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An analytical evaluation of factors that determine the red meat production in Turkey

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Abstract

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In this research, the factors that affect the red meat production in Turkey have been analyzed with an analytical approach. The material of the research is red meat production (dependent variable), red meat importation and exportation, livestock importation and exportation, prices of fattening feed, prices of red meat, agricultural supports (independent variables), index of consumer and producer prices in 1994-2017. Current prices and agricultural supports have been turned into fixed prices through consumer and producer prices. The effect of independent variables on red meat production has been analyzed through Least Squares Method. Before the stage of analysis, the stability of the series has been tested through Augmented Dickey-Fuller (ADF) unit root test. As a result of the test, it has been found out that, red meat production, agricultural supports, red meat importation and livestock importation series are not stationary in level values and they have been stabilized by taking their first variations. By applying stepwise method, which is one of the multiple regression methods, to the stabilized series, the model that best describes the relationship between dependent and independent variables has been identified. According to that model, it has been revealed that, the rise in the livestock exportation, livestock importation and red meat importation, reduces the red meat production and the increase in the red meat prices and agricultural supports, also increases the red meat production in Turkey. On the other hand, it has been found out that, the prices of fattening feed and the variables of red meat exportation are not explanatory in red meat production.

Keywords: red meat; agricultural policies; Turkey

Introduction

While the World population was 5.6 billion in 1994, it increased 34% until 2017 and became 7.5 billion. During this same period, the percentage of agricultural population in total population decreased 10.38% and dropped from 55.5% to 45.12% (World Bank, 2018). While the share of agricultural sector in GDP was 8.8% in 1994, it decreased to 3.5% in 2016. While the total agricultural production value was 1.425 trillion dollars in 1994, it increased 283% and reached to 4.029 trillion dollars. While the agricultural production index (2004-2006 =100) was 76.75 in 1994. It increased up to 127.81 in 2016 and phytonutrient index increased from 75.24 to 131.2 and animal products index increased from 79.65 to 120.42 (FAO, 2018a).

While the total meat production was 199.79 million tons in the World in 1994, in 2017, it increased by 67% and reached to 334.21 tons. 27% of the total meat production was poultry, 73% was red meat in 1994, yet in 2017, the percentage of poultry increased up to 37% and red meat decreased to 63% (FAO, 2018b).

In Turkey, the total agricultural production value which was 29.953 billion dollars in 1994 was 77.368 billion dollars in 2016. The agricultural production index in Turkey (2004-2006=100) was 82.15 in 1994 and increased to 129 in 2016. During the same period, the plant production index increased

from 80.05 to 118.7 and animal production index increased from 89.27 to 163.93 (FAO, 2018c).

While the total meat production in Turkey was 1.189 million tons in 1994, it increased by 201% and became 3.584 million tons. While 59% of the total meat production in 1994 was red meat, 41% of it was poultry. In 2017, poultry increased up to 61% and the rate of red meat decreased to 39% (FAO, 2018b). As in the world, while the rate of red meat decreases, poultry keeps increasing.

69.70 % of the red meat produced in Turkey in 1994 was beef, 27.10% of it was mutton and 3.20% of it was goat's meat. In 2017, 87.63% of the red meat produced in Turkey was beef, 8.90% of it was mutton and 3.42% of it was goat's meat (TURKSTAT, 2018a, 2018b). In 1994 in Turkey, there were 12 million cattle, but in 2017, it increased by about 32% and reached 16 million (TURKSTAT, 2018b). However, when the fact that the number of cattle were 15 million in 1984, is taken into consideration, it is obvious that we could be able to reach the same level in 2017. On the other hand, the number of small cattle was about 46 million and it decreased by 4% and dropped down to 44 million in 2017. When it is considered that the number of small cattle was 67 million in 1983, it is possible to say that there was a dramatic decrease. Especially after 1983, the fact that importation is considered as an important alternative for compensating the insufficiency in animal production had a negative effect on animal production in Turkey (Ovali, 2002). This effect was felt more on especially small cattle production.

Although the contribution of agricultural sector to the economic development changes every year, it constantly and increasingly meets the nutritional requirements of people. There is a positive relationship between especially the amount of consumption of animal products like meat and milk per capita and the development levels of countries. However, in most of the countries in the world, it is known that the consumption of these products is insufficient. Information on the meat consumption per capita in Turkey and in the World is as in Table 1.

As in Table 1, the meat consumption per capita in the world is 34.3 kg, 59% of which is red meat while 41% of which is white meat. While meat consumption per capita is 69 kg in EU and OECD countries, it is under world average with 32 kg. On the other hand, about 55% of the meat consumed per capita in Turkey is white meat, while 45% of it is red meat. If it is considered that, yearly red meat consumption per capita needs to be 33 kg in a balanced diet, it is obvious that red meat consumption in Turkey is very insufficient (Kavakoglu & Okur, 2014).

