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Technical and Economical Analysis of Angora Rabbit Raising: Case of Turkey

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Abstract: Totally 42 active farms located in 17 cities of different regions of Turkey were studied to put forward the current situation and the problems related to Angora wool production. Data collected from the 42 farms were analyzed statistically for general characteristics. Collected data by face to face survey method from 28 farms were analyzed statistically for the economical criterions. The farms were grouped according to their capacities (number of rabbits) as follows: the first, small farms (<49 rabbits), second, middle scaled (50-200 rabbits) and the third was big farms (>200 rabbits). Mean wool production 1st, 2nd and 3rd group of farms was found as 728, 821 and 575 g, respectively. The average yield of all farms was 642 g year^{-1}. The low wool yield was probably due to the inconvenient production conditions. The revenue of 3 groups of farms was found 1112.03, 3164.86 and 6698.74 $ year^{-1}, respectively. The cost of wool in the same order was 81.05, 35.21 and 54.73 $ kg^{-1}. Observed main problems were as follows: Inconvenient location of farms, Difficulties of supplying the high quality rabbit feed, Management problems related to housing, feeding, reproducing and wool harvesting and the marketing troubles of wool and other products.

Key words: Angora rabbit, wool, cost of wool, wool yield, economical analysis, Turkey

INTRODUCTION

Angora wool production is the 3rd largest animal wool industry in the World after wool and mohair production (Schlink and Liu, 2003; Kocak and Taskin, 2004). Although, the name of Angora originated from capital city of Turkey, Ankara; until 1995-96 there was no angora wool production in Turkey, except a few demonstrations and investigations. In 1990's, some textile companies started to import Angora wool in small amounts in order to process it and in 1995, the amount of imports has reached to its maximum level (105 tons) (Kocak and Taskin, 2004). As a result of that several small scaled farms started to produce angora wool in various provinces of Turkey. The first enterprise started in Kayseri and foundation of Angora farms soon spread out to the other cities. Along the time some problems have occurred in the sector and Angora Union, which is the first union for Angora husbandry was founded in November 2002. In the aftermath, some farms quitted the sector and some others changed hands.

The aim of this research was to study Angora rabbit raising and wool production from the view of various aspects and to analyze economical aspects for the future of this sector.

MATERIALS AND METHODS

Two types of material were used in this research. The 1st type was the data collected from the farms by the survey method. Data were gathered from 42 farms as 8 farms in 7 provinces of Mid-Anatolia, 23 farms in 4 provinces of Aegean, 7 farms in 4 provinces of Marmara and 2 farms in 2 provinces of both Mediterranean and Black Sea regions. The 2nd type of material was available obtained from Angora Breeding Association and various textile companies in which Angora wool were used. The general outline of farms has been evaluated based on the data from these 42 farms. The data gathered from the group of 28 farms through face to face surveys has been analyzed economically, as well. In both analytical studies, the farms have been separated in three different groups with respect to the animal capacities (Table 1).

The data gathered through survey method have been tested for their compliance with the normal distribution (Kolmogorov-Smirnov test). Variance analysis has been used for variables fitting the normal distribution and Kruskal Wallis test for those which do not. And also for categorical variables chi-square (χ^2) test was used (Ozdamar, 2004a, b).

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Table 1: The grouping of farms according to their rabbit capacities

Group no.	No of rabbits	No of farms		No of farms analysed economically	
		No	(%)	No	(%)
1	>49	14	33.33	10	35.71
2	50-199	16	38.10	10	35.71
3	>200	12	28.57	8	28.58
Total	-	42	100.00	28	100.00

RESULTS AND DISCUSSION

Mean age, education and experience of raisers were found 38, 11 years and 26 months, respectively. The variance analysis revealed no significant differences between the three groups regarding the ages and years of education. Similarly, according the Kruskal Wallis test, no significant differences have been determined between groups with respect to the experience of enterprisers in the sector. More of the rabbit raisers (80.95%) have established their enterprises as a second job. The percentage of farmers engaged by only Angora production is very low (4.76%). From the view of wool production characteristics there is a similarity between Finland and Turkey (Simola and Nurminen, 1997).

