

Full Length Research Paper

Economical analysis of sheep breeding according to the NUTS Level 1 region in Turkey

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The aim of this study was to provide an analysis of current situation in sheep breeding sub-sector of animal husbandry in the NUTS Level 1 region in Turkey. The total number of sheep and slaughtered sheep and the quantity of mutton production in Turkey have decreased by 42.31, 62.12 and 55.27%, respectively in 1983 - 2007 periods. While the mutton productivity has been above Turkey's average in the East and Middle regions, they have been under Turkey's average in the West, North and South regions. The analyses show that marketing margin for mutton changes between 20.82 - 15.91%. According to the result of the econometric analysis, the important factors in mutton production in the west and middle regions are mutton price; and beef price in the east region. On the other hand, the most important factor in mutton production in the middle region is technology. This situation needs to be assessed attentively.

Key words: Sheep, mutton, NUTS Level 1, Turkey.

INTRODUCTION

In human nourishment, meat and meat products have an important place. Turkey is among the top in the world with regard to the number of animals. But, Turkey is at the bottom of the list of the capacity to produce animal products (Kızıloğlu, 1990). Per capital consumption of animal products in Turkey is far below the levels of developed countries. This gap may stem from the marketing structure as well as production problems (Vural and Yıldırım, 1995).

Meat is obtained from cattle, sheep, goat and water buffalo in Turkey. Generally, these animals have adapted to ecological circumstances. These animals are generally raised in traditional small farms (Dağdemir et al., 2003). They can also be found in farms dealing with intensive farming and fattening.

In recent years, in parallel with the general decline in the number of animal stock, the number of ovine too decreased considerably. As a result of the decline in the number of sheep, the number of slaughtered sheep and the quantity of mutton production has also decreased.

Similarly, in the 1993 - 2007 periods, there has been a 7.93% decrease in sheep skin, 32.14% in the number of sheared sheep, 16.78% in the quantity of sheep wool, 53.03% in the number of milking sheep and 25.28% in the quantity sheep milk in Turkey (Anon, 2009). As a result of the deteriorating situation in sheep breeding, the income of some families has declined considerably. Many farmers from the regions which had comparative advantage had to move to urban areas. This unplanned and unwanted migration has caused serious social and economic and environmental problems in the big cities in the Country.

The domestic demand of raw and processed mutton has increased. The increase has been at a level of 6 - 7% annually. The supply and demand balance has been broken for the supply can not keep up with the demand (Güneş, 1998). This negative situation which appears in sheep breeding sub-sector of animal husbandry has decreased the mutton supply which will result in the need to import mutton from abroad. Nowadays it's of importance to produce a certain product with minimum cost and to market them effectively. This is especially important for the small farms which have difficulties in competing with big farms which can produce relatively at a low cost and market the products more effectively (Dağdemir, 2005).

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Figure 1. NUTS 1 regions in Turkey.

As can be seen in the explanations above, there are several important problems regarding the meat production and consumption. These problems need to be solved urgently to ease the burdens of both the farmers and the consumers.

In this study, we try to determine the current situation and problems regarding the supply side in sheep breeding which is one of the most important sources of red meat in the country according to NUTS Level 1 regions of Turkey.

MATERIALS AND METHODS

Materials

The data used in this study are the secondary data provided from local and other sources which were made available earlier. They include annual reports of the Turkish Statistical Institute. The data were processed according to the provinces and then they were grouped according to the NUTS Level 1 Anonymous (1983-1993) regions. There are 12 regions in the country according to NUTS 1 division system. But these regions were regrouped into the five groups to be able to determine the general situation and changes more clearly. The five regions are as follows:

- (i) The West (Istanbul, West Marmara, Aegean, East Marmara).
- (ii) The Middle (West and Central Anatolia).
- (iii) The South (Mediterranean and South East Anatolia).
- (iv) The North (West Black Sea and East Black Sea).
- (v) The East (North-East and Middle-East Anatolia).

