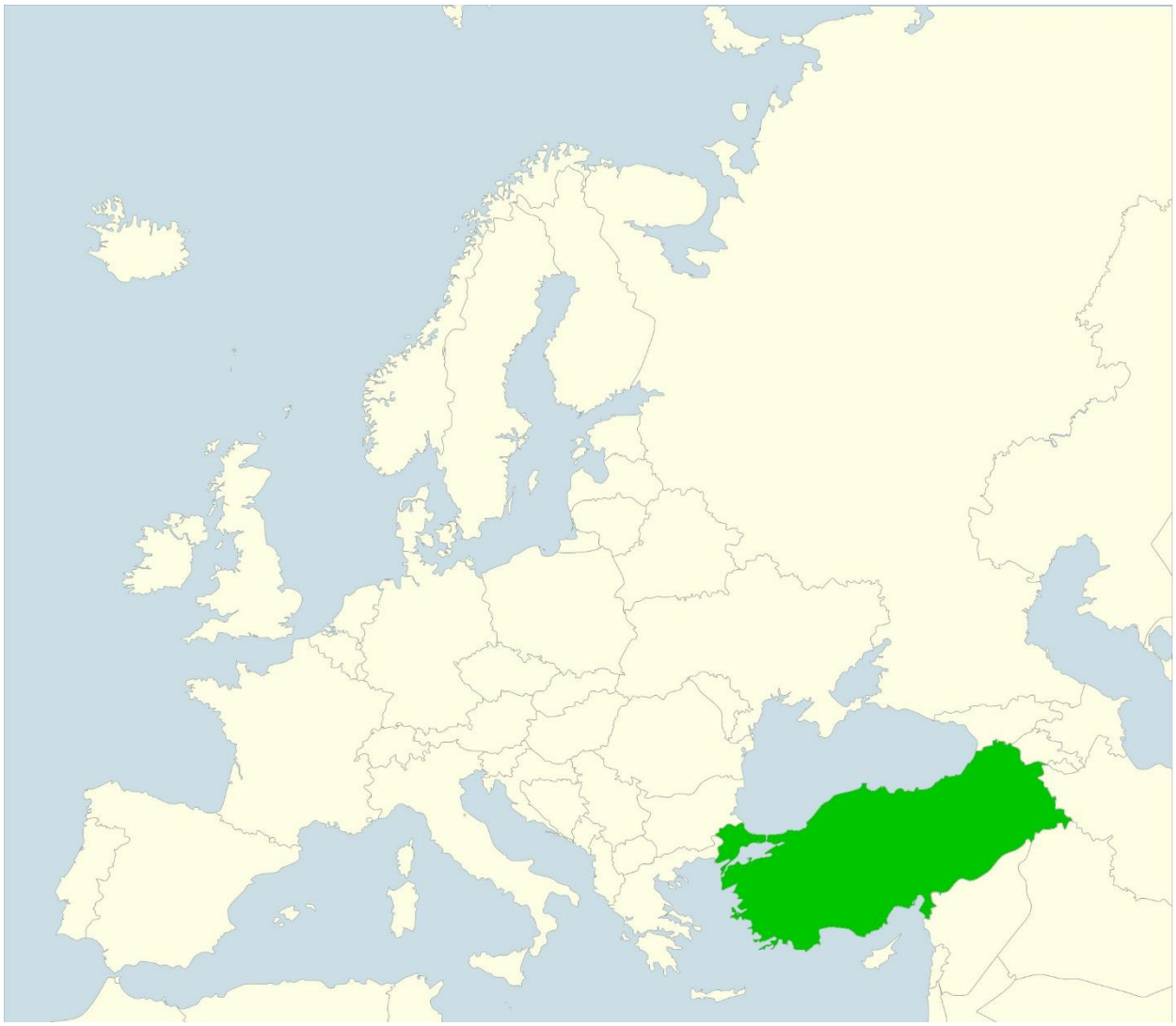
Europ. Countrys. · 2 · 2017 · p. 263-273
DOI: 10.1515/euco-2017-0016