Table 1. Red meat consumption per capita, 2017, kg

Country	Beef	Pork	Sheep	Poultry	Total
World	6.4	12.2	1.7	14.0	34.3
Turkey	10.4	0.1	4.2	17.7	32.4
EU (28)	10.9	32.1	1.8	24.2	69.0
OECD	14.5	23.2	1.4	30.2	69.3

Source: OECD Agriculture Statistics, 2018

The yearly progress of real prices of red meat (producer prices) and fattening feed in 1994-2017 are as in Figure 1. Based on real prices, both fattening feed prices and red meat prices decreased during the period of 1994-2017. While considerable instability was encountered in red meat prices, fattening feed prices showed a more stationary progress. Red meat prices decreased 18% and fattening prices decreased 43% in 2017 when compared to 1994.

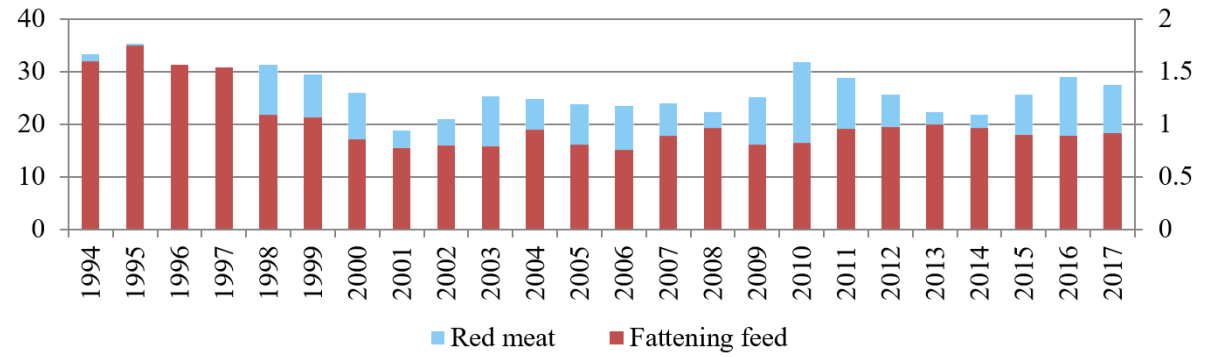

Fig. 1. The progress of red meat and fattening feed prices between the years of 1994-2017 in Turkey (fixed Prices*)
***When 2017 prices are taken as a basis, based on CPI and PPI indexes, the current prices have been turned into fixed prices by us**

Source: TURKSTAT (2018c), FAO (2018d), Republic of Turkey Ministry of Agriculture and Forestry (2018), Feed Manufacturers Association of Turkey (2018)

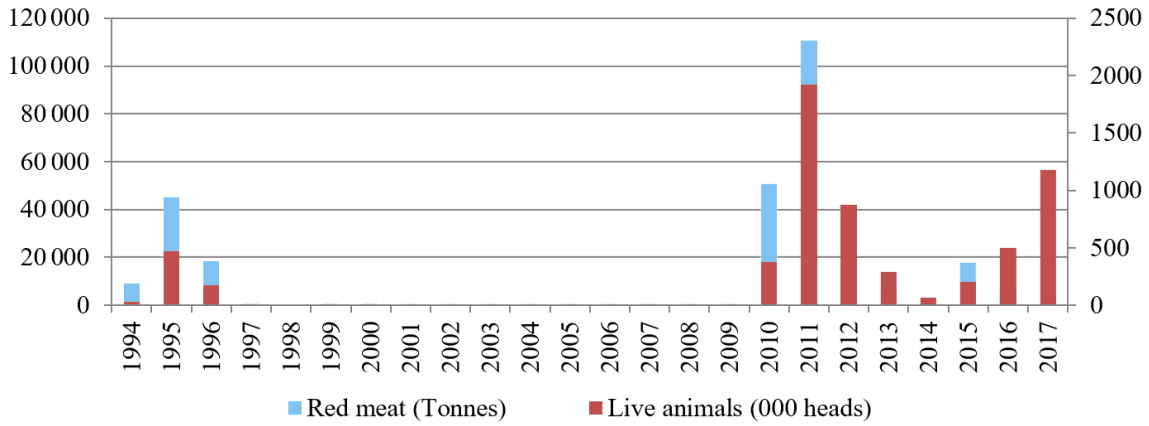

Fig. 2. Turkey's livestock (000 heads) and red meat importation (tones) 1994-2017
Source: FAO (2018c), TURKSTAT (2018d)

In Turkey, with the regulations that have been made on customs duties especially since 2010, instead of breading animals, the importation of stocker and butchery animals and red meat has been increased rapidly in order to prevent the increase in the prices which result from the insufficient national production. However, these policies that have been carried out for years have not been a solution for meat production in Turkey but they have only provided temporary relief. The shift in livestock and red meat importation in 1994-2017 in Turkey is as in Figure 2.

