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Full Length Research Paper

An analysis on factors effective in benefiting from forage crops support

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This study aims to determine what factors are effective for farmers to benefit from forage crop support which is very important for animal growers. In order to determine factors that affect utilization of government support as well as to make regional comparisons in terms of benefit levels of these supports in Northwest of Turkey where meat and milk productivity is the highest and Northeast of Turkey where number of animals is the highest. The number of the survey conducted in the provinces was determined to be 540 based on random sampling method. The regression analysis was performed in the LIMDEP package program with Univariate (binomial) probit model. According to the results of the study, the farmers in the Northeast intend to benefit more from this support than those of Northwest. Increasing the forage crops support in the Northeast, in which especially the animal husbandry and forage crops cultivation have comparative advantages. Therefore, when implementing this policy, it is very important to consider these regional differences in order to meet the goals of the support policies efficiently.

Key words: Forage crops support, regional comparison, Probit model, Turkey.

INTRODUCTION

The shortage forage crop in Turkey 60% according to the present number of animals However, the share of the cultivation areas of forage crops, which are the main sources of forage, is 8% in the total farm lands. On the other hand, in countries where the animal husbandry industry is well developed, this rate varies between 25 and 30%. Therefore, in order to meet forage deficit, it is necessary that the share of land allocated to forage crops needs to be increased (Yolcu and Tan, 2008). Because of this fact, government has been supporting forage crops cultivation since 2000. It is thought that the support program of forage crops cultivation, which has been conducted in accordance with the decision to support the animal husbandry, has an important contribution to the increase in the production of forage crops especially in recent years (Akman et al., 2007, Demir and Yavuz, 2007). The supported forage crops cultivations were determined to be alfalfa, sainfoin, vetch, Hungarian vetch, silage corn, and artificial grassland-grazing land. The support amounts to be granted the producers who plant forage crops per decare in order to produce high quality forage were determined to be 115 TL/decare for alfalfa (irrigated), 70 TL/decare for alfalfa(dry), 75TL/decare for sainfoin, 75 TL/decare for artificial grassland-grazing land, 30TL/decare for one-year, 45 TL/decare for one-year silage forage crops, 45 TL/decare for silage corn(wet), 30 TL/decare for silage corn (dry) (OG, 2008). This support remained the same in 2009 (OG, 2009).

With the support policies applied in forage crops, significant increases have occurred in forage crops cultivation areas and production of hay and seed in the country. As a matter of fact, Turkey's forage crops cultivation area which was 3 583 000 decare in 2000, increased to 15 856 812 decare in 2008 with these supports (TSI, 2009). The forage crops support, which was 39 million TL in 2002, was increased to 676 million TL in 2008 and an increase about 17 times was provided (Demir, 2009). When the economic advantage of "the Decision on Supporting the Animal Husbandry" is examined, it can be easily understood how much effective the incentives have been. The total supports reached to 117.2 million TL in 2000-2003. On the contrary, the return of grass produced in the supported area as grass value reaches 798.4 million TL and with a conversion to meat and milk it reaches 3.1 trillion TL. As it is clearly seen from these figures, while the incentives create 6-7 times

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value as grass value, they create 23-30 times value on the basis of animal production (Açikgöz et al., 2005).

Determining which factors affect the farmers more in benefiting from the support is very important in terms of finding out if these supports are reaching their purpose. Besides this, it is also necessary to determine regional differentiated impact of forage crop supports, which are applied in the same way for each region, in terms of putting objectives of production planning forward with respect to regions. The study aims to determine the factors which are effective in farmers' benefiting from forage crops support by taking regional differences into consideration. Within this framework, the Northwest, which has the highest milk productivity as 3530 kg/head and meat productivity as 220 kg/head and in which the animal husbandry is performed by using the more advanced technology, and the Northeast, in which the animal stock is 1649 thousand heads, which constitutes approximately 15.5% of the cattle stocks of Turkey and in which the animal husbandry is performed with conventional methods, were included in the area of study (Demir, 2009).

MATERIAL AND METHOD

Material

In order to make a regional comparison, the main material of the study was obtained with a survey study conducted in the Northwest, in which meat and milk productivity is higher, in other words cattle growing is being performed better, and the Northeast, in which there is more intensive animal existence but the animal husbandry is not developed as well as in Northwest. In addition, published materials were obtained from the Ministry of Agriculture and Rural Affairs, Turkish Statistical Institute (TSI), related studies on the subject, related laws and regulations, and related web pages. The data obtained were used in the univariate (binomial) Probit model analysis.