European Countryside MENDELU

ECONOMIC ANALYSIS OF DAIRY CATTLE ENTERPRISES: THE CASE OF KONYA PROVINCE

Cennet Oğuz[1], Aysun Yener



[1] Prof. Dr. Cennet OĞUZ, Selcuk University Konya, Faculty of Agriculture, Department of Agricultural Economics, Ardıçlı Mahallesi, İsmetpaşa Cad., 42250 Konya, Turkey; e-mail: coguz@selcuk.edu.tr, Aysun YENER, assistant

Received 7 May 2016; Accepted 26 October 2016

Abstract: This study evaluates the economic activity results of dairy cattle enterprises in Konya Province. The data used in the research was obtained through questionnaire technique from 125 dairy cattle enterprises which were determined with stratified random sampling method on a voluntary basis. The total active captial of the enterprises are $845,330.85 and the share of animal capital is 26.27%. Average cattle number in the enterprises have been determined to be 104.95 heads, cow number is 61.22 heads per farm while average daily milk yield in the enterprises is determined as 27.45 lt/head for milker cows. The total average variable cost in dairy cattle enterprises is calculated to be $104,235.23 and the sum of all fixed cost is $40,496.15. The share of feed cost in variable costs is 84.33%. Gross Production Value (GPV) is $194,759.57 and 85.08% of this value is from milk and milk products. Gross profit per enterprise is $90,524.34 and net profit is $50,028.19. In the study, the milk cost is calculated at $0.31/lt. Sale price of milk of enterprises is $0.42/lt in 2015. In the research field, economic profitability of enterprises is calculated at 2.04% and financial profitability is calculated at 2.02%. As a result of the research, the greatest problems of dairy cattle enterprises are identified as supplying of roughage and concentrate feed, low levels of organization, low number of milked stocks, and taking individual actions against the market.

Keywords: Dairy cattle, economical analysis, Konya.

1. Introduction

Livestock farming has an important place in Turkey in term s of adequate and balanced nutrition, and its use as an industrial raw material in many areas as well as all over the world. Its contribution can be stated as reducing unemployment in rural areas, preventing rural to urban migration and providing raw materials for agriculture-based industries (meat, milk, leather, cosmetic, pharmaceutical industry, etc,.). It also has significance for balanced and adequate nutrition of future generations and for exportation. Having an essential place in Turkey's economy, livestock is one of the irreplaceable activity branches for agricultural enterprises and it is like insurance for these enterprises. Livestock activities are essential for utilising idle labour force and feed, providing regular cash flow and spreading risk in enterprises (Öztürk and Karkacıer, 2008). Throughout the world, there is a number of studies with different characteristicscarried out where productivity and profitability in dairy cattle breeding enterprises are determined and also enterprises are compared according to their economic and technical analysis and their sizes. The importance of livestock farming is considered in many studies in the world (Vallapureddy, 2013; Gandhi and Zhou, 2010; Upton, 2004; Alvarez et al., 2008; Rodríguez-Couso et al., 2006). The research takes advantage of studies in which profitability analyses of economic activity results, especially in dairy farming, were conducted with consideration of various methods and approaches (Gerosa and Skoet, 2012; Mumba et al., 2012; Venkatesh and Sangeetha, 2011; Marco et al., 2008; Riveiro et al., 2008 ve Pereira et al., 2005). In world milk production ranking, EU-27 is in the first place and Turkey is in the eighth place (FAO, 2015). 99.03% of total milk production in Turkey is composed of cow, sheep and goat milk and 0.97% is composed of water buffalo milk. Total number of milked cattle animal is 5.598 heads and total milk production is 16.922 tons in Turkey. Konya province has 4% of stocks and produces 5% of milk in Turkey (Anonymous, 2012; TÜİK, 2015). There are a total of 233,572 heads of milked cattle stocks and approximately 822.424 tons of milk is produced in Konya. Dairy cattles consist of 76.75% culture (Holstein) race, 21.23% crossbred race and 2.01% domestic race of Konya region (TÜİK, 2015). Stocks from culture race yield higher productivity than crossbred or domestic race stocks in Konya, as in Turkey. In this study, it is aimed to estimate the result of economic activity of the milk production in Konya province, one of the most significant milk production areas of Turkey. Agriculture, particularly the livestock sector, is a major economic activity in the Konya region of Turkey. Konya milk production sector has gone through a restructuring process with a reduction in the number of farms, and an increase in the number and average size of farms specialized in

