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Economic Analysis of Sheep Farms in Center District of Van Province

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Abstract: The major aim of this study was to make an economic analysis of sheep farms in Center district of Van province. In this context, the level of inputs were determined. Productivity and profitability ratios and some efficiency measures were calculated and compared. The data was collected from 63 sheep farms selected by stratified random sampling methods among 12 villages. The data belong to 1999-2000 production period.

Lamb value amounted to 67.8% of the gross production value. Feed expenses accounted for 68.3% of total variable expenses. The amount of feed intake per sheep production unit during the rearing period was 143.7 kg, of which 81.33 kg was roughage feed and the remaining 62.44 kg was concentrated feed. Gross margin per sheep production unit, per TL 100 variable expenses and per TL 100 operating capital was TL 38.9 million TL 199.31, and TL 31.14 respectively. These figures were highest with TL 42 million, TL 261.69 and TL 31.91 respectively in the third farm group (farms with 61-100 head sheep).

Key words: Sheep management, productivity, profitability, efficiency

Van İli Merkez İlçede Koyunculuk Yapan İşletmelerin Ekonomik Analizi

Özet : Bu çalışmanın başlıca amacı, Van İli Merkez İlçe'de koyunculuk yapan işletmelerin yıllık faaliyetlerinin ekonomik açıdan değerlendirilmesidir. Bu kapsamda, işletmelerin girdi kullanım düzeyleri belirlenmiş, işgücü prodüktiviteleri ve kârlılık oranları ve bazı etkinlik katsayıları hesaplanmıştır. Çalışmanın verileri, Van İli Merkez İlçe'de bulunan 12 köyden tabakalı tesadüfi örnekleme yöntemi ile belirlenen 63 işletmeden toplanmıştır. Veriler 1999-2000 üretim dönemine ait bulunmaktadır.

Brüt üretim değerinin %67.8'i kuzu üretim değerinden elde edilmiştir. Toplam değişken masrafların %68.3'ünü yem masrafları oluşturmuştur. Bir üretim döneminde koyun üretim birimi başına düşen yem miktarı 143.7 kg olup, bunun 81.33 kg'ı kaba yem ve 62.44 kg'ı ise kesif yemdir. Koyun üretim birimine, 100 TL'lik değişken masrafa ve 100 TL'lik işletme sermayesine düşen brut marj (kâr) sırasıyla 38.9 milyon TL, 199.31 TL ve 31.14 TL'dir. Bu rakamlar sırasıyla 42 milyon TL, 261.69 TL ve 31.91 TL ile üçüncü grup işletmelerde (61-100 baş koyuna sahip işletmeler) en yüksektir.

Anahtar kelimeler: Koyunculuk işletme yönetimi, prodüktivite, kârlılık, etkinlik

Introduction

Livestock production on a farm has many advantages. It permits the use of labor to some profit during parts of the year when it could not be used in producing crops. It permits the conversion of some marketable crops into other products, which can be disposed of to better advantage. It also helps in the conservation of soil fertility and in rounding out a well balanced and profitable farm organization (Hopkins and Heady, 1955). Thus, the livestock activity helps in providing a more balanced income (Oktay, 1988). Sheep farming requires low capital and not much specialized machinery compared with most of the other agricultural production alternatives (Nix, 1988). Sheep farming is alternative production activity in those areas which are characterized with the abundant of semi mountain and mountainous pasture, the surplus labor of sheep farm families and by-products of cereals (Kitsopandis et.al., 1980).

The area studied for this research shows most of the above features. Sheep production amounts to 61.9% of total livestock production, in Van Province (Anonymous, 1999). The proportion of Sheep number in the total livestock in terms of cattle unit is 52.8% in the research area for 2000 production year (Anonymous, 2000).