As shown in Figure 2, following the increase in 1995, both red meat and livestock importation continued with small amounts of breeding animals and red meat in 1997–2009. As of 2010, red meat and livestock importation increased dramatically. Some reasons like the agricultural policies that have been carried out in agricultural sector since the past, that the institutions which support and interfere in agricultural sector have been privatized rapidly, livestock industry has been excluded from supported sectors, caused the most extensive livestock and meat importation between 2011-2012. Most of the animals that were imported during those years were butchery animals.

Until the mid-1980s, livestock industry had been protected by the application of high customs tariffs in Turkey. However, in the following years, especially the excessive exportation of small cattle caused imbalances in the country. This made the importation of vast amounts of red meat and livestock inevitable. On the other hand, a number of responsibilities that came with the Customs Union agreement signed with EU caused an increase in meat importation.

Red meat importation in Turkey showed fluctuations during that period and following the dramatic increase during the 2007-2009 period, it decreased and reached its minimum level in 2017. While Turkey was exporting vast amounts of livestock in 1980s, after 1994, livestock exportation decreased rapidly (Figure 3).

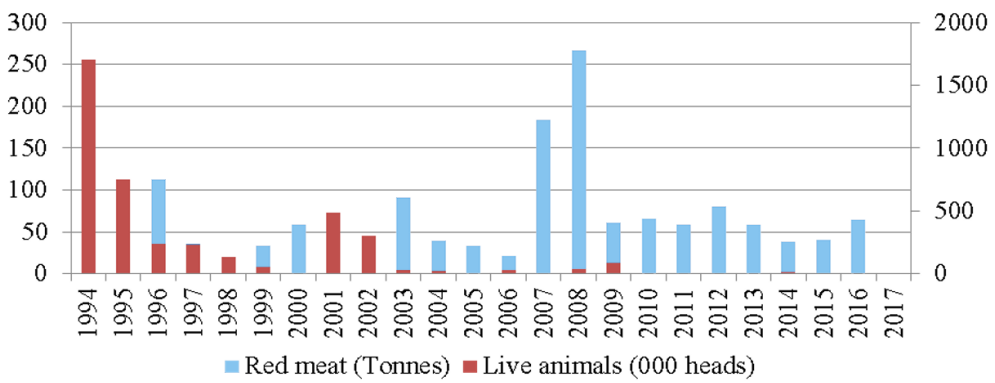

Fig. 3. Turkey's red meat (tonnes) and livestock (000 heads) exportation 1994-2017
Source: FAO (2018c), TURKSTAT (2018d)

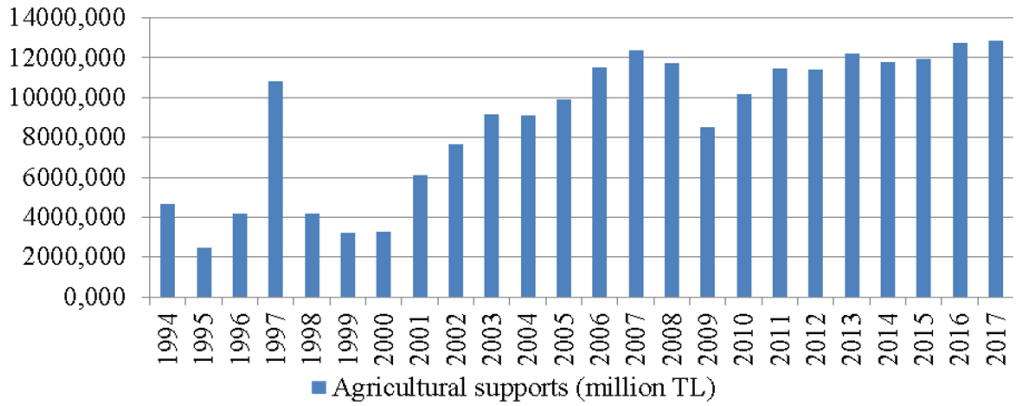

Fig. 4. Real support given to agricultural sector million TL (fixed prices*)
***The current prices has been turned into fixed prices by making use of CPI and PPI indexes and considering the agricultural support in 2017**

Source: Republic of Turkey Ministry of Treasury and Finance (2007), (2010), (2018)

In order to ensure the sustainability in agricultural production, to ensure that producers earn a consistent and sufficient income, to raise the productivity in agriculture; the agricultural industry is being supported in different ways (Tuncer & Gunay, 2017). The real progress of support given to agricultural industry in 1994-2017 is as Figure 4.