milk production has increased significantly since 2007. Despite the increase in the total number of farms, more than 100,000 farms in Konya region, were affected by the reduction in farms with less than 10 cows because of the fund by EU IPARD Project. The total number of cattle heads and milk production has increased. This study is focused on farm design improvement (Pereira et al., 2005; Marco et al., 2008) and on the interdependence between the farm and the quality of life of farmers. Based on this study aim, it has analyzed the social and economic activity results used on dairy cattle farms. According to the results, they are in agreement with those reported by other researcher who measured the profitability of the production activity in economic terms considering inputs and outputs. Cattle breeding is very important to rural development and the quality life of farmers. Particularly, in Konya, 25% of total population lives in rural areas and their source of income is agricultural activities (TÜİK, 2015).

Fig 1. Research area.

The aim of this study is to present the economic activity results, capital structure and profitability levels of the enterprises that work on dairy cattle breeding in Konya.

2. Material and Method

The main material of the study consists of original data collected through questionnaires from dairy cattle enterprises in Konya which is selected as the research region. Furthermore, some data were obtained from previous studies made by various institutions and organizations on this subject. The data in the study contain the production period 2015 and the questionnaires are filled by the researcher. Fieldwork, animal husbandry economy and survey practice have all been completed in August 2015.

In order to increase the accuracy of findings collected from enterprises and ensure adequate representation of different parts of population, stratified sampling method was used in the research (Yamane, 1967; Güneş and Arıkan, 1985). Sample size is calculated as 125 within 99% confidence interval and with 5% error margin and the enterprises in sample size are randomly selected on the basis of voluntariness.

Tab 1. Distribution of Dairy Cattle Enterprises according to Stock Count.

Enterprise Size Groups (heads)	Sample Size (Count)
0–50	72
51–150	38
151 and more	15
Total	125

The values of the relevant capital components in dairy cattle enterprises are determined as the end of August 2015. For the determination of building capital, the values of the buildings in

the premises related to livestock and the costs of a building with equal characteristics is determined on the basis of employers' statement. In the determination of livestock capital value, the market prices are taken on the basis of employers' statement, in consideration of race, age and productivity status of stocks. Cash balance, debits and credits are determined on the basis of employers' statement and equity capital is calculated by subtracting debits from active capital (Kıral et al., 1999). Gross profit is accepted as a measure of success in determining the competitive power of production activities and is used in the comparison of enterprises under Farm Accountancy Data Network (FADN) in EU (Keskin ve Dellal, 2011). In the analyses, the calculation of milk income and variable costs are carried out in accordance with the following equations (Kıral et al., 1999).

- Gross Production Value (GPV) = (Milk Production Amount * Milk Price Paid to the Farmer (MPPF) + Productive Stock Value (PSV) + Animal Manure Income;
- Productive Stock Value (PSV) = (year end stock value + value of the sold stock + value of the stock slaughtered) – (value of the stock at the beginning of year + value of the stock bought);
- Fixed Costs in Milk Production = Labour Force+ Depreciation + Interest + Administrative Fee;
- Variable Costs in Milk Production = Roughage + Concentrate Feed + Veterinary & Medicine + Artificial Insemination + Temporary Labour + Salt + Electricity & Water + Other (Cleaning etc.) (Semerci et al., 2015). Depreciation values are composed of buildings, tractors, tools and equipments used in the premises and of animal subjected to depreciation. Straight line method is used in the calculation of depreciation in the research. In the calculation of depreciation for tools and machines, the formula Depreciation = (New Value of Tool or Machine – Salvage Value) / Economic Life;
- In the calculation of depreciation for stock animals, the formula Depreciation = (Brood Value – Butchery Value) / Economic Life of Animal;
- In the calculation of interest costs for tools, machines and building, the formulas Interest = (Tool, Machine or Building Value + Salvage Value) / 2) * Interest Rate;
- Stock Capital Interest = (Brood Value + Butchery Value) / 2) * Interest rate are used (Kıral et al., 1999);
- Gross Profit is obtained by subtracting total variable costs from Gross Production Value (GPV) and Net Profit is obtained by subtracting production costs from GPV (Kıral et al., 1999);
- Profitability, which gives the profitability rate of a capital invested in a certain activity in a certain period, can be calculated in two ways as financial and economic profitability (Erkuş et al., 1995; Oğuz and Bayramoğlu, 2015);
- Financial Profitability (FP) = Net Profit/Equity Capitalx100;
- Economic Profitability (EP) = Net Profit+Debt Interest **/** Equity Capital+Foreign capital.