The producers have not enough information on the Angora rabbit raising. Generally, location of farms for high wool production was not convenient. Most of the rabitries have the construction and equipment problems. There was no roof isolation in 62% of the rabitries. The cages used in rabitries were standard a great deal (73.8% of farms). But it was generally found that the equipments, except the cages, were inconvenient.

There is an antagonism between the amount of wool produced and the reproductive performance (Cheeke *et al*., 1987; Schlolaut and Lange, 1983; Kocak, 2003). Therefore, it is not advisable in Angora raising >4-6 L year^{-1}.

It was found that in more than half of the farms (55.60%) were produced >7 L year^{-1}. In small amount of farms (7.40%) 3 kindling year^{-1} could be realized. Litter size was found 7-9 in almost 40% of the farms. But 60% of farms were produced approximately 4-6 young L^{-1}, which was convenient for wool production. In normal conditions, the breeder (male and female) should be hold in rabitry until approximately 18 month of age. It was found that only 35% of the raisers were able to success for this standard.

If the Angoras (males and females) are free of disease, they can be used till 4 years of age for wool production. It was observed that the longevity of the wool producing Angoras was changed 1-7 years of old. A lot of the farms (75%) were used the animals 4 years in wool production.

Mean wool production per year in 1st, 2nd and 3rd group of farms was found as 728, 821 and 575 g, respectively. The mean wool yield of all farms in a year was 642 g. The averages were lower than the standard wool production in a year. In normal conditions, the females produce 900-1000 g year^{-1}, males without castration produce 700 g year^{-1} (Kocak, 2003). These results probably were due to the inconvenient production conditions such as location of farms, housing, equipments, feeding and also management.

The number of shearing varies between 3 and 6 times year^{-1}. It was observed that in 80% of the farms the rabbits were sheared 4 times in a year, which was the standard for gathering much fibre with high quality. The rate of shearing the rabbits more than the standard was 8.82%, whereas, those shearing less was 11.77%.

In small, middle and big scaled farms the standard wool harvesting (4 times year^{-1}) has been realized as 70.0, 91.7 and 75.0%, respectively. Some farmers have plucked their Angoras 5 and 6 times year^{-1}. The rate of these were 8.33 and 8.34%, respectively.

In the small scale farms, it was observed that contribution to the agricultural gross production value of the rabbit husbandry enterprise was very low. In middle scaled farms this value was around 50%, whereas it was fairly high in big scaled ones. Therefore, it might be claimed that big scaled farms have expertise in the husbandry of Angora rabbit (Table 2).

In farms, the total value of assets was largely comprised of buildings. Even though the buildings of some farms lack of proper roof isolation, there are some among them having the qualities of a good shelter. It was observed that the share of the value of the cages and equipment was rather low in comparison to that of the buildings. The bigger the farm is, the bigger this value gets. As a result, while the share of the buildings in the total assets was the highest in the small farms, the inner equipment has comparatively higher shares in the third and the second groups (Table 3).

Proportions of various items in the total revenue obtained from Angora rabbit enterprise have been investigated. The share of the value of products sold and consumed at home was found higher than the other groups. But the value of products in the warehouse was lowest in the 3rd group (Table 4). This situation was found to be a result of limited marketing ability of the small and medium sized farms compared to the big farms.

