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Characterization of Semi-Extensive Goat Production Systems in South Marmara Region of Turkey

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ABSTRACT

This study attempts to describe the semi-extensive goat farming sector in south Marmara region of Turkey and to establish characteristics. Ninety-two goat farmers were surveyed in four provinces of this region. The aim of the study was to assess and document the prevailing goat production systems in the provinces. Information obtained was mainly on flock sizes, reasons for keeping, breeding and management practices. A structured questionnaire, based on interviews of 92 respondents revealed variability in response among flock sizes (116–220). Most of the goat farms studied is single-worker or family managed. Goat supply kids, milk and fiber, especially to farmers moving their animals through seasonal grazing. Farms specializing in milk production, whose main activity is dairy goat farming. Feeding depends largely on grazing, with little area being cultivated to produce feed for the goats. Goats in these systems have not been adequately studied, nor have they received the same attention as sheep. Goat production practices are essentially traditional and characterized by low productivity. Poor overall management, inadequate housing, malnutrition, improper use of grazing resources, inadequate health services, lack of organized marketing and lack of a national policy on small ruminant production, were identified as major constraints. However, recently more attention has been paid to goat production by producer and productivity is increasing. This work supposes previous steps for improving the semi-extensive goat farming sector. From a methodological point of view, the discussion on variable types and utility establishes farm type characteristics.

Key Words: Goat, Farming systems, Production, South Marmara Turkey.

INTRODUCTION

Society's awareness of the detrimental effects of extensive livestock systems has changed methods and aims of researchers and even in research institutes, trying to focus on the improvement of sustainability of systems instead of increasing productivity (Sorensen and Kristensen 1992). At this point, the continuity of semi-extensive systems without the loss of their traditional values (re-evaluation of little-productive land, environmental conservation) requires a good knowledge of their characteristics and of their strengths and weaknesses at the farm level and within the frame work of the overall forming sector (Rubino and Haenlein 1996).

Different management systems are prevailing in goat husbandry depending on the environmental and social conditions. In one of the systems, farmers keep quite a number of goats and most of the income comes from goat production for living. This type enterprise either employs a shepherd or this duty is done by one of the family member. Only small amount of the product is consumed within the family and rest is sold especially in dairy product from such as cheese. The number of such owners is not so high and they usually use a system commonly known as "Horizontal Transhumance". In this system, goat herds sometimes are mixed with sheep especially in the east part of the country and taken to the gradually higher grazing lands and got back late in autumn. "Vertical Transhumance" system is more common in the other part of the country among goat breeders. In this system, herds are taken out early in the morning and returned back during late afternoon. Milking is generally done when the animals are outside. In some villages, the size of the herds varies 10-50 for each farmer. In this case, animals are got together in common herd and this herd is managed by hired shepherd. The herd is commonly taken to the grazing land during the day and returned back (Tuncel and Okuyan 1988).

Nomadism has declined over the years but is also still a prevailing system in goat husbandry. Nomads are the people who do not have any certain place of settlement. Accordingly they do not have their own land for arable farming and grazing. They generally keep their goats and sometimes sheep in the highlands of the East Anatolia and go town to the south east depending on the climatic conditions. The numbers of animals owned by each nomad group vary in size, depending on the number of the people in the groups. They generally make cheese and sell them in order to buy their essential needs for living. They also produce hair and skin mostly for their own use.

The greater percentage of goats in the South-Marmara region is owned by subsistence farmers based mainly in an extensive system, which is characterized by poor management and low productivity. The goat's adaptability, prolificacy and modest nutrient requirements make it ideal for exploitation under extensive

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conditions of Turkey (Koyuncu et al 2005). However, recently more attention has been paid to goat production by farmers and number of goats and productivity are increasing in South-Marmara region.

The Turkey goat population consists of spare and relatively small herds. The average herd size is about 10 does and their offspring, varying in size between a few and 400 head. At present in the South-Marmara region of Turkey goats are found abundantly, but there is little reliable information regarding their potential and true role in rural development. In order to undertake any development work in the rural area, the goat production problems and prospects should be identified.

The basic objective of this study was to examine goat production system among the rural farmers in the South-Marmara region of Turkey and to identify constraints so that improvement strategies might be formulated.

MATERIALS AND METHODS

This work has been carried out in the South-Marmara region of Turkey. The methodology used was an adaptation from Bourbouse (1995), with the following phases: (1) Selection of samples and construction of the data-gathering instrument, and (2) information treatment and statistical processing, including the review and selection of variables for the analysis of types, application of multivariate statistical techniques (multiple correspondence and cluster), and analysis of variance and contingency tables.