The agricultural supports which were 4.7 billion TL in 1994 in Turkey increased by 172% in 2017 and increased up to 12.8 billion TL. The share of agricultural supports in GDP in 2006 was 0.6% and it became 0.4% in 2016 (Republic of Turkey Ministry of Treasury and Finance, 2018). According to the data from OECD (2017), while the producer support (PSE) was the 27.30% of the gross farm income (6 048 million Euro), in 2017, it was 27.89 (15 538 million Euro). During the same period, the average of EU countries was 35.68% (89 426 million Euro) and became 20.99 (90 189 million Euro) (OECD, 2017).

In this research, it has been aimed to determine the factors that affected the red meat production during the period of 1994-2017 and the information that has been gathered will be helpful in generating agricultural policies. With this aim, the statistical data on some factors that are considered to be effective on red meat production have been analyzed with an analytical approach.

Materials, Data Set and Method

The materials of the research are the current red meat prices (TL/kg) (TURKSAT, 2018c), (FAO, 2018d), amount of red meat production (Tons) (TURKSAT,2018b), importation and exportation amounts of red meat (kg), livestock importation and exportation (heads) (FAO, 2018c), (TURKSAT, 2018d), fattening feed price (TL/kg) (Republic of Turkey Ministry of Agriculture and Forestry, 2018), (Feed Manufacturers Association of Turkey, 2018), current agricultural supports (million TL), (Republic of Turkey Ministry of Treasury and Finance, 2007, 2010, 2018), consumer price index (CPI), (TURKSTAT, 2018e) and producer price index (PPI), (TURKSAT, 2018f), between 1994-2017.

In the research the following variables, which are considered to be effective on red meat production in Turkey, have been used.

RMP: Red meat production (Ton)
FFP: Fixed feed price (TL/kg)
FRMP: Fixed red meat price (TL/kg)
LAE: Livestock export (000 heads)
LAI: Livestock imports (000 heads)
AS: Agricultural Supports (Million TL)
RMI: Red meat imports (Tons)
RME: Red meat export (Tons)

Among the variables, the red meat prices, fattening feed prices in TL and current prices have been turned into fixed prices by using yearly PPI and CPI indexes in order to clear the effect of inflation on agricultural supports (Table 2). Therefore, based on 2017 average values, the effect of inflation on current prices has been cleared.

Method

The effects of the variables, which have been held in the research, on the amounts of meat production, have been analyzed through Least Squares Method. Taking into consideration that there might be spurious regression in the regression that will be generated by using time series (Baltagi, 2003), the variables have been put to stability test. Because, among

Table 2. Current and fixed prices of red meat, fattening feed and agricultural supports (1994-2017)

Years	Current values			Index		Deflator		Fixed values		
	Red meat price TL/kg	Fattening feed price TL/kg	Agricultural supports million TL	PPI	CPI	PPI	CPI	Red meat price TL/kg	Feeding price TL/kg	Agricultural-supports million TL
1994	0.15	0.00	17.00	0.77	1.19	224.29	273.37	33.31	1.60	4647.35
1995	0.30	0.01	17.00	1.46	2.26	118.29	144.56	35.23	1.75	2457.44
1996	0.37	0.01	52.00	2.60	4.07	66.42	80.15	24.78	1.57	4167.94
1997	0.66	0.02	251.00	4.70	7.56	36.75	43.16	24.23	1.54	10831.83
1998	1.48	0.04	180.00	8.20	13.96	21.06	23.37	31.22	1.09	4206.99
1999	2.13	0.05	226.00	12.50	23.02	13.82	14.18	29.48	1.06	3203.86
2000	2.84	0.09	359.00	18.90	35.66	9.14	9.15	25.98	0.85	3285.22
2001	3.33	0.13	1033.00	30.50	55.06	5.66	5.93	18.84	0.74	6122.41
2002	5.57	0.19	1868.00	45.80	79.81	3.77	4.09	21.01	0.73	7637.27
2003	8.42	0.24	2805.00	57.60	100.00	3.00	3.26	25.24	0.73	9152.84
2004	9.17	0.32	3084.00	63.90	110.58	2.70	2.95	24.78	0.86	9100.06
2005	9.56	0.30	3707.00	69.20	121.80	2.50	2.68	23.86	0.75	9931.47
2006	10.29	0.31	4747.00	76.00	134.60	2.27	2.42	23.39	0.71	11508.13
2007	11.16	0.40	5555.00	80.80	146.38	2.14	2.23	23.86	0.86	12382.71
2008	11.72	0.48	5809.00	91.00	161.67	1.90	2.02	22.24	0.91	11724.65
2009	13.41	0.43	4495.00	92.20	171.78	1.87	1.90	25.12	0.80	8538.58
2010	18.41	0.47	5817.00	100.00	186.49	1.73	1.75	31.80	0.81	10177.93
2011	18.54	0.58	6961.00	111.10	198.56	1.55	1.64	28.83	0.90	11439.24
2012	17.51	0.65	7553.00	117.90	216.22	1.47	1.51	25.65	0.95	11398.58
2013	15.83	0.71	8684.00	123.10	232.42	1.40	1.40	22.21	0.99	12191.88
2014	17.10	0.74	9148.00	135.80	253.00	1.27	1.29	21.75	0.95	11798.59
2015	21.14	0.75	9971.00	142.90	272.41	1.21	1.20	25.55	0.90	11943.86
2016	25.03	0.80	11489.00	149.10	293.59	1.16	1.11	29.00	0.92	12769.37
2017	27.44	0.91	12838.00	172.70	326.31	1.00	1.00	27.44	0.91	12838.00