Some of earlier studies on economic analysis of sheep farms are as follows: Açıl and Demirci (1977) found the lamb production value as 70% of total gross farm income for sheep farms in Central Anatolian part of Turkey. Karaca et.al. (1990) reported the meat production value as 61% of total gross production value in Eastern Anatolia part of Turkey while Yıldırım (1993) found this figure as 63.08% for sheep farms in Çatak town of Van Province. Erkan et.al. (1993) showed that the major part of variable expenses (61.9%) was due to feed expenses in Toros Mountainous Villages sheep farms. Yıldırım (1993) found this ratio as 47.3% for sheep farms in Çatak Town of Van Province. Özayar (1997) calculated the gross production value per TL 100 variable expense as TL 150.5 for sheep farms in Yozgat Province while Tuncer (1983) found the operating

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expenses per TL 100 gross return as TL 85 and TL 88 for Kıvırcık and Tahirova type of sheep farms respectively in Biga town of Çanakkale Province. Kaya (1997) singled out the most important problems faced by sheep farmers in Şanlı Urfa as insufficient number of sheep per farm, inefficient labor use, low yield and low literacy level. Kaymakçı et.al. (1999) reported that the most serious obstacles noticed on sheep farms in Turkish Republic of Northern Cyprus were marketing inefficiencies, lack of organization, problems related to credit use, agricultural insurance and feeding and health of the animals. Geeta et.al. (1999) reported that a large number of the sheep farmers in Karnata region of India had no land and more than half of farmers were involved in blanket weaving activity and that the yearly activities resulted in an Rs 13,000 net profit. Sirohi and Rawat (2000) reported that the most important factor affecting the gross margin of sheep farms in Tonk, Rajastan region of India was labor expenses. The labor use was below the optimum in small farms while it was around the optimal level in big farms.

The major aim of this study was to make an economic analysis of sheep farms in Center district of Van province. In the study, the level of inputs used, productivity and profitability ratios and some important efficiency measures were calculated and compared among the determined groups. No research on economic analysis of sheep farms has so far been conducted in the district. For this reason, the importance of the study is obvious.

Material and Methods

The data were collected from 63 sheep farms selected by stratified random sampling method in the 12 villages in Center town of Van province. The data belong to 1999-2000 production period.

There are 514 sheep farms in the selected area. The stratified random sampling method was used in order to determine the sample farms size. The following formula was used for this purpose (Yamane, 1967).

$$N = \frac{N.\sum N_h.S^2_h}{N^2.D^2+\sum N_h.S^2_h}$$

Where,

N= Total number of farms,

S^2_h= Variance of h th strata,

$D^2=d^2/Z^2$

d^2=Error size permitted from population mean.

Z^2=Z value in the standard normal distribution table

N_h= Number of farms in the h th strata

The sampling number was calculated as 63 farms according to 90 percentage of confidence interval. Based on sheep number percentage in each group, the farms were classified into four groups and analyzed accordingly. Thus, 24, 19, 12, and 8 farms were randomly determined for the first farm group (1-30 sheep), the second farm group (31-60 sheep), the third farm group (61-100 sheep) and the fourth farm group (more than 100 sheep) respectively. In addition, 20% farms were also randomly selected as a reserve. The analysis of farms was done in two stages. Firstly, the yearly result of activities of farms was analyzed taking farm as a whole. Secondly, sheep production enterprise was examined. The farms were accepted as specialized sheep farms since more than 70% of farm income were obtained from sheep production unit (Talim and Aras, 1964; Oktay, 1989; Anonymous, 1975). The analysis was carried out using SPSS 11.0 for Windows packet program.

Family labor potential was expressed in terms of man-days using generally accepted coefficients (Aras and Çakır, 1975). The assets and liabilities in the balance sheet were arranged according to the functional structure (Hopkins and Heady, 1955; Erkuş et.al., 1995). The sales values of the crops and livestock products were calculated by multiplying the unit of products with the related farmyard prices. Gross return is consisted of sales of value of plant and livestock products, increases in inventory, agricultural income obtained from outside the farm and the other incomes in a given production period. Operating expenses were classified into three groups, namely labor expenses, current expenses and decreases in inventory. Farmyard prices were used in the calculation of operating expense items. Depreciation rates of 4%, 3%, 10%, 5% and 3% were applied for mud buildings, concrete buildings, tractor; sheep and fruit trees respectively. Net return was calculated by subtracting the operating expenses from gross return. Agricultural income was calculated by subtracting the interest on debt and rents from net return and adding family labor equivalent to the remaining value. The rate of interest on debt was taken as 38.47%, which was applied by Agricultural Bank of Turkey in 2000 for small and medium scale livestock farms that had less than 500 sheep. Economic profitability was calculated by dividing the net return to the total assets. In order to calculate the financial profitability, interest on debt was subtracted from net return and the result was divided to net worth (Erkuş et.al., 1995). The gross production value was calculated by multiplying each product of sheep production unit with the farmyard prices and adding the increases in the inventory to this total (Rehber and Çetin, 1998). Sheep production unit was taken as a base for determining technical coefficients sheep production. The sheep production unit was accepted to be consisted of one sheep, of lambs reared per sheep during a production period, 0.04 rams and 0.2-replacement ratio of herd. Gross margin was calculated by subtracting the variable expenses from gross production value (İnan, 1999; Erkuş et.al., 1995).