Data of the 125 surveys conducted in the research area has been evaluated according to the enterprise sizes formed with the suckled cow numbers; 0–50 head (72 enterprises), 51–150 head (38 enterprises) and 151 head and more (15 enterprises) – and also according to the culture race (Holstein) and crossbred (Simmental and Domestic) race stock number in the enterprises and the average of the enterprises. Gross Production Value and variable expenses are also estimated according to these classifications. In addition, stock assets of the enterprises have been converted to the Large Animal Unit (LAU) and one part of the evaluation has been carried out according to this LAU (Erkus et al., 1995).

In this study, $1 = 2.84 Turkish Liras calculated (approximately in August, 2015).

3. Research Findings and Discussion

3.1 Capital Status in Dairy Cattle Production Activity

Capital which consists of all wealth elements allocated to production is an important factor of production beside nature and labour. The enterprises are analysed by their capital groups and in this examination, their classification according to functions is taken as the basis (Erkuş, 1979). Active capital is composed of land capital (farm capital) and enterprise capital. Farm capital is composed of land capital, land improvement capital, building and plants capital. Passive capital of enterprises analysed is composed of foreign and equity capital used in the enterprise.

In the enterprises analysed, the largest share in active capital belongs to land capital (46.84%). This is followed by livestock capital (26.27%), building capital (18.34%) and tools & machines capital (5.43%) (Tab 2). Distribution of capital elements composed of active capital is essential in terms of effective enterprise management. In an enterprise which works rationally, the capital distribution is expected to be so that 25% is for land capital, 25% is for building capital, 25% is for livestock capital, 10% is for tools & machines capital, 10% is for materials and supplies capital and 5% is for money capital (Erkuş et al., 1995). However, the population pressure increase on the agricultural lands because of the limited number of agricultural lands and increasing population. Furthermore, out-of-purpose use of agricultural lands increases the population pressure on lands. Limited lands and increase in demand for agricultural or non-agricultural lands increase land prices. For this reason, the share of agricultural land in active capital is high. In fact, the previous researches also found out that the share of land capital in active capital is high (Özüdoğru, 2010; Öztürk and Karkacıer, 2008; Altıntaş and Akçay, 2007; Bayramoğlu, 2003; İnan, 1998). Of passive capital ($845,330.85), 95.92% is equity capital and 4.08% is foreign capital.

Tab 2. Distribution of Active and Passive Capital in the Enterprises Analyzed ($, %)

Capital Groups	Enterprise Groups ($)							
	0–50		51–150		151-+		Enterprise Average	
	$	%	$	%	$	%	$	%
Land Capital	206,051.94	54.45	494,287.44	45.86	1,058,098.59	42.37	395,921.13	46.84
Land Impr. Captl.	4,029.73	1.06	15,664.38	1.45	27,089.20	1.08	10,333.80	1.22
Building Capital	72,079.91	19.05	206,871.76	19.19	422,077.46	16.90	155,056.34	18.34
Plants Capital	5,212.86	1.38	14,730.82	1.37	41,414.32	1.66	12,450.49	1.47
Livestock Capital	70,070.42	18.51	270,397.52	25.09	829,407.28	33.21	222,090.28	26.27
Tools Machines	18,994.28	5.02	72,161.32	6.69	108,252.93	4.34	45,868.10	5.3
Materials and Supplies Capital	709.12	0.19	2,038.55	0.19	6,807.51	0.27	1,845.07	0.22
Money Capital	1,306.24	0.35	1,757.79	0.16	3,990.61	0.16	1,765.63	0.21
Total Active Capital	**378,454.49**	**100.00**	**1,077,909.57**	**100.00**	**2,497,137.91**	**100.00**	**845,330.85**	**100.00**
Total Foreign Capital	32,118.06	8.49	34,408.36	3.19	46,215.96	1.85	34,506.06	4.08
Equity Capital	346,336.44	91.51	1,043,501.20	96.81	2,450,921.95	98.15	810,824.79	95.92
Total Passive Capital	**378,454.50**	**100.00**	**1,077,909.56**	**100.00**	**2,497,137.91**	**100.00**	**845,330.85**	**100.00**