Total numbers of sheep, number of slaughtered sheep, mutton production and efficiency were analyzed for 25 year period covering 1983 and 2007 (Anon, 1983 -1993; Anon, 1993 - 2007). The reason

for taking 1983 as the beginning year is that Turkey started adopting liberal economy in that year and Turkish Statistics Institute (TUIK) improved the calculation method connected with animal husbandry statistics. The Average of 5 yearly periods (1983 – 1987, 1988 – 1992, 1993 – 1997, 1998 - 2002 and 2003 - 2007) was taken to make comparisons. In the marketing margin calculations of 15 year mutton producer and consumer prices between 1993 - 2007 were taken (Figure 1). The data used in the models to estimate supply functions were obtained from Turkish Statistics Institute time series covering 1993 - 2007 period (Anon, 2009).

Methods

The difference between producer prices and prices paid by consumer was considered as marketing margin. Current prices used in supply function were turned into real prices taking notice of “agriculture, hunting and forestry index (1994 = 100)” within the wholesale goods prices. The econometric model which was used for both the Country as a whole and the regions is the following:

$$SP_{ii}^k = \alpha^k + \beta_1^k MP_{ii} + \beta_2^k BP_{ii} + \beta_3^k D_{ii} + e_i$$

In this form:

SP: Mutton production (ton), $i = 1, \dots, 15$,

MP: Mutton price (TL/kg), $k = 1, \dots, 6$ (Regions and total Turkey)

BP: Beef price (TL/kg), $t = \text{Time and}$,

D: Technology.

We determined the relationships between the econometric model estimation and the variables, and used these parameters to conduct statistical analysis. All of the models were analyzed according to the least squares method. The test of Durbin-Watson was applied, for the data used are chronological data and auto-correlation was proved in the model estimated only for the North

Table 1. Total numbers of sheep according to regions.

Region	1983 - 1987		1988 - 1992		1993 - 1997		1998 - 2002		2003- 2007	
	Number	%	Number	%	Number	%	Number	%	Number	%
West	8512176	19.33	7515770	18.06	6529444	19.19	5584810	19.94	4979572	19.60
Middle	9608238	21.82	8926574	21.44	7246124	21.29	5144069	18.37	4257795	16.76
South	8568478	19.46	8890762	21.36	7479396	21.98	5982962	21.36	5871767	23.11
North	4557458	10.35	3608946	8.67	2603424	7.65	1883595	6.73	1444007	5.69
East	12783990	29.04	12685546	30.47	10172138	29.89	9410887	33.60	8850108	34.84
Total	44030340	100.00	41627598	100.00	34030526	100.00	28006323	100.00	25403249	100.00

Source: Anon, 1983 - 1993; Anon, 1993 - 2007.

Table 2. The numbers of slaughtered sheep according to regions.

Region	1983 - 1987		1988 - 1992		1993 - 1997		1998 - 2002		2003 - 2007	
	Number	%	Number	%	Number	%	Number	%	Number	%
West	4910590	45.35	3725071	42.68	2646851	41.39	2647210	44.73	1814641	44.23
Middle	1561298	14.42	1482696	16.99	952402	14.89	826122	13.96	527516	12.86
South	2756846	25.46	2185062	25.04	1961918	30.68	1593922	26.93	1347350	32.84
North	663132	6.13	600134	6.88	352667	5.51	363325	6.14	173116	4.22
East	935412	8.64	733776	8.41	481625	7.53	487480	8.24	240255	5.85
Total	10827278	100.00	8726739	100.00	6395463	100.00	5918060	100.00	4102877	100.00

Source: Anon, 1983–1993; Anon, 1993–2007.

region (Gujarati, 1995; Yavuz, 1996). After this problem had been analyzed in the “Shazam” program, the parameters were estimated again (White et al., 1993).