Four representative areas from this region were chosen where goats are farmed semi-extensive, all of them with a substantial dependence on the land basis but with different degrees of intensification. Within each province, goat farmers were identified. Overall, 92 goat farmers (30 in Bursa, 24 in Balıkesir, 20 in Bilecik and 18 in Canakkale) were interviewed between March and December 2002.

A questionnaire comprised 80 items, grouped into the following sections: socio-economy, line of production, animal basis, land basis, infrastructure, installations and machinery, herd composition, reproductive and feeding management, hygiene, production and commercialization.

The field data were introduced into an Excel matrix after checking for missing and abnormal data. Subsequent statistical treatment was performed using the programs MINITAB (University of Texas at Austin). Comparison between the four types of different quantitative variables was performed using ANOVA. In the case of analysis of degree and sense of the relationship between qualitative variables, the corresponding contingency tables were constructed and statistics calculated were used as basis for the Chi-squared distribution.

RESULTS AND DISCUSSION

The multiple correspondence analyses yielded two principal components. The first, corresponding to the abscissa, includes a large number of variables, which in order of importance are the following; study area (Bursa, Balıkesir, Bilecik and Canakkale province); main activity (the main activity is, or is in part, or is not, goat farming); productive capacity of the goats local (Hair goat breed), mixed (Saanen x Hair goat); grazing area for the animals; type of business; type of goat houses; and use of machine-milking. The second component, corresponding to the ordinate, includes, in order of importance, the following variables; study area, productive capacity of the goats, feeding methods, and number of milking per goat per day. The significance of the differences between provinces or farm types for those main variables in creating the two principal components; such variables have been grouped in four categories: socio-economic aspects, line of production, infrastructure and installations and feeding (Castel et al 2003).

Variables related to socio-economic aspect that have an effect on province or farm types and statistical significance; manager's years of work with goats, number of household and age of house hold ($P<0.05$); field status ($P<0.01$). Farm size, ownership area and rented area, proprietary, type of farm, main activity of the farm and professional training no significant differences were found between provinces.

Variables related to production level; the two most important variables are the reproduction characteristics ($P<0.05$) and live weights of the goats on the farm ($P<0.05$). There was a third variable-the number of milking per goat per day which also defined the level of production ($P<0.01$).

Variables related to infrastructure and installations; type of goat house ($P<0.05$). With regard to the use or not of machine-milking and artificial nursing on the farm were no significant differences. The other variables, though with little importance in the multiple correspondence analyses, were type of field and parasite control of animals.

Variables related to feeding; differences of grazing fields ($P<0.05$); the other variables with little weight in the multiple correspondence analysis, were managed on free ranging and were allowed to graze a distance away from home.

Table 1 includes, for each of the four provinces, the descriptive statistics of the quantitative variables of greatest zootechnical interest. Table 2 shows, also by types, the frequencies for each response of the qualitative variables of greatest zootechnical interest. The four provinces present a series of general characteristics that are the following:

The indicators of the possibilities for continuing forming activity, such as age of the farmer, and the number of years in activity, present high values, with few farmers coming into goat farming in recent years. The most common type of business is the family type, followed by single-worker type. Goat owners had been keeping goats for a period ranging between 5 and 40 years. The herd size is medium, with average between 146 and 220 goats. The common family type in the research area was the nuclear family that consists of mother, father and unmarried children.

Especially in the mountainous areas of the provinces, goat farming plays an important role in the whole farming system. The goat farming in this area mainly depends on the range land and forest. Almost all year long goats graze on range land, in the forest and mountainous lands with shrubs. Under these conditions production has been seasonal, common pasture, and vegetative cover of marginal lands, supported by grazing on cereal stubbles and by wintering on cereal straw.

Animal feeding is greatly dependent on grazing; land is cultivated to produce feed for the animals with a medium frequency. According to the weather condition the grazing period starts in early April and lasts until the end of October. Supplementation is not common, only on rainy days and for does that will be kidding.

Table 1. Means (±SE) for descriptive statistics of the quantitative variables for each province