The cost items of the Angora rabbit raising are also examined. Feed costs were observed as the highest share in all groups. The share of the feed ranging between 26.89 and 44.07% was found to be less than the

Table 2: Gross Production Value (GPV) in the studied farms and the share of angora raising

	Plant production GPV		Animal production GPV (except angora rabbit)		Angora rabbit GPV*		Total
Groups	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}
1	1387.36	71.26	-	-	559.60	28.74	1946.96
2	1647.36	48.07	-	-	1779.44	51.93	3426.80
3	130.21	2.54	257.81	5.02	4745.61	92.44	5133.63
General	1121.03	33.10	73.66	2.18	2191.54	64.72	3386.23

*It is the sum of the value of rabbit products sold, consumed at home and of the changes in the inventory

Table 3: The value of the building equipments and the rabbits used in the rabitries

	Group 1		Group 2		Group 3		General	
Assets	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)
Building	17847.22	87.33	13854.17	51.30	38194.44	57.15	22234.63	61.70
Cage and equipment	705.97	3.46	2336.25	8.65	10291.67	15.40	4026.99	11.17
Rabbit	769.51	3.77	4439.17	16.44	10581.60	15.84	4883.56	13.55
Ware house	654.44	3.20	1619.58	6.00	4077.00	6.10	1977.05	5.49
Cash account and claims	458.33	2.24	4756.94	17.61	3683.68	5.51	2915.08	8.09
Total	20435.47	100.00	27006.11	100.00	66828.39	100.00	36037.30	100.00

Table 4: The revenue of angora rabbit production in the studied farms

	Group 1		Group 2		Group 3		General	
Revenue	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)
Wool (1)	166.25	14.95	963.75	30.45	2287.78	34.15	1057.22	30.72
Breeder rabbits(2)	50.35	4.52	145.83	4.61	942.71	14.07	339.41	9.86
Meat (3)	30.42	2.74	125.00	3.95	312.50	4.67	144.79	4.21
Skin(4)	10.83	0.97	22.22	0.70	104.17	1.56	41.57	1.21
The value of the product sold and consumed at home (1+2+3+4)	257.85	23.18	1256.80	39.71	3647.16	54.45	1582.99	46.00
Stock sheet exchange value (5)	301.75	27.14	522.64	16.51	1098.46	16.40	608.27	17.68
Wool (6)	205.21	18.45	656.25	20.74	1901.04	28.38	850.82	24.72
Manure(7)	347.22	31.23	729.17	23.04	52.08	0.77	399.31	11.60
The value of the products in the warehouse (6+7)	552.43	49.68	1385.42	43.78	1953.12	29.15	1250.13	36.32
Total	1112.03	100.00	3164.86	100.00	6698.74	100.00	3441.39	100.00

Table 5: The expenses of rabbit wool production

	Group 1		Group 2		Group 3		General	
Expenses	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)	$ farm^{-1}	(%)
Rabbit feed	126.01	8.75	492.51	17.56	2173.01	19.00	841.76	17.60
Lamb feed	81.25	5.64	285.56	10.18	1810.42	15.83	648.26	13.55
Calf feed	18.75	1.30	19.17	0.68	-	-	13.54	0.28
Wheat (grain)	-	-	20.83	0.74	22.92	0.20	13.99	0.29
Barley (grain)	67.64	4.69	-	-	-	-	24.16	0.51
Straw	10.97	0.76	-	-	5.20	0.05	5.41	0.11
Clover	82.76	5.75	160.24	5.71	1028.08	8.99	380.53	7.95
Total feed expenses	387.38	26.89	978.31	34.87	5039.63	44.07	1927.65	40.29
Permanent labour	208.33	14.46	500.00	17.82	3020.83	26.42	1116.07	23.33
Temporary labour	83.33	5.79	125.00	4.46	-	-	74.40	1.56
Electricity	35.49	2.46	124.31	4.43	277.01	2.43	136.22	2.85
Drugs	19.06	1.32	62.70	2.24	201.39	1.76	86.74	1.81
Water	10.14	0.70	36.63	1.31	96.70	0.85	44.33	0.93
Veterinary	35.42	2.46	41.67	1.48	17.36	0.15	32.49	0.68
Tax	0.52	0.04	10.42	0.37	49.31	0.43	17.99	0.38
Heating expenses	-	-	-	-	39.06	0.34	11.16	0.23
Rent fee	-	-	108.33	3.86	302.08	2.64	125.00	2.61
Depreciation expenses	592.57	41.12	684.23	24.39	1848.90	16.17	984.26	20.58
Other expenses*	68.61	4.76	133.76	4.77	542.23	4.74	227.19	4.75
General total	1440.85	100.00	2805.36	100.00	11434.50	100.00	4783.50	100.00

*The cost of service and repair, general management expenses etc

standards (60-65%). The share of feed cost to total production cost was the highest in the big farms (Table 5).