FINDINGS AND DISCUSSION

In the Table 1 the numbers of sheep are given according to the regions. Generally, in all of the regions a decrease was realized in total numbers of sheep by years. A decrease by 42.31% took place in total numbers of sheep in 2003 - 2007 periods when compared with 1983 - 1987 period. Total number of sheep did not change considerably in the west region. Although, a proportional increase took place in the east and south regions, a decrease took place in the Middle and North regions. Besides, the highest number of sheep is in the East region, the lowest number of sheep is in the North region. In Table 2, the numbers of slaughtered sheep by regions are given. A decrease by 62.12% took place in the number of slaughtered sheep between 2003 - 2007 and 1983 - 1987 periods. When all regions and all the periods are taken into consideration, the rank of the regions with regard to the number of slaughtered sheep, from high to low, is as follows: the west, South, Middle, East and North regions. When total numbers of sheep and the number of slaughtered sheep rates are examined in the West, Middle, South, North and East regions, it was observed that the live sheep are being transferred from East, Middle and North regions to West and South

regions. Population density is quite high in these regions especially in the West region, so the number of slaughtered sheep is significantly high in this region compared to others.

Although, the east region is known to be a living animal depot which ranks first with regard to the number of animals, it was at the bottom of the list in terms of the number of slaughtered animals. This situation affects the economy of the region negatively for the lost added value. This is one of the main reasons why rural people have been migrating out of the region in a significant number for the past decades.

In the Table 3, the quantity of mutton production by the regions is given. As can be seen on the table, there have been a decrease in the production of mutton in all regions in the country. The natural consequence of this situation is the decrease in the number of slaughtered sheep. A decrease by 55.27% took place in total mutton production between 1983 - 1987 and 2003 - 2007 periods. The mutton production increases, as the number slaughtered sheep increases. Similarly, the higher the intensity of the population gets, the higher the amount of mutton production is realized. In fact, mutton production is the highest in the west region where the population intensity is also the highest. The decrease in the production of mutton in general results in a need to import meat and meat products from other countries.

In Table 4, mutton outputs are given according to regions. Although, the fluctuations take place in the

Table 3. Mutton production according to regions in Turkey

Region	1983 - 1987		1988 - 1992		1993 - 1997		1998 - 2002		2003 - 2007	
	Ton	%	Ton	%	Ton	%	Ton	%	Ton	%
West	63122	39.17	51408	37.25	41302	37.22	45801	42.02	31384	43.54
Middle	24862	15.43	23802	17.25	16651	15.01	16117	14.79	10086	13.99
South	45135	28.01	39990	28.98	38231	34.46	31210	28.64	23044	31.97
North	9314	5.78	8540	6.19	5169	4.66	5969	5.48	2753	3.82
East	18698	11.61	14258	10.33	9601	8.65	9884	9.07	4813	6.68
Total	161131	100.00	137998	100.00	110954	100.00	108980	100.00	72081	100.00

Source: Anon (1983–1993); Anon (1993–2007).

Table 4. Mutton yields according to regions in Turkey (kg/head).

Region	1983 - 1987	1988 - 1992	1993 - 1997	1998 - 2002	2003 - 2007
West	12.85	13.80	15.60	17.30	17.29
Middle	15.92	16.05	17.48	19.51	19.12
South	16.37	18.30	19.49	19.58	17.10
North	14.05	14.23	14.66	16.43	15.90
East	19.99	19.43	19.93	20.28	20.03
Weighted average	14.88	15.81	17.35	18.41	17.57

Source: Anon (1983–1993); Anon (1993–2007).

mutton productivity between 1983 - 1987 and 2003 - 2007 periods, generally, an increase has taken place. The highest efficiency is realized in the east region in all the periods. This region is followed by south and middle regions even though a decrease has occurred in the south in the last period.

Despite some fluctuations, the general trend is upward with regard to efficiency in the North region. It is important that, significant increases have occurred with regard to efficiency in the west region in the periods covered in this study. Although, the number of live sheep is not high in this region, the number of slaughtered sheep is. This shows that sheep are transferred from other regions to west and slaughtered here.

In Table 5, the marketing margin for mutton, and the percentages of the of the consumer price taken by the producer and the middle men are given. According to the figures in the table, during the 15 year period between 1993 - 2007, the percentage of the market price that goes to the producers changes between 79.18 - 84.09%. On the other hand, the percentage of the market price that goes to the middlemen changes between 20.82 - 15.91% in the same period. This shows that approximately 1/5 of the money that the consumers pay for a kilogram of mutton goes to middlemen who take the commodity from the producers to the consumers without producing an added value through processing. They simply change the place of the commodity.

