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The Econometric Analysis on Regional Differences of Milk and Meat Production of Sheep and Goats in Turkey

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Abstract: This study examines the changes in sheep and goats' products by regions. In this research it was tried to determined that regional differences and factors affecting milk and meat production in sheep and goats by using econometric analysis. Results convey that while the main factor affected production was the parity of product/feed price in western regions, the main factor was number of animals in East and South Regions. Furthermore, results reveal that livestock policies should be developed and implemented on the basis of region and product.

Key words: Econometric analysis, sheep and goat farms, milk, meat

INTRODUCTION

Sheep and goats breeding in Turkey generally carried out in extensive way and animal products constitute main food resource of low income farms. On the other hand it gives an opportunity to labor force for employment[1]. According to 1970-2001 period data, there was an important decrease in the number of sheep and goats in Turkey. While there were 36.5 million sheep and goats in 1970, this number decreased in 2001 as 26.9 million. In spite of decrease in the number of sheep and goats, small ruminant production activity is still important for agricultural farms and also Turkish economy. As a matter of fact, as to 2001 data, milk, meat and hide obtained from sheep and goats, respectively constitute 9.9, 23.3 and 80% of total animal production. Furthermore, 40000 tons wool, 2600 tons hair and 401 tons mohair was obtained from sheep and goats breeding[2].

In spite of important share of sheep and goats in livestock sector, it is difficult to say that appropriate and stable policies were implemented in this sector. As a matter of fact, some studies done in recent years show that there were regional structural differences and these differences should be taken into consideration in policies which would be implemented[3,4].

In this study, it was examine that the factors affected sheep and goat' milk and meat production in Turkey by regionally. For this aim econometric analysis was made by both regional and country base.

MATERIALS AND METHODS

Turkey has nine agricultural regions as Middle North, Aegean, Marmora, Mediterranean, Northeast, Southeast, Black Sea, Middle East and Middle South Regions. To be able to make econometric analysis, the number of sheep and goats, milk/barley, meat/barley price parity have been taken as variables and two models were conducted for milk and meat production. In Turkey, the feed resource of small ruminant breeding is mostly depend on cereal production and barley is the most important ingredients of feed. For this reason product/barley price parity was taken into consideration as an variable. Data for each province that include number of sheep and goats, slaughtered, milky animals and their production were obtained from State Institute of Statistics (SIS) publications for 20 years (1980-2000)[5]. Then they were aggregated for regional level regarding agricultural regions. As prices, farmer prices was used and calculated with Whole Sale Price Index for each year[6]. And following models used for econometric analysis[4]. Calculations obtained by using SHAZAM econometric program[7].

$$\text{Model 1: } Q_t^{milk} = \alpha + \beta_1 p^{milk}_{t-1} + \beta_2 p^{meat}_{t-1} - \beta_3$$
$$\text{Model 2: } Q_t^{meat} = \alpha + \beta_1 p^{milk}_{t-1} + \beta_2 p^{meat}_{t-1} - \beta_3$$

Where:
Qt^{milk} = sheep and goat milk production
Qt^{meat} = sheep and goat meat production

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p^{milk}_{t-1} = sheep or goat milk price/ barley price in t-1 period

p^{meat}_{t-1} = sheep or goat meat price/ barley price in t-1 period

t = numbers of sheep and goats milked and slaughtered.

RESULTS

Results on regional and Turkey basis from econometric analysis of milk and meat production in sheep and goats breeding were, respectively shown on the Table 1 and 2. The variable signs were obtained as expected. R^2 values generally varying but close to 1 which means that data were suitable for the model and included variables were adequate. D-H statistic having a value lower than 2 shows that there was no autocorrelation in the models.

Since computed t values of all variables in the first model were high, all variables were statistically significant and signs were correct (Table 1). As seen the factors affecting milk production in sheep and goats breeding on Turkey basis, sheep milk price/barley price parity was the most important factor since t statistics of this variable was higher than t statistics of other variables. Therefore, on Turkey basis when sheep

Table 1: Factors affecting milk production of sheep and goats in Turkey

	Variables					
Regions	α	β_1	β_2	β_3	R^2	D-H
Central-North	2.32	0.81	0.30	-0.10		
	(2.60)*	(11.29)*	(1.96)	(-3.62)*	0.98	-0.10
Aegean	3.83	0.69	0.13	-0.80		
	(1.72)	(5.07)*	(1.17)	(-2.51)*	0.97	0.91
Marmora	-0.35	1.01	0.46	-0.70		
	(-0.24)	(8.31)*	(3.89)*	(-0.25)	0.98	1.57
Mediterranean	2.02	0.83	0.14	-0.45		
	(1.89)	(9.59)*	(1.36)	(-3.92)*	0.95	0.51
Northeast	1.95	0.83	0.30	-0.33		
	(1.33)	(6.63)*	(1.00)	(-1.54)	0.74	-0.27
Southeast	4.52	0.64	0.42	-0.28		
	(2.15)*	(3.84)*	(1.11)	(-1.05)	0.51	0.72
Black-Sea	6.60	0.40	0.13	-0.25		
	(4.19)*	(2.98)*	(3.86)*	(-4.44)*	0.94	-1.92
Central-East	3.75	0.69	0.30	-0.13		
	(2.22)*	(5.16)*	(1.16)	(-2.71)*	0.96	0.26
Central-South	3.07	0.75	0.11	-0.70		
	(2.07)*	(6.20)*	(0.67)	(-2.39)*	0.95	0.94
Turkey	3.82	0.73	0.31	-0.67		
	(2.12)*	(5.85)*	(1.69)	-(2.98)*	0.92	0.41