The difference between income and outcome was found positive only in second group (Table 4 and 5). Economic and financial profitability was calculated as follows (Inan, 2000);

$$\text{Economic profitability} = \frac{(\text{Total income - total expenses}) + \text{the rent}}{\text{Total capital (total assets)}} \times 100$$

$$= \frac{(3164.86 - 2805.36) + 108.33}{27006.11} \times 100$$

$$= 1.73$$

Table 6: The cost of wool in the studied farms

Revenue/cost elements	Group 1	Group 2	Group 3	General
Total costs (1) ($ farm^{-1})	1440.85	2805.36	11434.50	4783.50
Liquid capital interest (2) ($ farm^{-1})*	95.92	225.35	932.01	381.03
The value of products other than wool (3) ($ farm^{-1})	91.60	293.06	1359.38	525.77
Subtraction of income from expenses (1+2) - (3) ($ farm^{-1})	1445.17	2737.65	11007.13	4638.76
Quantity of wool (kg farm^{-1})	17.83	77.76	201.13	91.60
The cost of 1 kg wool ($ kg^{-1})	81.05	35.21	54.73	50.64

*The rate of interest is the half of the one that has been fixed by Agricultural Bank of Turkey for 1 year working capital loan (15%)

$$\text{Financial profitability} = \frac{(\text{Total income - total expenses})}{\text{Equity capital}} \times 100$$
$$= \frac{(3164.86-2805.36)}{17978.33} \times 100$$
$$= 2.00$$

Both of the calculations given above display that the farms have been operated with very low of profit rates.

The lowest level of cost was determined in the 2nd group, which was the only one that made profit even if in a small amount. On the other hand, the maximum prices received by the 1st, 2nd and 3rd groups of the farmers in year 2004 were 20.77, 73.38 and 24.93 $ kg^{-1}, respectively. When the costs kg^{-1} of wool and the prices received by the producers were considered together, the prices pronounced, especially by the first and in the third groups, were found to be quite low. The difference between the prices received by respective groups was also striking (Table 6).

It was observed that rabbit wool was sold to some agents, Angora rabbit association and some other companies. The wool was mainly sold through instalments however sometimes also in cash.

The most important problem faced by the farms during the production is the inability to buy the rabbit feed with high quality. It is known that the cost of feed takes the first place in total expenses and also that rabbit feed with quality is important in the wool production. However, it was observed that most of farms used the their own feed or those bought from poultry, sheep and cattle feed manufacturers. Only a minor group used rabbit feed produced specially for rabbits. On the other hand, it is suspect to what extend those feed could satisfy the needs of rabbits. The researchers (Schlolaut, 1981; Schlolaut and Lange, 1983) show that the amino acid additives (DL. methionin in particular) into granule feed increase the production of wool in considerable amounts (16% females, 7% males). Alternatively, the feed consumption per 100 g wool is determined to be reduced by 18% in females and 7% in males. It was understood that the producers had no information on this type of basic feeding management. Moreover, they didn't have the chance to use factory feed contained necessary ingredients for Angora rabbits. This is because the feed manufacturing machines actually specialized in the feed for lamb, calf, etc. are programmed for production of minimum 1-2 tons of feed. For this reason small scaled farms didn't have the opportunity to use special feed for Angora rabbit. Only a very small number of farms have used special feed prepared by Angora Union. However, because the members of the Union are located in different regions, feed could not be distributed regularly and continuously.