Results

Population and education

The number of persons per household was 9.98 person and it increased in proportion to farm size. The male percentage of total population was 54.37%. Active age groups consisted of 44.49% of total population. The illiteracy ratio among the population above six years age was 35%. On the other hand, illiteracy of female population amounted to 80.5%.

Some characteristics of farm managers

The average age of farm managers was 46 and their experience in sheep production field was 27 year. Nearly a quarter of farm managers were illiterate and 42.9% graduated from primary school.

Labor force and its use

Family labor potential was 1,717.3 man-days. Less than a quarter (21.1%) of family labor potential was utilized and the major part of used family labor (63.9%) was involved in sheep production activity. More than ¾ (86.6%) of labor used on farms was provided by the family labor.

Farm land

The average amount of land per farm was 13.01 ha. This figure was the lowest in the first farm group with 8.15 ha. and the highest in the fourth farm group with 20.56 ha. The owned land amounted to 64.6% of the total land, followed by share-cropped land with 22.9% and rented land with 12.5%. The major part of land (69.1%) was not irrigated. The average number of field was 9.08 and the average size of field was 1.43 ha. The field land accounted for 47.2% of total arable land, followed by fallowed land with 29.7% and feed cropped land with 21%. Of total field land (6.14 ha), wheat field accounted for 90.1% (55.3 ha) followed by barley field with 9.1% (0.56 ha) and sugar beet field with 0.8% (0.05 ha). The average yields per decares for wheat; barley and sugar beet were 90.6 kg, 146.4 kg and 952 kg, respectively.

Farm capital and its composition

The total assets per farm were TL 25,014 million for overall farms and increased in parallel to farm size. Fixed assets made up 56.92% of total assets. Fixed assets included land, buildings and other relatively long-lived improvement. Land consisted of 38.55% of total assets. Working assets consist of livestock, machinery, supplies and cash. The percentage of working asset in the total assets was 43.08%. The livestock made up 33.61% of total assets. Expressed in the terms of Cattle Unit, the livestock per farm was 11.33 heads and, of which 77.23% accounted for sheep. The net worth was TL 21,920 million and covered 87.63% of total liabilities. The remaining 12.37% was liabilities in the form short-time indebtedness.

Economic Results of Farms

Gross return

The average gross return was TL 4,511 million and increased in parallel with the farm size. Livestock production value contributed more than half (64.60%) of the gross return followed by increases in the inventory and crops production value with 19.48% and 11.93% respectively. Gross return per decare, per sheep production unit and man- years was TL 34.6 million, TL 78.3 million and TL 10.8 million respectively. Gross return decreased in parallel to the farm size as regards to sheep production unit. Gross return per TL 100 capital and per TL 100 net worth was TL 10.03 and TL 20.58 respectively.

Operating expenses

Operating expenses per farm were TL 4,266 million. The operating expenses per sheep production unit were TL 74.00 and decreased according to farm size. The operating expenses per TL 100 gross return were TL 94.58 and decreased in proportion to the farm size. Labor expenses accounted for nearly half (49.64%) of the operating expenses followed by current expenses and decreases in the inventory and amortization with 34.86% and 15.5% respectively. The family labor expenses amounted to 85.5% of total labor expenses, which showed that hired labor was not common on the studied farms. More than half of the current expenses (61.9%) were the feed bought expenses.

Net return

Net return was TL 224.6 million and increased in parallel to firm size. While net return was negative with TL 486.6 million in the first farm group, it was positive in all other groups and the highest in the fourth farm groups with TL 1,892 million. Net return per sheep production unit, TL 100 operating expenses, per TL 100 net worth, and per man-days used was TL 4.2 million, TL 5.73 and TL 1.12 and TL 585,000 respectively. These figures increased according to farm size (Table 1).

Agricultural income

Agricultural income per farm, per sheep production unit and per person was TL 1.746 million, TL 30.3 million and TL 174.9 million respectively (Table 1).