Method

When the provinces of the regions constituting the study area are analyzed, it is seen that there are 5 provinces in the Northwest (Balikesir, Çanakkale, Edirne, Kirklareli and Tekirdağ), whereas there are 7 provinces in the Northeast (Erzincan, Bayburt, Erzurum, Ardahan, Kars, Ağri and Iğdir). While selecting the provinces in which the survey was conducted, the idea was to represent the region. Within this framework, Balikesir, Çanakkale, Tekirdağ, which are thought to represent the Northeast, and Erzurum, Kars, Ağri and Bayburt, which are thought to represent the Northeast, were selected. The number of the enterprises for which the survey study was conducted was calculated according to the simple random sampling method with the following formula. Since the variability in the animal numbers in livestock enterprises belonging to the cities in the study area is different from each other, the number of the survey conducted in each province was determined individually. Considering the idea that some of the surveys cannot reflect the reality and cannot represent the population, the number of the surveys was increased by 5%. In determining the number of the enterprises for which the survey was conducted, the study was conducted within 5% significance level and 95% confidence interval (Çiçek and Erkan, 1996).

$$n = \frac{N * \sigma^2}{(N-1) * D^2 + \sigma^2}$$

In the formula,

n = Sample size.
N = Number of total unit belonging to sampling framework.
σ^2 = Population variance.
D = d/z value.
d = Acceptable error ($\bar{x}$ .0,05).
z = z value in the Standard Normal Distribution Table according to the rate of acceptable error.

According to the sampling results, total number of the conducted survey in two regions was calculated as 540. The number of the surveys conducted in each city was determined to be 95 in Erzurum, 85 in Ağri, 86 in Kars, 55 in Bayburt, 82 in Balikesir, 74 in Çanakkale, and 63 in Tekirdağ. The data obtained at the end of the survey study were loaded in an EXCEL file within a certain coding and analyses of binomial Probit model and marginal effect belonging to the study were conducted in the LIMDEP package program. It is assumed in the Probit models whether or not an event will happen or that the event is dependent on a benefit index whose decision cannot be observed. If the benefit index is represented by Ii , Ii, is dependent on independent variables such that to the extent of the Ii size, the possibility of occurrence i.e. realization of that event in question increases. Ii, index is expressed as:

$I_i = B_1 + B_2X_i$

In the formula,

B_1= Expresses the constant value.
B_2= Value expresses the coefficient belonging to the variable whose value is expressed with X.
X_i= Expresses the value of the i nth independent variable.
I_i= The relationship between whether or not an event will happen is expressed with 1 if the event happens and with 0 if the event does not happen. For each dependent variable, whether or not an event in question will happen ensues from a certain value of I_i'(critical or initial value). If the initial value is expressed as I_i^*, the event will happen only when the I_i value exceeds I_i^* value, otherwise it will not happen. The possibility of I_i^* less than or equal to I_i can be calculated as follows:

$Pi = Pr (Y = 1) = Pr (Ii^* \leq Ii) = F(Ii)$

In the formula,

Pi= Expresses the possibility that the event will happen.
P_r = Expresses the Probit model.

The R^2 value which expresses the coefficient of determination in the Probit models is not taken into consideration on whether or not the functional form of the model is selected well. Therefore, the coefficients of the variables and the P values are taken into consideration on whether or not the model is selected well (Gujarati, 1995; Akkaya and Pazarlioğlu, 1998).

RESULTS OF THE ANALYSIS

A correlation analysis was conducted to determine the correlation among the variables to have better

Table 1. The correlation coefficients between the variables in the model of forage crops support.

	FODDER	REG	AGE	LEVED	ACTIVITY	TAN
REG	0.519**					
AGE	-0.019	-0.125**				
LEVED	-0.027	0.116**	-0.409**			
ACTIVITY	-0.219**	-0.114**	-0.215**	0.093*		
TAN	0.033	-0.133**	0.166**	0.022	-0.021	
FCPA	0.390**	0.363**	-0.016	0.054	-0.148**	0.137**

Source: Original calculations. ** : P < 0.01, * : P < 0.005, N: 540.
FORAGE: State of the enterprise's benefiting from forage crops support in 2007 (yes:1, no:0) **REG**: regions in which the survey was conducted (the Western Thrace Region:1, the North Eastern Anatolia Region:0), AGE: the producer's age, **LEVED**: level of education (illiterate:1, primary school:2, secondary school:3, high school:4, college:5, faculty:6), **ACTIVITY**: state of having non- agricultural activities (yes:1, no:0) **TAN**: total animal number, **FCPA**: forage crops production quantity.

Table 2. The results of Binomial Probit model estimation of fodder crops support.