Wool yield of Angora rabbits is influenced by several factors. Genetic is one of them and very important, because the wool yield is highly heritable trait. Three types of Angoras, German, French and English are used for wool production. German Angoras have been selected for high wool production for many years and produce more wool yield than the French and English Angoras (Cheeke *et al*., 1987). On the other hand, at west Germany (Neu-Ulrichstein Test Station) wool yield has been achieved as 874 g year^{-1} for males and 1159 g year^{-1} for females. Researchers believed that this is economically maximum yield obtainable (Schlolaut and Lange, 1983; Cheeke *et al*., 1987). It was understood that the producers were used 3 types of Angoras. But it was not possible to determine the wool yields separately for the types. Therefore, it is logical to estimate the low yield was effected other factors than the genetic in studied farms.

As the Angora rabbit raising is a quite new sector in Turkey, technical knowledge becomes more important than ever. In every stage of production the breeders and the other personal have to have the precise and sufficient technical knowledge and experience.

In this research, it is found out that the people involved in Angora rabbit husbandry are not proficient in this sector at the beginning and that they gain experience in time through trial and error method. Also, the researchers witnessed that the people involved in husbandry do not know the basics such as negative effect of over-heat and light upon Angora rabbits, the appropriate conditions for maximum yield or factors that affect the amount and the quality of wool (Kocak, 2003; Kocak and Taskin, 2004). Even though, the people in husbandry business gained certain amount of knowledge in time, they were usually insufficient or negligent in practice.

The health condition of the rabbits is one of the factors that affect the amount of wool production. For instance, the scars in the feet that is frequently seen usually lowers the feed consumption of feed and this results 25% decrease in wool production (Bekyurek, 1998). The producers involved this types of problems expressed that they had serious difficulties in gathering enough knowledge and experience. Another problem is that the increasing number of deaths of the baby rabbits puts the sector in a big trouble. These kinds of health problems most probably occur due to housing conditions and some inconveniences of the cages and its equipments. We may claim that the adult rabbit deaths after shearing and the baby rabbit deaths may be due to usage of inconvenient nest box both in terms of shape and size.

There were no economic and technical records in the farms. In this research the expenses of labour are found to be considerably high. The husbandry of Angora rabbit is a labour-intensive sector. Each shearing takes about thirty minutes for an experienced worker (Lebas *et al*., 1986). It is expressed that the maximum number of rabbits that a worker can take care 500 Angora rabbits (Kocak, 2003). None of the farms could reach to this capacity.

An important problem was determined to be the no profitability in the small and the big-scaled farms and the profitability was limited in the middle-scaled. The fact that the cost of per kg wool was higher in the big farms compared to that in the middle-scaled ones might be attributed to the use of proper cages, appropriate roof isolation and rabbit feed.

Another problem that affecting the success of the farms was determined to be non-existence of a proper market organization. The producers usually try to market their products individually and on their own efforts. Besides, it is found out that neither the quantity nor the quality (packaging in standard wool length) of the product meets the requirements of the processing industry. Meanwhile, as the processing industry prefers to use the cheap wool imported from China (about 15 \$ kg^{-1}), demand for local production diminishes.

Another problem observed is that people involved in husbandry are scattered in various places, they are unable to come together and form an efficient union. This results in low market prices for fibre and increased costs for input used.

CONCLUSION

From the results of this research the following suggestions for the future of this sector were concluded:

- Organizations are very important factor for the development of this sector. It can be easily possible to buy feed and to sell products with convenient prices regularly and continuously by integration between wool production enterprises and the textile industries
- Wool yields are effected negatively by the inconvenient locations of the farms. Therefore the Angora farms must be founded in the regions which have cold climatic conditions
- Angora farms must be founded in rural areas especially in forest. So, the families can earn money and also meet their own living requirements. This type of enterprises must be supported by the government
- Education and encouragement in this field are also important factors. This must be realized in a wide project by the related ministries such as Ministry of Agricultural and Rural Affair and Ministry of Forestry

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