the variables, only the fact that R^2 is higher than Durbin-Watson (DW) statistics is not enough to doubt that the regression is spurious (Granger & Newbold, 1974). To stabilize the series, Augmented Dickey-Fuller (ADF) unit root test has been employed. Augmented Dickey-Fuller test is suitable to use if the sequential unit has a root and this situation can be cleared through difference method (Uysal & Sat, 2015). ADF unit root test has been applied for each variable separately. According to the results, the series which are non-stationary level value have been determined and by taking the first difference of these series, they have been stabilized.

Following the stabilization of the series, EKK method and multilinear regression analysis model have been applied to measure the effect of independent variables which are considered to be effective on meat production. This analysis model is one of the statistical methods that are used for revealing the cause and effect relations of matters like social, economical, production and fertility, which change according to many different factors (Ozturk, 2014).

Multilinear regression model can be written as,

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_p X_{ip} + i\varepsilon$$

$i = 1, 2, \ldots, n$ for p number of explanatory variables and n number of observations (Kutner et al., 2005; Weisberg, 2005). In order to be able to use the regression equation, which is derived from regression analysis, with the aim of estimation; some conjectures like the error terms should show aleatoric normal distribution, the average expected value of errors should be 0 and the variance should be homogenous and equal to σ^2, errors should be independent, there should not be any correlation between error terms and explanatory variables need to be provided (Alma & Vupa, 2008).

In this research, Stepwise Regression Method has been applied. This model has been used in various scientific researches (Senol & Saygi, 2001), (Celik & Bayramoglu, 2007).

F test has been applied for the coherence of the whole model created. That the estimated values of F and R^2 are

found to be coherent and that they are consistent with the theory show that model is good. However, in the research, the existence of multiple correlation in order to analyze the existence of some econometric problems, has been analyzed through Variance Inflation Factors (VIF) and the existence of autocorrelation has been analyzed through DW statistics.

$VIF_k = 1/(1 - R_k^2)$, R_k^2 represents here, the square of multiple correlation coefficient between k independent variable and other independent variables. If VIF ≥ 10, there is a multiple correlation (Webster, 1995), (Tabachnick & Fidell, 2006), (Birkes & Dodge, 1993), (Lin, 2008), (Salkin & Rasmussen, 2007). On the other hand, Emec (2018), and Bayramoglu, (2010) have stated that if VIF values are higher than 5, multicollinearity is significant, but if it is lower than 5, it is insignificant. The VIF values for all the variables that are dealt with in the research have been found out to be lower than 5.

The existence of autocorrelation in the research has been tested through Durbin – Watson Test. Durbin – Watson d statistics is being calculated with the following formula (Akkaya & Pazarlioglu, 1995).

$$d = \frac{\sum(e_t - e_{t-1})^2}{\sum e_t^2}.$$

Findings and Discussion

The results of ADF unit root test applied for the testing of stability in the level values of the variables that is dealt with in the research are as in Table 3. When the ADF unit root test results on level values of variables are analyzed, it has been observed that, in the variables of fattening feed prices, red meat prices, livestock exportation and red meat exportation, null hypothesis is rejected ($p = 0.0152 \leq 0.05$, $p = 0.0003 \leq 0.05$, $p = 0.0000 \leq 0.05$, $p = 0.0271 \leq 0.05$) with 1%, 5% and 10% error margin (H_0: Series is not stationary, H_1: Series is stationary). Therefore, the series of these variables are stationary in their level values. However, in red meat production, livestock importation, agricultural supports and red meat importation variables, it has been found out that null hypothesis is not rejected with 1%, 5% and 10% error margin ($p = 0.9471 \geq 0.05$, $p = 0.1871 \geq 0.05$. $p = 0.4058 \geq 0.05$, $p = 0.0648 \geq 0.05$).

Thus, by taking the first level differences of the related series, ADF test has been applied again and the results are as in Table 4.

When the results of ADF unit root test of the first differences of series which are not stationary in their level values, they became stationary as shown in Table 4. The probability values are lower than 0.05 for all the variables ($p \leq 0.05$). In addition to that, in all the series, that the t Statistical values are higher than the test critique values of all the three meaning levels, show that the related series are stationary in their first differences. Following the stabilization of series, multilinear regression analysis and variance analysis have been done and the results are as in Table 5.

