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Analysis of Factors Affecting on Live Weight Gain Cost in Cattle Fattening Farms: The Case of Erzurum Province

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Abstract: Although, cattle fattening have an important role in region economy and is one of the most important component of agricultural activities, region farmers have not still earned a considerable income from cattle fattening so that they are not used the production inputs effectively. This is partly because of farmers' inputs. Because of these reasons, the aim of this study is to determine the factors, which have negative effects on effectiveness, to analyze the efficiency levels of the factors on the cost of kg live weight gain in cattle fattening farms and to derive the implications from these effects. The primary data obtained from 129 cattle fattening farms in Horasan, Oltu, Pasinler Towns, Erzurum Central district and their villages. These villages were chosen by Objective Sampling Method. Cattle fattening farms were chosen by Simple Random Sampling Method according to their cattle stocks. The results show that the estimated parameters were statistically important and comply with economic theory. Lengthy of fattening period, daily live weight gain and increase in farm capacity have a negative effect on production cost. Being effective on providing inputs and having higher capacity minimize the cost of production in cattle fattening farms of research area.

Key words: Cattle fattening, cost function, farm, live weight gain, regression analysis, Turkey

INTRODUCTION

Cattle are considered to have been one of the first animals domesticated by man for agricultural purposes. They were tamed to provide milk, meat and hides and for draft purposes (CT, 2008). Animal husbandry is an important component of modern agriculture. It has been practiced in many societies since, the transition to farming from hunter-gather lifestyles. Modern farming techniques seek to minimize human involvement, increase yield and improve animal health. Economics, quality and consumer safety all play a role in how animals are raised. Cattle today are the basis of a multi-billion dollar industry worldwide. The international trade in beef for 2000 was over $30 billion and represented only 23% of world beef production (Clay, 2004).

The world cattle population is estimated to be about 1.3 billion head. India is the nation with the largest number of cattle, about 400 million, followed by Brazil and China, with about 150 million each and the United States, with about 100 million. Africa has about 200 million head of cattle, many of which are herded in traditional ways and serve partly as tokens of their owner's wealth. Europe has about 130 million head of cattle (SC, 2007). The cattle population in Turkey is about 11 million. The ratios of culture, cross and domestic breeds are 26, 43 and 31%, respectively. Turkey with about 74 million population, of which 27.3% lives in rural areas, has about 3.1 million farms. Seventy percent of the farmers deal with animal husbandry (TUIK, 2008).

Due to high proportion of domestic breeds, small scale subsistence farms and poor animal feeding and shelter conditions, meat and milk production levels in Turkey are quite low as compared to Europe. While, average carcass weight per cow in EU is 279 kg head^{-1} in EU-25, it is 196 kg head^{-1} in Turkey (Report, 2006).

All these statistical data show that the productivity in animal husbandry farms in Turkey is quite low. To improve the productivity and performance of the farms, farmers have to be educated and informed about what breeds to rear and how to feed and care them. Keeping good quality breeds and feeding and caring them properly will improve the success and profitability of farms significantly. The success and sustainability of farms also depend on how well the new generation is. Many researches were carried out to explore the effective factors (such as breed, gender, food, environment etc.) on the growth and weight gain of cattle (Yanar *et al*., 1997; Fiems *et al*., 1998; Topcu, 2003, 2008; Topcu and Demir, 2005; Topcu *et al*., 2008) and to find out the optimum conditions.

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On the other hand, the cattle fattening activity has a bigger important than other agricultural activities to nourish sufficiently and to save necessary capital for the region economy. Cattle fattening is a farm activity that enlarges the employment possibilities, that uses current labor steadily and that provides a more productive research condition. Cattle fattening has an important role to reduce the income distributions inequity and agricultural income disorder by using the agricultural products which are not utilized as raw material for industry and decreasing uncertainty deriving from natural condition and target market (Topcu and Demir, 2005).