Profitability

Both economic profitability and financial profitability increased in parallel to firm size. Economic profitability and financial profitability was calculated as 0.98% and 0.08%, respectively.

Table 1. Some performance criteria regarding yearly economic activities

	Farm Groups				
	1-30 Head 24 Farm	31-60 Head 19 Farm	61-100 Head 12 Farm	101-+Head 8 Farm	Total 63 Farm
Gross Return (TL 1000)	2536545	3606703	5903231	10495772	4511260
Operating Expenses (TL 1000)	3023142	3329926	5345113	8604112	4266638
Net Return (1000 TL)	-486597	276777	558118	1891660	244622
Net Return Per Sheep Production Unit (TL 1000)	-23260	6224	6522	12058	4247
Net Return Per TL 100 Operating Expenses	-16.10	8.31	10.44	21.99	5.73
Net Return Per TL 100 Net Worth	-4.13	1.66	1.97	3.44	1.12
Net Return Per Man-Days Used	-1403	890	976	2892	585
Agricultural Income (TL 1000)	896429	1391617	2465147	4059813	1746275
Agricultural Income Per Sheep Production Unit (TL 1000)	42850	31293	28805	25878	30317
Agricultural Income Per Person (TL 1000)	92320	140710	229316	410912	174977

Economic Analysis of Sheep Enterprise

Gross production value

Sheep products per farm were 50.65 lambs, 2,690 kg milk, and 6.89 sales of older sheep, 80.65 kg wool and 2,411 kg manure. Sheep products per sheep production unit were 0.88 lambs, 46.70 kg milk, and 0,12 sales of older sheep, 1.40 kg wool, and 41.86 kg manure.

The gross production value per farm was TL 3,361 million and increased in proportion to farm size. Taking this figure as a base, that is, 100, the gross production value for the first and the second farm group was lower than the average with 41 and 73 points respectively while it was higher for the third and the fourth farm groups with 148 and 269 points respectively.

Lamb value amounted to 67.8% of the gross production value followed by the sale of the older sheep with 15.4% and milk value with 14.4%. Taking the value of lamb and the sale value of older sheep together, it is appeared that meat production value accounted for 83.2% of gross production value. Yıldırım (1993) investigating the sheep farms in Çatak town of Van province found this figure as 62.86%. The average gross production value per sheep production branch was TL 58.3 million. The capital used in sheep production unit was TL 7,187 million. The labor used was 249.04 working day. The gross production value per TL 100 operating capital was TL 46.8 and showed wide differences among the farm groups. The gross production value per working day was TL 13.4 million.

Variable expenses

The variable expenses per farm were TL 1,222 million and increased in proportion to farm size. Feed expenses amounted to 68.3% of total variable expenses followed by veterinary and medicine expenses with 12.05% (Table 2). Yıldırım (1993) reported that feed expenses accounted for 47.13% of total variable expenses of sheep farms in Çatak town of Van province. The amount of feed per sheep production unit during the rearing period was 143.7 kg, of which 81.33 kg was roughage feed and the remaining 62.44 kg was concentrated feed.

Gross margin

Gross margin per farm was TL 2,237.8 million and increased in proportion to farm size. Taking the average gross margin for overall farms as a base, that is, 100, the gross margin of first and second farm group remained below the average with 40.4 and 73.3 points respectively, and it was above the average with 160.7 and 251.1 points for third and fourth farm group respectively. Gross margin per sheep production unit was TL 38.9 million. This figure was the lowest for fourth farm group with TL 35.8 million and the highest for first farm group with TL 43.2 million. The gross margin per TL 100 variable expenses, per TL 100 operating capital and per man-days used was TL 199.31, TL 31.14 and TL 9 million respectively (Table 3). Yıldırım (1993) investigating the sheep farms in Çatak town of Van province calculated the gross margin per sheep production unit, per TL 100 variable expenses, per operating capital and per working days used as TL 273 million, TL 84.41, TL 27.84 and TL 72.8 million, respectively.