Table 2: Factors affecting meat production of sheep and goats in Turkey

	Variables					
Regions	α	β_1	β_2	β_3	R^2	D-H
Middle North	7.90	0.41	0.66	-0.23		
	(3.46)*	(2.13)*	(1.67)	(-1.86)	0.58	0.66
Aegean	6.54	0.49	0.45	-0.10		
	(3.37)*	(3.10)*	(1.38)	(-1.23)	0.53	1.00
Marmora	10.14	0.28	0.79	-0.29		
	(1.97)	(1.97)	(2.89)*	(-3.94)*	0.80	-2.63
Mediterranean	6.45	0.41	0.22	0.95		
	(0.41)	(2.35)*	(0.86)	(1.12)	0.56	0.60
Northeast	8.51	0.51	1.23	-0.43		
	(4.12)*	(3.61)*	(2.43)*	(-2.87)*	0.77	-1.41
Southeast	7.22	0.21	-0.14	0.12		
	(3.50)*	(1.01)	(-0.58)	(0.18)	0.10	1.13
Black-Sea	6.30	0.45	0.42	-0.27		
	(3.76)*	(2.94)*	(1.49)	(-2.93)*	0.75	1.67
Middle East	7.25	0.39	0.55	-0.10		
	(2.99)*	(1.80)	(1.45)	(-0.94)	0.38	2.70
Middle South	8.51	0.38	1.02	-0.65		
	(4.20)*	(2.12)*	(2.22)*	(-0.53)	0.39	-0.67
Turkey	8.11	0.45	0.51	-0.11		
	(4.67)*	(3.53)*	(2.41)*	(-2.08)*	0.68	-0.32

*: statistically significant at %5 level (values in brackets were computed t values)

milk/barley price parity increased, milk production increased, too. The second important factor was the number of animals variable and negative sign of this variable means that decreases in animal numbers by years decrease milk production, as well. On regional basis, the main factor affecting milk production in all regions except Black Sea region was sheep milk/barley price parity. Especially, Middle North, Mediterranean and Marmora regions were more sensitive to this factor than other regions. Number of animal variable was the most important factor in Black Sea region. This factor was followed, respectively by sheep meat/ barley price parity and sheep milk/barley price parity.

R^2 of the model developed to analyze milk production was generally high in Turkey and regional basis except South East region. Therefore, it could be said that change in milk production in Turkey and all regions except South East Anatolia was determined by variables in the model. But, change was determined by variables out of the model For South East Anatolia. Especially, the most important factors lie under this fact was many social problems in the region and ineffective use of pastures and plateaus as feed resource.

Table 2 display the results of the model, developed to estimate factors affecting meat production of sheep and goats in Turkey and regional basis. In the 2nd model all variables were statistically significant and all signs were expected. Therefore, while increases in price parities increase meat production, decrease the number of animals decreases meat production.

All variables in the model affect meat production at almost similar rates (Table 2). However, R^2 of the 2nd model was lower than that of 1st model. This situation shows that there were other factors out of model affecting meat production. These factors were effective especially in South East region.

DISCUSSION

According to previous studies, there are regional differences of livestock production in Turkey. Çakmak[8] analyzed effects of various policies and external changing on sector and found that there were regional differences in production and consumption of meat and milk. Yavuz and Keskin[9] analyzed factors affecting interregional structural change. Findings of the study revealed that while population dynamics were the most efficient factor in Turkish meat production, productivity of cattle and buffaloes and number of sheep and goats were the most important factors in increases in Turkish milk production. Kasnakoglu[10] examined livestock inventory in Turkey by regions, livestock production quantities, pasture assets and feed sowing areas by regions, feed demand and supply relations and income and price elasticity of livestock products. His findings also revealed that both income and price elasticity of livestock products were higher than other products and also showed differences among regions. Yavuz *et al.*[11] examined structural change in milk sector by regions. The used econometric model in the study shows that productivity was the most efficient sector in milk production and also efficiency of productivity in East Anatolia was less than other regions. Tan[12] examined the effects of supply, demand and policy factors on milk production by regions. According to the analysis findings, whereas supply factors increase share of west regions in milk production, they decrease share of east regions in milk production.

According to results of this study, decrease in animal numbers was one of the most important factors causing decreases in milk and meat production of sheep and goats in Turkey in the last 20 years. Comparing with other regions, effect of this factor was higher in South East region than other regions. Main reason for this was that ineffective use of both pastures around villages and plateaus as feed resource due to many social problems in the last 20 years. This situation in these regions has negatively affected stallion and feed material of Mediterranean, Middle South, Middle North and Marmora regions.

Another important result of the model was that comparing with East regions, product/feed price parity was the most important factor in Western regions. The most important factor for this was high dependence of farms carrying out livestock activity to industrial feed due to limited pasture and plateau areas in western regions.

As a result, decreasing animal numbers and product/feed parity were the most important factors affecting milk and meat production of sheep and goats in Turkey both on regional and country basis in the last 20 years. Therefore, social and economic factors of decreases in the numbers of sheep and goats in recent years should be analyzed in more detail on regional basis. Later, necessary measures towards keeping number of sheep and goats in farms should be supported with regional policies. In addition improve alternative feed methods to decrease industrial feed cost in regions in which there was high dependence to industrial feed and utilizing feed inside of firm contribute increases and stability in meat and milk production of sheep and goats.

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