In Table 6, model estimates relating to mutton production are given. When model results are appraised

from a general point of view, it can be observed that, the results are in harmony with the economic theory. The prices of beef and mutton have been found to be statistically significant for mutton production. It has been determined that the changes in producer's prices of beef are more importance than the producer's price of mutton in the production of mutton.

While the mutton price is the most important factor in the mutton production in the west and middle regions, the beef price is the most important factor in the east region. In the middle region the technology is the most important factor in the mutton production.

RESULTS

As a result of this study, it was concluded that, when all NUTS 1 regions are considered together between 1983 - 2007, there has been a decrease of 42.31% in total numbers of sheep, 62.12% in total numbers of slaughtered sheep and 55.27% in total mutton production. In the meanwhile, the demand for meat increased including mutton has steadily increased which inevitably resulted in dependence for import from other countries. While the east region has the highest mutton efficiency (20.03 kg/head) in 2003 - 2007 periods, the North region has the lowest mutton efficiency (15.90 kg/head).

During the 15 year period between 1993 - 2007, the percentage of the market price that goes to the producers changes between 79.18 - 84.09%. On the other hand, the

Table 5. Marketing margin, the percentage of the shares of producers and middlemen from market price.

Years	Producer Price (TL)	Consumer Price (TL)	Marketing Margin (TL)	Market Price	
				Producers' Share (%)	Middlemen's Share (%)
1993	48 534	59 648	11 114	81.37	18.63
1994	90 920	111 231	20 311	81.74	18.26
1995	224 721	268 571	43 850	83.67	16.33
1996	336 167	410 648	74 482	81.86	18.14
1997	601 513	715 311	113 798	84.09	15.91
1998	1 160 420	1 423 183	262 763	81.54	18.46
1999	1 920 251	2 309 528	389 277	83.14	16.86
2000	2 688 921	3 250 657	561 736	82.72	17.28
2001	3 292 527	4 147 746	855 219	79.38	20.62
2002	5 486 736	6 349 664	862 928	86.41	13.59
2003	8 192 600	9 971 787	1 779 187	82.16	17.84
2004	8 634 168	10 903 891	2 269 723	79.18	20.82
2005	8 704 917	10 669 167	1 964 250	81.59	18.41
2006	9 171 442	11 310 833	2 139 392	81.09	18.91
2007	9 071 475	11 395 000	2 323 525	79.61	20.39

Source: Anon (1983–1993); Anon (1993–2007).

Table 6. Model estimates relating to mutton production according to the regions in Turkey.

Regions	R^2	α	β_1 (MP)	β_2 (BP)	β_3 (D)
West	0.50	42835 (1.97)	0.62* (2.89)	-0.65*(-2.18)	7529 (1.11)
Middle	0.87	14520 (1.59)	0.39* (3.75)	-0.28* (-2.84)	12189* (6.07)
South	0.31	74595 (1.97)	0.09 (0.56)	-0.65 (-1.29)	5497(0.81)
North	0.74	5163* (2.19)	0.52 (1.50)	-0.57 (-1.65)	656 (0.83)
East	0.42	16800 (0.38)	0.34* (2.33)	-0.48* (-2.81)	1680 (0.38)
Turkey	0.60	15080 (2.17)	2.60* (2.65)	-3.24* (-3.25)	7523 (0.55)

Source: Original calculation. * Significance level is 0.05. The figures in parenthesis are the t values. The table value of "t" is 2.179.

percentage of the market price that goes to the middlemen changes between 20.82 -15.91% in the same period. This shows that approximately 1/5 of the money that the consumers pay for a kilogram of mutton goes to middlemen who take the commodity from the producers to the consumers without producing an added value through processing. They simply change the place of the commodity.

According to the econometric model estimates, while the mutton price is the most important factor in the mutton production in the west and middle regions, the beef price is the most important factor in the east region. In the middle region the technology is the most important factor in the mutton production.

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