When the given variance analysis results have been analyzed, it has been observed that the regression equation is

Table 3. The results of ADF Unit Root Test of level values of series

		ADF test statistic 1%	Test critical value		
			5%	10%	
RMP	t-statistic	-0.0216	-3.75295	-2.99806	-2.63875
	probability	0.9471			
FFP	t-statistic	-3.577	-3.769957	-3.004861	-2.642242
	probability	0.01520**			
FRMP	t-statistic	-5.3301	-3.769957	-3.004861	-2.642242
	probability	0.0003*			
LAE	t-statistic	-9.5043	-3.75295	-2.99806	-2.63875
	probability	0.0000*			
LAI	t-statistic	-2.277	-3.75295	-2.99806	-2.63875
	probability	0.1871			
AS	t-statistic	-1.7255	-3.75295	-2.99806	-2.63875
	probability	0.4058			
RMI	t-statistic	-2.867	-3.75295	-2.99806	-2.63875
	probability	0.0648			
RME	t-statistic	-3.2955	-3.75295	-2.99806	-2.63875
	probability	0.0271**			

The Probability Values are MacKinnon (1996) one way p-values

* It is meaningful at the level of 0.01, ** It is meaningful at the level of 0.05

Table 4. The ADF Test results of first differences of the series

		ADF test statistic 1%	Test critical value		
			5%	10%	
ΔRMP	t-statistic	-5.400077	-3.7696	-3.0049	-2.6422
	probability	0.0003*			
ΔLAI	t-statistic	-4.530162	-3.7696	-3.0049	-2.6422
	probability	0.0018*			
ΔAS	t-statistic	-5.675817	-3.7696	-3.0049	-2.6422
	probability	0.0001*			
ΔRMI	t-statistic	-4.982237	-3.7696	-3.0049	-2.6422
	probability	0.0007*			

The Probability values are MacKinnon (1996) one way p-values
* It is meaningful at the level of 0.01

Table 5. Results of red meat production model analysis

Variable	Cofficient	Standard error	t-value	p-value	VIF value
Constant	-386194	152363	-2.53	0.023	
ΔRMI	-2.622	1.183	-2.22	0.043	3.829
ΔAS	255.45	8.416	-3.04	0.008	1.483
ΔLAI	-223.79	69.05	-3.24	0.005	3.788
FRMP	19719	7074	2.79	0.014	2.653
FFP	-68242	99832	-0.68	0.505	2.546
RME	-22.8	307.6	-0.07	0.942	1.156
LAE	-194.6	121.5	-1.6	0.13	1.895
F Value: 3.18					
F Probability value: 0.028					
DW: 2.3405					

meaningful for all the series (0.028 < 0.05) and there is no multicollinearity as VIF values are lower than 5 for each variable separately. However, Durbin – Watson statistic shows that there is autocorrelation in the series. When the probability values have been analyzed for each variable separately, FFP (0.505 > 0.05), RME (0.942 > 0.05) and LAE (0.130 > 0.05) variables have been found out to be meaningless.

In the research, to find out which variables are going to be included into the model and which ones are going to be excluded and to determine the strongest model in defining the functional relationship, stepwise method has been applied by using Minitab package and the six models that have come out are as in Table 6.

While deciding on a good model, the model is put to three tests. These tests are financial, statistical and econometric tests (Celik & Bayramoglu, 2007). The financial test includes the meaningfulness of the coefficients of the model. Statistical test analyze the R^2, t statistic and F statistic and probability value of the model. Econometric statistic includes the analysis of autocorrelation and multiple correlation of the model.

When those six models have been analyzed, the coefficients and signs of the variables have been found out to be consistent with the expectations. When the models have been analyzed from the aspect of statistical test, the highest R^2 value (74.76) has been found out to be in the sixth model. However, in this model, as the probability values of LAE and FFP variables (p = 0.111 and p = 0.465) are higher than 0.05, the H_0 hypothesis for these variables cannot be rejected. When the model 5, which has the second highest R^2 value, has been analyzed, it has been observed that the probability values for all the variables are lower than 0,05, the VIF values of each variable are lower than 5 and the Mallows Cp value is the lowest and thus it has been decided to be the suitable model. The criteria of Mallow are the suitable criteria that are used in the selection of variable or model (Cetin & Erar, 2000). While comparing the models, the model that gives the lowest Cp value is to be selected (Gujarati, 2003). On the other hand, it has been determined that there is autocorrelation in the model (DW statistics 2.37).