Variables	Coefficient	Standard error	P value
Constant term	-0.680	0.453	0.133
Age of the enterprise's owner	-0.011	0.006	0.077
Education level	-0.245	0.087	0.005
State of dealing with non-agricultural activity	-0.468	0.148	0.001
Region	1.292	0.171	0.000
Total animal number	0.038	0.009	0.000
State of forage Crops Production	0.130	0.026	0.000
Error terms consisting of the combination of unobservable factors that can affect the total animal number	-0.060	0.011	0.000

Source: Original calculations.

determination strategy of the model. The results of the analysis are shown in Table 1. As a result of the analysis, the highest but in the negative relationship was determined between age and the producer's level of education (r:-0.409). The highest positive correlation was determined to be between the dependent variable and the region variable (r:0.513), between the dependent variable and the quantity of forage crops production (r:0.390), and between the quantity of forage crops production and the region variable (r:363). No significant correlation was observed among the other variables. The fact that the correlation among the independent variables is not high indicates that there will not be any multi-collinear problems in the data.

The estimates belonging to the model in which the dependent variable is the state of benefiting from forage crops support and in which the model is estimated with the Univariate Probit model are seen in Table 2. When the model was estimated at the beginning, the variable of total animal number was taken as a single variable. However, it was determined that there are many unobservable variables that can affect the total animal number, and this causes the problem of endogeneity. In order to be able to overcome this problem, a variable including the error terms which consist of the combination of unobservable factors that can affect the total animal number was included in the model. While there is a relationship between the state of benefiting from forage crops support and the producer's age, level of education, the state of having non-agricultural activities, and the variable indicating the error terms which consist of the combination of unobservable factors that can affect the total animal number in a negatively, there is a positive relationship between the regions, the total animal number, and the quantity of forage crop production. The signs of the variables in the model came in the desired direction. Having a positive relationship between the state of benefiting from forage crops support and the region variable indicates that the farmers in the Northeast intend to benefit more from this support. Since the forage crops cultivation in the Northeast has a comparative advantage, the farmers in this region tend to benefit more from this support.

Since the old producers do not accept innovations and are not informed much about the supports, the level of these producers' benefiting from forage crops support is low. In addition, since the enterprise owners whose level of education is high generally deal with non-agricultural activities more, these producers' benefiting from forage crops support is also low. When the enterprise owners

Table 3. Marginal effect values belonging to the independent variables of forage crops support.

Variables	Coefficient	Standard error	P value
Constant term	-0.248	0.165	0.133
Age of the enterprise's owner	-0.004	0.002	0.762
Education level	-0.089	0.031	0.004
State of dealing with non-agricultural activity	-0.165	0.049	0.000
Region	0.463	0.053	0.000
Total animal number	0.014	0.003	0.000
State of forage crops production	0.047	0.010	0.000
Error terms consisting of the combination of unobservable factors that can affect the total animal number	-0.022	0.004	0.000

Source: Original calculations.

deal with non-agricultural activities, they will not have time to cultivate forage crops, they will benefit less from this support in this case.

Since having more animals in the enterprise will cause the producer to increase his forage crops cultivation area in order to meet his growing requirement, in this case there will be an increase in the level of the enterprise's benefiting from forage crops support. In addition, increasing the quantity of forage crops production in the enterprise will also increase the level of the producer's benefiting from forage crops support. While the variables except the producer's age among the variables in the model are statistically significant at 1% significance level, the variable of the producer's age is statistically significant at 5% significance level.

The estimates which contain the analyses belonging to the marginal effects of the variables in the model in which the dependent variable is the state of enterprise owners' benefiting from forage crops support in the study are shown in Table 3. According to these results, increasing the independent variables in model 1 unit, it is seen that the possibility of the enterprise's benefiting from forage crops support is increased by the variable of regions at the rate of 46%, decreased by the variable of the producer's age at the rate of 0.4%, decreased by the variable of the level of education at the rate of 8%, decreased by the variable of the state of having nonagricultural activities at the rate of 16%, increased by the variable of total animal number at the rate of 1%, increased by the change in the quantity of forage crop production at the rate of 4%, and decreased by the variable including the error terms which consist of the combination of unobservable factors that can affect the total animal number at the rate of 2%.

Conclusions and Reccomentdations

Depending on the quantity of forage crops cultivation, the amount of the support has also been continuing to increase year by year. The enterprises that have more animals and forage crops cultivation, the farmers who are young, whose level of education is low and who do not deal with non agricultural activities will benefit more from forage crops support. In addition, for the farmers in the Northeast, in which the animal husbandry and forage crops cultivation have comparative advantages, this support is without doubt is much more important than in the Northwest. As a result of the study, it was determined that the farmers in the Northeast intend to benefit more from this support than those of Northwest. The fact that policy makers should produce new policies in such a way considering these regional differences or should make new regulations on existing policies instead of the same amount of the support granted per decare for each region is considered to be very useful in developing the animal husbandry. In addition, forage crops support should continue and educational activities regarding to these supports in the Northeast, which has comparative advantages in animal husbandry.

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