Variable	Bursa (n=30)	Balıkesir (n=24)	Bilecik (n=20)	Canakkale (n=18)
Manager's years of work with goats	20.9±6.52^{a}	25.1±4.86^{b}	19.2±4.15^{a}	23.0±6.23^{b}
No.of household	5.4±0.45^{a}	3.3±0.36^{b}	6.0±0.45^{a}	6.3±0.63^{a}
Farm size (ha)	3.0±0.34	4.2±1.19	5.1±1.15	6.0±3.52
Goat shelter				
Width (m)	8.0±0.92	6.6±1.01	9.4±0.88	5.0±0.71
Length (m)	13.7±2.26	14.6±2.14	16.4±0.91	20.5±1.66
Height (m)	2.2±0.20	2.0±0.05	2.0±0.09	2.0±0.12
No.of adult females	97.6±21.30	83.8±22.75	107.7±14.66	98.8±15.32
No.of males	4.4±1.40	4.9±1.34	4.2±0.53	5.5±1.04
No.of male kids	22.4±5.62^{b}	25.5±2.43^{b}	59.4±7.42^{a}	37.0±13.46^{b}
No.of female kids	24.0±5.59^{b}	25.6±5.18^{b}	37.0±13.46^{a}	40.3±11.73^{a}
Reproductive characteristics				
No.of treated goats	100.4±22.88^{b}	67.6±18.89^{b}	159.6±20.87^{a}	123.3±31.84^{a}
No.of kids born	61.3±15.20^{b}	99.2±30.32^{bc}	115.0±12.95^{bc}	145.0±23.66^{a}
No.of kids / per kidding	0.6±0.11^{b}	1.4±0.08^{a}	0.8±0.05^{b}	1.2±0.17^{a}
Live weights				
Weaned kids (kg)	9.7±0.62^{b}	17.2±0.84^{a}	10.8±0.52^{b}	17.0±2.76^{a}
Adult females (kg)	41.0±1.22	46.8±0.84	43.7±1.27	44.4±5.54
Adult males (kg)	58.7±3.00	65.0±1.25	59.4±1.35	60.0±3.54
Age of first mating (month)	14.3±0.84	13.3±1.01	15.4±0.35	12.8±1.44
Age of culling (year)	5.0±0.23^{b}	8.6±0.72^{a}	3.7±0.19^{b}	7.1±0.24^{a}
Breeding period (year)	4.1±0.21^{b}	7.8±0.66^{a}	3.0±0.24^{b}	5.6±0.55^{a}
No.of milking goat	146.2±33.11^{a}	67.1±17.43^{b}	198.0±22.52^{a}	166.7±70.17^{a}
Lactation period (days)	99.3±14.13^{b}	173.0±14.70^{a}	98.5±3.46^{b}	172.5±14.36^{a}
Milk production (kg/goat)	30.1±4.67^{d}	180.3±10.14^{ac}	25.8±3.04^{d}	100.2±12.25^{b}

Table 2. Frequency of the discrete variables by each province

Variable	Bursa (n=30)	Balıkesir (n=24)	Bilecik (n=20)	Canakkale (n=18)
Legal situation of the farm				
Partnership	-	-	-	-
Rented	-	-	-	-
Proprietary	100.0	100.0	100.0	100.0
Type of farm				
Family	100.0	73.4	100.0	80.3
Single-worker	-	26.6	-	19.7
Corporate	-	-	-	-
Age of household				
<16	20.2	8.8	29.5	8.0
16-65	74.6	84.5	57.0	89.4
>65	5.2	6.7	13.5	2.6
Field				
Ownership	73.0	63.8	80.3	58.7
Rent	27.0	36.2	19.7	41.3
Type of field				
Irrigated	26.4	34.7	39.0	37.8
Un irrigated	73.6	65.3	61.0	62.2
Type of goat shelter				
Adobe	67.0	40.0	96.0	25.0
Briquette	27.0	60.0	4.0	50.0
Concrete	6.0	-	-	-
Wooden	-	-	-	25.0
Evaluation of milk				
Fresh	75.0	30.0	20.0	40.0
Fresh + cheese	25.0	70.0	80.0	60.0
Main activity of the farm				
Goats	92.3	100.0	97.2	100.0
Goats together with other activity	7.7	-	2.8	-
Other than goats	-	-	-	-
Carries out artificial nursing	-	-	-	-
Professional training	-	-	-	-
Type of milking : hand	100.0	100.0	100.0	100.0
No.of milking daily				
One	16.5	-	33.6	-
Two	78.5	100.0	20.0	100.0
One or two depending on season	5.0	-	46.4	-
Parasite control of animals	71.1	80.7	62.7	84.6

The goat houses were built with available materials and generally were under or near the farm family house. Bucks are mated at the end of September and in October. The bucks have been separated from the flock two months before by the farmers who keep the bucks and goat together. The matings are not well managed and have resulted in inbreeding. The breeding periods are relatively long, although with slight differences between farm types. Goats prices vary and depend on a number of factors like season, age, sex and size of the goat, whether the buyer. Management of the goats was based on primary experiences, and modern technology was not applied resulting in low productivity and low efficiency. The goat milk is used

for cheese, yogurt for home consumption and some is marketed. Milking is done by women after suckling. Most of them carry out hand milking once or twice a day. Especially cheese making from goat milk is economically important in the provinces.

Income from meat represented varies low proportion of the total income. Animals for slaughter were mostly sold as live animals. Sold offspring as an income source indicates the proportion of money from selling kids for slaughter. Income from selling young breeding animals was found to be very low. Selling bucks and adult does were more typical for the smaller farms.