The selected model in the research is as follows.

$$\Delta \text{ RMP} = -380782 - 246 \text{ LAE} + 23.6 \Delta\text{AS} + \\ + 17055 \text{ FRMP} - 220 \Delta\text{LAI} - 279 \Delta \text{ RMI}$$

From the variables that are dealt with in the model, fattening feed and red meat exportation have been found out to have no effect on red meat production in Turkey. The fact that coefficients of LAE, ΔLAI and ΔRMI variables are negative and the coefficients of Δ AS and FRMP are positive has been consistent with the expectations. According to these results, every thousand increase in livestock exportation, decreases red meat production by 246 tons. According to this result, the livestock exportation does not encourage red meat production, on the contrast, as a result of a decrease in the number of animals; it decreases the red meat production in Turkey. Although Turkey has enough potential for animal industry, because of the reasons like the irrational structure in the businesses and the present agricultural policies, it could not protect its potential (especially in small cattle). As the increase in the livestock exportation has not resulted as an encouragement that will raise the number of animals in the country, the domestic red meat production has decreased. On one hand, the illegal and uncontrolled red meat importation and on the other hand, the illegal livestock exportation to the neighbor countries (Altuntas, 2010) has also caused these results.

The agricultural supports are among the most important tools that provide the sustainability of the agricultural industry, the rise in the wages of the workers, the production and the fertility. Therefore, between agricultural supports and agricultural production, there is a positive relationship. Among the sum of support given to agricultural industry in Turkey, while the share of the support given to animal industry was 31.11% in 2013, it decreased down to 28.59% in 2014, 27.02% in 2015 and 25.87% in 2016 (South Aegean Development Agency, 2016). During the same period, the fact that the animal production value decreased (Karaman, 2018), verifies this relationship between the agricultural supports and production.

In the research, there is a positive relationship between the support given to agricultural industry and red meat production and a million TL rise in the support given to agricultural industry means a 23,6 tons of increase in red meat production. However, it is debatable if the support encourages

Table 6. Alternative Models in Red Meat Production

Model		Cofficient	t- value	p-value	R^2	Mallows cp	VIF value
1	Constant	45210	1.89	0.072	23.44	15.1	
	LAE	-157	-1.39	0.179			1
2	Constant	41720	1.75	0.095	29.73	14.8	
	LAE	-159	-1.43	0.168			1
	ΔAS	10.6	1.21	0.239			1
3	Constant	-264012	-1.79	0.090	45.71	10.8	
	LAE	-197	-1.89	0.075			1.031
	ΔAS	18.8	2.10	0.050			1.238
	FRMP	11929	2.09	0.050			1.265
4	Constant	-398616	-2.57	0.019	57.43	8.5	
	LAE	-204	-2.08	0.052			1.033
	ΔAS	22.2	2.58	0.019			1.292
	FRMP	17308	2.87	0.010			1.616
	ΔLAI	-84	-1.91	0.072			1.281
5	Constant	-380782	-2.80	0.012	73.36	4.5	
	LAE	-246	-2.82	0.012			1.071
	ΔAS	23.6	3.13	0.006			1.299
	FRMP	17055	3.23	0.005			1.617
	ΔLAI	-220	-3.35	0.004			3.754
	ΔRMI	-280	-2.55	0.021			3.591
6	Constant	-390123	-2.82	0.012	74.76	6	
	LAE	-192	-1.69	0.111			1.780
	ΔAS	25.6	3.17	0.006			1.462
	FRMP	19874	3.04	0.008			2.42
	ΔLAI	-223	-3.35	0.004			3.773
	ΔRMI	-260	-2.30	0.035			2.391
	FFP	-70064	-0.75	0.465			3.764

enough red meat production or not. Because, if a cost benefit analysis is done here, the result shows that the support does not increase the red meat production enough. Therefore, it is important to be questioned how they are taking advantage of that support. In a research carried out in the level I regions of Turkey, it has been found out that they have been benefitting less from the support in the regions where animal industry is dense (Karaman, 2018). Therefore, the support policies need to be reviewed by taking the regional differences into consideration (Yavuz et al., 2009).

In the Survey Report of Turkish Court of Accounts on Ministry of Agriculture and Forestry in 2017 (Turkish Court of Accounts, 2018), it has been stated that, "Regarding the allowances that have been included in the budget of the institution to realize the final aim of the agricultural policies in Turkey, the effect analysis like, to what extend the economic and social effectiveness and the fertility conditions of agricultural supports, which are given from public resources, is provided and to what extend it effects and serves for the economics of the country and its aims of agricultural policies, the evaluation of the satisfaction of the farmers from the supports, found out not to be reported". This statement openly shows that there are deficiencies in the evaluation of effectiveness of agricultural support in Turkey.

According to law of supply, between the price of a product and its supply, there is a positive relationship. In a research that analyzes the relationship of the production of tomato, which is an agricultural product, and its price, while in the current year, a unit of increase in tomato prices, increases the production by 1149 tons, while a unit of increase in the previous years increased the tomato production by 1089 tons (Erdal, 2006). In a research that analyzes the relationship between wheat production and its price, it has been determined that a 1% increase in average wheat prices, increases wheat production by 0.009% (Ozcelik & Ozer, 2006). In the researches, it has been found out that there is a positive relationship between red meat production and red meat price, in accordance with law of supply and research done on this subject. In real terms, 1 TL of increase in red meat prices, increases red meat production by 17055 tons.