3.2 Distribution of Costs in Dairy Cattle Enterprises

In dairy cattle enterprises, costs were analysed in two groups of variable costs and fixed costs. Variable costs are concentrate feed and roughage, veterinary and medicine, insemination, labour, electricity, repair and maintenance, feed mixer- manure scrappers, cleaning and other costs. Fixed costs are general administrative expenses, building capital depreciation, building capital interest, building repair and maintenance, family labour force fee return, permanent labour fee, cow capital depreciation, cow capital interest, tool and machinery depreciation and tool and machinery capital interest.

As seen in Tab 3, stock production variable cost per enterprise in the enterprises analysed is determined to be $104,235.23. The largest share in livestock production variable costs belongs to concentrate feed with 63.53% (Tab 3). It is followed by roughage with 20.84%. In a similar study, 56.54% of variable costs is composed of concentrate feed (Ata and Yılmaz, 2015). In other studies, the share of feed in variable costs is calculated at 85.20% (Demircan et al., 2006), 86.60% (Şahin, 2001), 85.60% (Gül, 1998) and 50.20% (Yurdakul, 1978). In the enterprises, total fixed cost per enterprise is determined to be $40,496.15 30.09% of this value is depreciation cost, 26.08% is capital interest, 19.80% is family labour fee return, 8.34% is permanent labour force fee, 7.77% is repair & maintenance cost, and 7.12% is general administrative costs (Tab 4). As enterprise size groups enlarged, fixed cost amount per livestock decreases.

Tab 3. Variable Costs in the Farm Enterprises Surveyed ($, %)

	0–50		51–150		151-+		Enterprises Average	
	$	%	$	%	$	%	$	%
Concentrate Feed	24,591.04	64.26	81,554.94	63.84	227,177.87	62.88	66,218.48	63.53
Roughage	7,059.37	18.45	26,503.19	20.74	79,959.33	22.13	21,718.29	20.84
Temporary Labor	1,113.65	2.91	3,484.06	2.73	7,862.32	2.18	2,644.10	2.54
Veterinary and Medicine	4,788.73	12.51	8,328.39	6.52	26,267.61	7.27	8,442.25	8.10
Artificial Insemination	-	-	6,456.63	5.05	17,556.34	4.86	4,069.58	3.90
Electricity	560.64	1.47	971.09	0.76	1,115.02	0.31	751.94	0.72
Repair-Maintenance	110.04	0.29	259.04	0.20	645.58	0.18	219.60	0.21
Cleaning	24.45	0.06	131.58	0.10	516.43	0.14	116.06	0.11
Other*	20.79	0.05	69.50	0.05	181.93	0.05	54.93	0.05
Total Variable Cost	38,268.71	100.00	127,758.42	100.00	361,282.43	100.00	104,235.2	100.00

* Salt, rope, etc.

In the enterprises surveyed, variable costs and fixed costs are estimated to be $104,235.23 and $40,496.15, respectively. 72.02% of total cost is variable costs and 27.98% is due to fixed cost (Tab 5). In a study by Semerci et al. (2015), it was determined that 64.26% of total cost is variable and 35.74% is fixed cost. Uysal and Cinemre (2012) calculated the share of variable cost in total cost at 76.32% and of fixed cost at 23.65%. Gündüz and Dağdeviren (2011) calculated that 75% of milk production costs are variable and 25% consists of fixed costs. In that study, the largest share among variable costs was feed costs with 70%. In the study by Keskin and Dellal (2011), were in the first place with a feed cost of 86% was in the first place, which was a study of themselves.

