4: Milk production costs/unit (kg) on the sample farms

Animal products	Gross production value (\$)	(%)	Production cost (\$)	By-product (\$)	Milk production (kg)	Production costs kg ⁻¹
The increase in inventory value of the herd	6,879.55	33.33	4,190.36			
Manure	250.30	1.21	152.46			
Milk	13,511.93	65.46	8,230.16	478.54	26,493.75	0.29
Total	20,641.78	100.00	12,572.97			

CONCLUSION

Goat production not only constitutes the main means of living for low-income farms situated in forests, forest and mountain villages where climatic and geographical conditions are not favorable, but it is also increasing since, it also ensures better use of production sources in low land villages where per animal production is higher. While, goats bred in forest and mountain villages are composed of low genotype goats, those bred in low land villages are composed of high genotype goats and thus, their milk production is high.

When the farms are evaluated according to the data collected from this study conducted on the member farms of the sheep and goat breeders' association, the following results were obtained:

- The average land operated on the sample farms is approximately, 4.7 times larger than Turkey average.
- Intensive goat production is performed on the farms, animals are grazed in highly nutrient pastures for 7 months and fed by concentrate on addition to pasture.
- While, average goat milk yield in Turkey varies between 0.75 and 1.00 L/unit/day, this number was found to be 2.2 L/unit/day in the farms studied (Anonymous, 2003).
- Great diversities exist between the farms in terms of their input usage levels. The most important reason accounting for this is that farmers are using inputs unconsciously since, they do not have sufficient information on goat production.
- One of the most important problems encountered in goat production is that the animals are delicate in nature. This situation makes it necessary to rear animals carefully.
- When farmers compared milk cow and sheep production with goat production, they expressed that goat production was more profitable and more advantageous since milk production out of it was relatively higher.

With a view to improving goat production activities carried out on 24 member farms of the sheep and goat

breeders' association and to eliminating current problems; it will be useful to educate farmers on intensive goat production, provide them with technical support, allow breeding livestock importation for development of new gene sources, provide state support on low-interest loan utilization.

REFERENCES

- Anonymous, 2003. Prime Ministry Republic of Turkey, Turkish Statistical Institute. www.tuik.gov.tr.
- Anonymous, 2004. Ministry of Agriculture and Rural Affairs. Canakkale Provincial Directorate of Agriculture.
- Cakir, A., A. Aksoy and S. Hasimoglu, 1995. Practical Nourishment and Feeding of Livestock, Ataturk University Faculty of Agriculture Publications, Publication, Erzurum, 179: 264-279.
- Dellal, I., 2000. Economic analysis and planning of hair goat farms in antalya province. AERI Publication, Ankara, No: 43.
- Erkus, A., M. Bulbul, T. Kiral, A.F. Acil and R. Demirci, 1995. Agricultural Economics. 5th Edn. AUAF Development Foundation Publication, Ankara, pp: 1-298. ISBN: 975-7185-01-9.
- Kiral, T., H. Kasnakoglu, F.F. Tatlidil, H. Fidan and E. Gundogmus, 1999. Cost calculation methodology and database guide book for agricultural crops. 37th Edn. Agricultural Research Institute, Ankara, pp: 1-143. ISBN: 975-407-051-2.
- Kiral, T. and E. Rehber, 1986. Calculation of the Cost of Animal Products, West Mediterranean Region I. Cattle Breeding Seminary, Akdeniz University Faculty of Agriculture, Antalya.
- Kiral, T., A. Ozcelik, H. Fidan and D. Yilmaz, 1996. The Economic Analysis of Angora-wool Production in the Farming Enterprises in Ankara, Governorship of Ankara Publications, Ankara.
- Tuncel, E. and E. Rehber, 1995. Goat Production Systems in the Mediterranean, FAO, EAAP and CIHEAM, EAAP Publication, No. 71, Wageningen.