The developments in the country economy, increasing importance of international relations and adaptation efforts for competition conditions in global markets have based on economical effectiveness and rational production. On the other hand, cost analyses and accounting data are need to compare with similar farms, to help the farmers' production planning when the number of agricultural activities in farms is much >1 activity, to use the scarce sources effectively, to enlarge employment possibilities and to provide more profitable agribusiness.

Concentrated and rough feed plants areas are 39 and 14% of total feed plants area in Erzurum, respectively (PDAD, 2005). As for labor in the region farms, active and inactive labors are 69 and 55% per farm, respectively (Topcu, 2004). To use feed plants and to benefit from inactive labor are very important for cattle fattening farms. Plant production has been continued for about 6 months due to a long winter season and harsh climate in Erzurum. In this period, cattle fattening supplies liquidate supply to the farm and meets farmers' necessary needs. Cattle fattening are carried out indoor areas without depending on inconvenient weather conditions and cattle are ready for sale at the end.

Cattle fattening farms in the investigation area has occurred scattered and small-scale farms with very bad management organization by using traditional production methods for decade. These conditions cause technique and economic ineffectiveness for the formation of the market prices at the factor and product markets. Under these conditions, the one way decreasing the production cost is to arrange with only certain input-output combinations, so farms' net income could be increased (Topcu, 2004a). The aim of this study, is to analyze the cost factors affecting on kg live weight gain in cattle fattening farms of Erzurum Province.

MATERIALS AND METHODS

The main material of this investigation consisted of data obtained from survey studies which were conducted in cattle fattening farms in Erzurum Center district and Pasinler, Horasan, Oltu towns and their villages. There were 3573 farmers who were engaged in cattle fattening under village conditions and they had between 5-50 heads cattle in Erzurum (Yavuz, 1992). It was reported that these farmers who conduct cattle fattening under village conditions had <50 heads cattle. If the farms had more ones than 50 heads cattle, they would define as the commercial farms (PDAD, 2005; Yavuz, 1992). Therefore, farms with more ones than 50 heads cattle are except for this research.

Firstly, farmers who conduct cattle fattening in Erzurum's Centre district, Pasinler, Horasan, Oltu towns and in their villages were selected according to cattle fattening records of Erzurum Provincial Directorate of Agriculture. On the other hand, the difficulties applying questionnaire to the cattle breeders who make indoors cattle fattening was taken into consideration. Farmers which make cattle fattening in indoor areas consisted of 59% of the population of all farms and 66% of the cattle stocks of the province live in these farms (PDAD, 2005). Because of these reasons, the investigation area had enough qualities to represent farms that do cattle fattening in Erzurum Province.

Objective Sampling Method could constitute the first stage of other sampling methods. In an investigation on the physical input usage levels of some important agricultural products and their cost, firstly villages where these products are very common could be chosen as objective. And then Simple Random Sampling Method may be used with sampling from these villages (Topcu, 2004b).

The villages in Erzurum' Centre district, Pasinler, Horasan and Oltu towns and their villages where the fattening cattle is common, were chosen by using Objective Sampling Method. In the selection of farms, 3573 cattle fattening farms were taken as targets in Erzurum Province. In Erzurum' Center district, Horasan, Pasinler and Oltu towns and their villages, 465, 637, 650 and 365 farms were chosen, respectively and all of them have made indoors cattle fattening (PDAD, 2005). That is, 2117 farms were used for pilot areas. Sampling farms were chosen among these 2117 farms with 5% significant level. Farms were grouped according to social-economical and technical conditions and financial structures. Survey numbers according to towns were given in Table 1.

The primary data were used for regression analysis with some additional variables. For this end, double logarithmic functional form and enter regression model were chosen to estimate the relationship between dependent variable and independent variables (Table 2). SPSS 15.0 statistical software program was used for regression analyses.