In the researches, a negative relationship between red meat production, livestock exportation and red meat importation has been detected. According to that, 1000 increase in the number of imported livestock, increases red meat production by 220 tons and 1000 tons of increase in red meat importation, decreases the domestic red meat production by 279 tons. In Turkey, livestock and red meat importation increases the meat production in the market at first, as a result of the concern that the prices will drop. However, this concern might encourage the producers to withdraw from this field and decrease the red meat production in the long run

It has been found out that there is no relationship among the total meat production and the total meat exportation and the real fattening feed prices in Turkey. It is possible to say that, as the meat exportation was not at a significant level between the period of 1994-2017 and that the change remained at very low levels, have been effective on the come out of such a result. However, as there could not be found a relationship between fattening feed and meat production or that it is insignificant, might be considered as an interesting result. Because, it is known that fattening feed generates 60-70% of the total cost in animal industry. According to the research carried out by Yalcinkaya (2017), the biggest risk for the producers has been defined as drought, while the second biggest risk is fattening feed costs. In the research carried out by Oztornaci (2013), it was found out that the decrease in the amount of fattening feed that can be bought in return to 1 liter of milk, affected the red meat production negatively and the coefficient of the parity of milk-fattening feed prices variable was found out as -0.062.

Conclusion

Turkey, with its geographical features, climatic conditions, various types of animals and agricultural population, has a significant potential in general in agriculture and in particular in animal industry. In addition to several functions it undertakes to provide rural development, as the possibility to create added value is high, animal industry has an important place.

When the companies in animal industry are analyzed structurally, 56.11% of the companies have 1-5 animals. The rate of companies that have 1-49 animals is 98.38% and only 1.62% of them have 50 or more animals. On the other hand, the number of native cattle is decreasing and the decrease in the number of small cattle is more remarkable. It is obvious from the data of Turkish Statistical Institute that the pasture areas, which are very important in the development of animal industry, are getting narrower every year. The most important reasons for this are the plant infertility because of drought and the fact that agricultural areas are being opened to settlement.

The red meat consumption per person in Turkey (when pork meat is also included) is less than the world average. The increase of prices as a result of the imbalance between supply and demand, create this kind of result. The producer who is at the beginning of the marketing of red meat industry and the consumer who is at the end of the process are not satisfied with the red meat prices. The producers complain about the prices they earn are low while the consum-

ers complain about the prices they pay are high. Although the current prices the consumers pay for red meat increased dramatically, the prices the producers gain decreased in real terms by 17.61% from 1994 to 2017. In the research it has been revealed that the increase in the producer prices increased the meat production. Therefore, reflecting the increase in the consumer prices to producers, it is possible to increase the red meat production in Turkey. For the solution of the current problems of animal industry in Turkey, it is necessary to make more long term plans and instead of taking precautions only for animal industry, it needs to be dealt with an extensive approach from production to retail market. Therefore, while an increase is provided in red meat production, the constantly rising consumer prices will also be avoided.

The increase in red meat prices has been tried to be reduced with livestock and red meat importation since 2010 in Turkey. However, although this policy had been positively effective in short term, it has not been a sustainable and permanent solution. On one hand, the increasing production costs, on the other hand, the repression of red meat prices, have affected the decisions of producers negatively and lead them to decrease their investments and meat production. In the research, a negative relationship has been found between the red meat production and red meat exportation and livestock importation.

In Turkey, animal industry is identified with cattle. However, Turkey has an important potential in small cattle industry. On the other hand, the number of small cattle is decreasing in years. When it is analyzed both from the aspect of support and from the aspect of animal breeding efforts, it is possible to say that the small cattle industry is underdeveloped. The improvements that will be made on these matters will increase the red meat supply.

When agricultural supports in Turkey are analyzed in real terms, it increased by 2.5 times during the 1994-2017 period. In the research, it has been found out that the governmental support increases the red meat production. However, in many researches and in the reports of Court of Account, it is stated that the agricultural support has no effect. Despite the governmental support, the fact that the red meat production does not increase, show that the supports do not reach the right people, therefore, these agricultural support policies need to be localized by taking the regional differences into consideration. On the other hand, it is important to realize policies that will ensure that the small companies can benefit from the supports and that will support the rural life as well.

It is not possible to provide the animal companies to function more rationally only with capital support. In addition to that, the necessary information support should also be provided. The information support that will be provided in animal industry and the financial support and incentive that will ensure that young generations, who are open to being innovative, will stay in the industry and will provide an important contribution in the increase of production. The financial support and the incentive that will be provided should be extended not only for animal industry but also to include the companies that produce their own fattening feed.

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