Bursa farms, with diversified forming activity in which the goat is usually the main activity. They are practically all in ownership with family management. They have medium-sized herds of goat (98 adult females) with little dairy specialization and Hair goat breed and capacity. They show considerable deficiencies in infrastructure and installations for milk production and most of them carry out hand milking once or twice a day. The lactation periods are short (100 days).

Balıkesir farms, with main activity dairy goat farming, with highly specialized breeds. They are family farms, and with a long time in goat farming. Infrastructure and installations are better than Bursa and Bilecik provinces for milk production and most of them carry out hand milking twice a day. The herd size is medium (84 adult females). The lactation periods are long (173 days).

Bilecik farms, with diversified forming activity in which the goat is usually the main activity, with a high percentage in ownership. The herd size is medium (108 adult females). There is a medium frequency in the presence of infrastructure and installations for milk production and most of them carry out hand milking once or twice depending on season a day. The lactation periods are short (99 days).

Farm of Canakkale, main activity is dairy goat farming, with highly specialized breeds. They are practically all in ownership, with single-worker or family management. The herds are medium-sized (99 adult females). Infrastructure and installations are better than Bursa and Bilecik provinces for milk production and most of them carry out hand milking twice a day. The lactation periods are long (173 days).

Feeds are supplied to the goats in the goat house according to nutrient requirements of the stage of production. After 15 days the kids are separated from the mother and the does are milked (especially Balıkesir and Canakkale provinces) one or twice a day and the kids suckle after milking. The kids are weaned at two months of age. In the semi-extensive system, the goats are grazed during the day, and are confined and get feed supplements in the goat house at night. This system is easily applied in goat production especially in mountainous areas in research region.

The major diseases reported among small ruminants were diseases caused by internal parasites, exthymatosis, diarrhea, pneumonia. The most important and dangerous infectious diseases with high mortality were controlled by vaccination, especially pasteurellosis and Enterotoxeneamia. Farmers recognized gastro-intestinal parasitism as serious problem in goat production, especially in the wet season. The waste from goats was rarely gathered in the areas next to the goat houses. Under nutrition, inbreeding and bad hygiene was still widespread in small ruminant production at village level and control of internal parasites was not done by the farmers. Due to this the productivity and economic output of goat production is still low.

Goats in Balıkesir and Canakkale were better than in Bursa and Bilecik, and also were reported to produce more milk than in Bursa and Bilecik. From a visual appraisal exercise, one could note that goats in the two groups were of different blood lines, especially crosses of the Saanen and Maltese breeds. Milk yield per goat per day was found as 30.1 kg in Bursa, 180.3 kg in Balıkesir, 25.8 kg in Bilecik and 100.2 kg in Canakkale, and significantly different. The buck to doe ratio was 1:22, 1:17, 1:26 and 1:18 in Bursa, Balıkesir, Bilecik and Canakkale respectively. More households in Balıkesir and Canakkale had goats with multiple births, compared to households in Bursa and Bilecik. Goats are primarily consumed by the household and occasionally sold in rural markets at low prices. The goat meat market is limited and offers low price incentives. The milk is often transformed into fresh cheese, consumed by the farmer’s family and sold locally as a result of a reasonable demand for this product.

The critical aspects of production are only assessed from extrapolation of what is known in the cropping system. Information on range resources and the value of the leguminous shrub vegetation is limited. Ranges are community-owned and their unbalanced use causes progressive degradation of the resource base.

The farms with greatest area usually have more extensive farming systems, either with goats of little or medium dairy capacity or with animals of other species (cattle or sheep), whereas on the farms with smaller area, the main activity of the farmers is usually goat farming, with a greater trend towards dairy specialization, even for those having mixed breeds.

The contribution of goats to the livelihood of farmers and livestock production in environments characterized by dry and harsh production conditions is unquestionable but undocumented (Iniquez, 2004). Studies to reveal how farmers benefit from goat diversity are required. Productivity of these animals is generally low due to fluctuations in fodder availability caused by the lack of water and increasing land degradation. However, in order to target production improvement the chief constraints should be identified through sound constraint analysis of production systems and identification of market opportunities.

Farm characterization represents an important step to better understanding the productive systems. In a first approach, the structural variable types referring to geographical area and to the system as a whole (like farm size, property characteristics, age of farmer, available crop and range land or production type) must be used. The information obtained through surveys lets build a classification of structures. The use of variables referring to systems operation should be done in a second phase trying to answer specific problems such as feeding management or commercial improvement (Castel et al 2003).

In conclusion, keeping of goats is widely practiced in the rural areas, contributing to household income and food security. Generally, an increase in the productivity of goats can be achieved by improving environmental factors and/or the genetic merit for the increased productivity.

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