Table 1: Survey numbers according to towns

Target towns	Farm number	Survey number
Horasan	650	40
Oltu	365	22
Erzurum's central district	465	28
Pasinler	637	39
Total	2 117	129

Multiple double logarithmic regression model can be written as follows:

$$CAM = f(ISK, BSU, GCA, YMF, HAF, IGU, D_1, D_2, D_3, \varepsilon_i)$$

Dependent variable:

CAM = Cost of live weight gain ($ kg^{-1})

Independent variables:

ISK = Farm capacity as Cattle Animal Unit (CAU)
BSU = Total cattle fattening period (day)
GCA = Daily live weight gain (kg CAU^{-1})
YMF = Daily average feed price ($ kg^{-1})
HAF = Buying animal price ($ CAU^{-1})
D_1 = Influence of Horasan town
D_2 = Influence of Oltu town
D_3 = Influence of Pasinler town

Coefficient estimates were obtained using Ordinary Least Squares (OLS). Individual and group significance of these coefficients were tested using t and F tests, respectively. Multicollinearity among variables was detected by calculating the Variance Inflating Factor (VIF). The presence of auto-correlation was assessed using Durbin-Watson d statistic (Gujarati, 2005; SPSS 15.0, 2006).

RESULTS AND DISCUSSION

In the regression model, regression coefficient (R^2) was valuated as 0.81. OLS estimates of the model coefficients are listed in Table 2. Given the F-statistic 262.94 (p = 0.000), we reject the null hypothesis that all slope coefficients are equal to zero.

The overall amount of multicollinearity present in the model was measured by calculating the Variance Inflating Factor (VIF). The calculated values of VIF were between 1.1 and 2.2, indicating acceptable levels of multicollinearity since these values fall between 1.0 and 2.5. Durbin-Watson d statistic has been used to detect the existence of auto-correlation. Since, the computed d value (2.08) lies between d_u (1.78) and 4-d_u (1.57), there is no evidence auto-correlation (Kalayci, 2005).

Table 2: The parameters and tests related to cattle fattening cost

Independent varibales	Coefficients	SE	t-values	p-values	VIF
Constant	1.6126	0.6481	2.488*	0.014	-
ISK	-0.8383	0.0541	-15.500**	0.000	1.57
BSU	-0.2843	0.1068	-2.661**	0.005	1.15
GCA	-0.0975	0.0381	-2.561*	0.012	1.30
YMF	0.4032	0.0643	6.274**	0.000	1.15
HAF	0.2791	0.0679	4.110**	0.000	1.23
D_1	-0.0466	0.0701	-0.6644	0.508	1.81
D_2	0.0941	0.0817	1.1510	0.252	1.78
D_3	-0.0533	0.0827	-0.6446	0.520	2.20

*p<0.05, **p<0.01, n = 129, R^2 = 0,81, F_h = 60,68, F_c = 2,02*, d_L = 1,57, d_u = 1,78, DW d_h = 2,08

Partial regression coefficients of ISK, BSU, GCA, YMF and HAF were found meaningful at 1% statistical significance level. As ISK, BSU and GCA decreased, the live weight gain kg^{-1}, YMF and HAF increased the production cost, as well. It was found that while, Horasan and Pasinler towns had an advantage with their tendency to decrease the live weight gain cost when they compared with Erzurum' Center district, Oltu town had a disadvantageous at similar periods. The signs of these parameters were found correct from point of view both economical theory and expects. The cattle fattening farm capacities of the region were under the optimum size, but as farm capacity was increased, the live weight gain cost decreased significantly.

Since, the cattle fattening period depended on changes of sex, race and age of animals, the cattle fattening performance was directly affected from this period. When the length of cattle fattening period was increased, live weight gain costs decreased in the cattle fattening farms. This could explain that the fattening period of these farms was at a lower level than the optimum fattening period. Until farmers attain to the economical optimum fattening period, they could decrease the production cost by continuing to the cattle fattening activity and by providing the live weight gain (Topcu *et al*., 2008). Therefore, the live weight gain obtained from this fattening period could increase marginal income higher than expected (Topcu, 2004b).

Buying feed and animal prices were very high in the region's input market, so they increased the live weight gain costs, considerably. Buying feed and animal material prices have an important ratio, about 65%, among variables costs (Topcu, 2004a, 2008). These high price-inputs, which had an important ratio on production cost affected the cattle fattening activities negatively.