Table 2. The distribution of variable expenses of farm groups (%)

Type of Expenses	Farm Groups				
	1-30 Head 24 Farm	31-60 Head 19 Farm	61-100 Head 12 Farm	101-+ Head 8 Farm	Total 63 Farm
	Sheep Production Unit (Head)				
Feed	63.1	66.3	61.2	75.9	68.3
Concentrated Feed	33.5	30.9	36.4	36.5	34.8
Industrial Feed	8.2	8.0	10.2	10.9	9.6
Barley	25.3	22.9	26.2	25.6	25.1
Roughage	29.5	35.5	24.8	39.3	33.5
Straw	14.3	15.9	13.0	16.7	15.3
Dry grass	15.2	19.6	11.9	22.7	18.3
Salt	0.2	0.2	0.2	0.2	0.2
Wage of Shepherd	11.2	15.0	11.4	7.1	10.5
Veterinary and Medicine	10.4	10.5	15.8	11.4	12.1
Electricity and Water	2.7	2.7	2.2	1.1	2.0
Hired Labor Wages	10.4	3.4	7.6	3.3	5.5
Marketing Expenses	2.0	1.9	1.6	1.1	1.5
Total Variable Expenses (TL Million)	485.6	799.8	1374.6	3423.9	1122.8

Table 3. The quantity of gross margin per some success criteria

	Farm Groups				
	1-30 Head 24 Farm	31-60 Head 19 Farm	61-100 Head 12 Farm	101-+ Head 8 Farm	Total 63 Farm
	Sheep Production Unit (Head)				
Gross Production Value (TL Million)	1389.4	2440.4	4971.8	9042.9	3360.6
Variable Expenses (TL Million)	485.6	799.8	1374.6	3423.9	1122.8
Gross Margin (TL Million)	903.8	1640.6	3597.2	5619.0	2237.8
Gross Margin per Sheep Production Unit (TL Million)	43.2	36.9	42.0	35.8	38.9
Gross Margin per TL 100 Variable Expenses	186.14	205.13	261.69	164.11	199.31
Gross Margin per TL 100 Variable Capital	33.21	28.33	34.91	29.23	31.14
Gross Margin per Man-Days Used (TL Million)	4.8	8.2	10.5	13.6	9.0

Feed consumption

The roughage consumption per sheep production unit was 213.3 kg and varied inversely to farm size. This figure was the lowest in fourth farms' group with 137.1 kg and the highest in the first farms' group with 407.6 kg. This clearly showed that the bigger farms substituted the roughage feed for the concentrated feed. The concentrated feed consumption per sheep production unit was 69.7 kg, of which 17.9 kg consisted of mixed feed

Labor use

The labor used for feeding and animal care and milking was 203 and 24.4 working day respectively. The feeding and watering of the sheep was performed three times and the cleaning of the sheep fold once a day during the winter season. Labor used for feeding and milking increased in proportion to farm size. Women generally undertook the milking activities.

Conclusion

The number of person per household was 9.98 person. Among the reasons for high number of population per farm, the high birth rate and the patriarchal family structure have a special place. The illiteracy ratio among the population above six years old was 35%, which could be considered high compared to the more developed regions of Turkey. According to Kaya (1997) the illiterate percentage of the population was 12.68% for sheep farms in Yozgat, a Central Anatolia province in 1997. On the other hand, of total 1,717-man days family labor potential, less than one quarter (21.1%) was employed which shows the high unemployment rate. A balanced plant and livestock production activities as well as handcrafts could be suggested to a more efficient use of the family labor potential.

Feed expenses amounted to 68.3% of total variable expenses. However, only 2.73 ha. of total 13.01 farm area was appropriated for feed production. Thus, special attention should be paid to the more production of feed on the farm by increasing the feed production area. Nearly third of farm manager (30.16%) buy the feed and find the price high relative to its quality.

The milk yield per sheep for a lactation period was 46.7 kg. The average yield for wheat, barley and sugar beet, which are the major crops, were 90.6 kg, 146.4 kg and 952 kg respectively, improvement in productivity and a higher product price is needed in order to increase the yields. There exit no production and marketing organization among the farmers. Such an organization could increase the income of the farmers by lowering the cost of inputs and transportation and providing them with a higher price for their products. This organization could also be a useful source for technical assistance.

Gross margin per sheep production unit, per TL 100 variable expenses and per TL 100 operating capital was TL 38.9 million TL 199.31 and TL 31.14, respectively for overall farms while these figures were highest with TL 42 million, TL 261.69 and TL 31.91 respectively in the third farm group (farms with 61-100 head sheep).

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