CONCLUSION

Estimated econometric production model was finely explained by determined independent variables owing to high regression coefficient (R^2), F and t-values at 1 and 5% significant levels, statistically. It was observed that farm capacity, cattle fattening period, daily obtained live

weight gain had an effect on decreasing live weight gain cost kg^{-1}. The current prices of animal feed and fattening animal material which was bought by farm owners are fairly high level. Due to this reason, high prices have an important effect on the increasing costs.

As the fattening animals were taken into consideration at the present time, the closer farm capacity and cattle fattening period to get the optimum production level, the more income could obtain and the easier live weight gain could be increased to higher levels. Moreover, farmers could decrease the input costs by paying an more effective role in region's input market, by acting and associating under some organizations. In this way, the farmers could decrease the live weight gain costs by arranging a better management organization both at the input markets and their farms.

REFERENCES

Clay, J., 2004. World agriculture and the environment: A commodity-by-commodity guide to impacts and practices. Washington, D.C., USA: Island Press, pp: 24-38. ISBN: 1559633700.

Cattle Today (CT), 2008. Breeds of cattle and Cattle today. http://www.cattle-today.com.

Fiems, L.O., B.G. Cottyn, S. De Campeneere and C.V. Boucque, 1998. Effects of dietary level on performance of early-weaned double muscled calves. Biol. Abstr., 105 (12): 79-87.

Gujarati, D.N., 2005. Basic econometrics. Reference Publish, Istanbul, 33: 540-578. ISBN: 975-7860-99-9.

Kalayci, S., 2005. SPSS Applications, Multi-Variables Statistics Techniques. 1st Edn. Asil Publish, Ankara, pp: 273-305. ISBN: 975-9091-14-3.

PDAD, 2005. Erzurum Provincial Directorate of Agricultural Data, Erzurum.

Report, 2006. Reports of sub-study group on common market regulations. http://sgb.tarim.gov.tr.

Spectrum Commodities (SC), 2007. Live cattle. http://spectrum commodities.com/.

SPSS Base 15.0, 2006. SPSS base 15 user's guide. Chicago, pp: 210-212. ISBN: 0-13-241152-0, IL 60606-6412.

Topcu, Y., 2003. Functional analysis of ration's effect on increasing live weight the case of Erzurum Province. Productivity J., 3: 129-143.

Topcu, Y., 2004. A research on input using and the production cost in cattle fattening farms of Erzurum Province. J. Fac. Agric., No. 35, pp: 65-73.

Topcu, Y., 2004a. The evaluation of production and marketing policies with total quality management in food industry. Turk. J. Agric. Econ., 10: 25-40.

Topcu, Y., 2004b. A study on the meat cost and marketing margins of cattle fattening farms in Erzurum province. Turk. J. Vet. Anim. Sci., 28 (6): 1007-1015.

Topcu, Y. and N. Demir, 2005. Functional analysis of cattle fattening farms: The case of Erzurum Province. J. Applied Sci., 5 (6): 1071-1077.

Topcu, Y., 2008. Analysis of success in dairy farms: Case study of Erzurum Province. J. Fac. Agric., OMU, 23 (1): 17-24.

Topcu, Y., A.S. Uzundumlu and S. Kiziloglu, 2008. Analysis of factors affecting on failure of cattle fattening farms: The case of Erzurum Province. J. Agric. Sci., 15 (B): 19-25.

TUIK, 2008. Turkiye Istatistik Kurumu (Turkish Statistical Institute). http://www.tuik.gov.tr.

Yanar, M., F. Ugur, N. Tuzemen and R. Aydin, 1997. Growth performance of BS calves reared on 2 milk feeding schedules. India J. Anim. Sci., 67: 1114-1116.

Yavuz, O., 1992. Economic analysis of cattle fattening farms related to linear program according to alternative financial sources in Erzurum center district. Turk. J. Agric. Econ., 1 (1): 69-80.