Tab 4. Fixed Costs in the Enterprises Surveyed ($, %)

	0–50		51–150		151-+		Enterprises Average	
	$	%	$	%	$	%	$	%
General Administrative Costs	1,288.07	6.03	3,832.75	8.61	10,838.47	8.87	3,207.70	7.92
Building Capital Depreciation	2,162.40	10.13	5,802.63	13.03	14,246.83	11.66	4,719.16	11.65
Building Capital Interest	1,802.00	8.44	4,835.52	10.86	11,872.36	9.72	3,932.63	9.71
Building Repair and Maintenance	1,441.60	6.75	3,868.42	8.69	9,497.89	7.78	3,146.11	7.77
Family Labor Force Fee Return	9,973.41	46.70	5,157.14	11.58	5,867.37	4.80	8,016.54	19.80
Permanent Labor Force Fee	0.00	0.00	2,935.51	6.59	20,704.23	16.95	3,376.90	8.34
Cow Capital Depreciation	2,296.21	10.75	8,401.49	18.87	25,070.42	20.52	6,885.12	17.00
Cow Capital Interest	2,066.59	9.68	7,561.34	16.98	22,563.38	18.47	6,196.61	15.30
Tool and Machine Depreciation	185.12	0.87	1,220.01	2.74	855.88	0.70	580.22	1.43
Tool and Machine Capital Interest	138.84	0.65	915.01	2.05	641.91	0.53	435.17	1.07
Total Fixed Costs	21,354.23	100.00	44,529.82	100.00	122,158.74	100.00	40,496.15	100.00

Tab 5. Milk Production Costs in the Enterprises Analysed ($, %)

	0–50		51–150		151-+		Enterprises Average	
	$	%	$	%	$	%	$	%
Total Variable Cost	38,268.71	64.18	127,758.42	74.15	361,282.43	74.73	104,235.23	72.02
Total Fixed Cost	21,354.23	35.82	44,529.82	25.85	122,158.74	25.27	40,496.15	27.98
Total Cost	59,622.93	100.00	172,288.24	100.00	483,441.17	100.00	144,731.37	100.00

3.3 Gross Production Value (GPV) in Dairy Cattle Enterprises

GPV obtained in dairy cattle is composed of milk production value, livestock sale value, PSV and farm manure sale value. In the enterprises surveyed, the dairy cattle production value per enterprise is calculated to be $194,759.57. 85.08% of this value is milk production value, 5.67% is livestock sale value, 4.99% is farm manure and and 4.25% is PSV (Tab 6).

Tab 6. Gross Production Value in Diary Cattle Enterprises ($, %)

	Enterprise Groups							
	0–50		51–150		151-+		Enterprises Average	
	$	%	$	%	$	%	$	%
Milk	49,871.80	81.06	203,892.22	85.76	624,908.27	86.15	165,698.39	85.08
Live Stock Sale	4,488.46	7.30	14,272.45	6.00	34,369.95	4.74	11,048.57	5.67
PSV	2,493.59	4.05	10,194.61	4.29	31,245.42	4.31	8,284.92	4.25
Farm Manure	4,670.81	7.59	9,389.04	3.95	34,858.59	4.81	9,727.69	4.99
Total GPV	61,524.67	100.00	237,748.32	100.00	725,382.24	100.00	194,759.57	100.00

In the study by Semerci et al. (2015) in Hatay province, they found out that GPV was composed of milk in 82.98%, PSV in 11.03%, manure in 3.82%, and milk incentive premium in 2.17%. Bayramoğlu and Direk (2006) determined that 86.48% of dairy cattle GPV was milk, 4.92% was PSV and 8.60% was farm manure income in Konya province. In the study researched by Dağıstan

(1999), GPV obtained in dairy cattle enterprises consisted of milk and milk products with 76.08%, PSV with 22.18% and manure income with 2%. In a study in Çerkeş, Çankırı, Turan (1997) found out that 70% of GPV is milk.

3.4 Gross Profit and Net Profit in the Enterprises Surveyed

In the enterprises surveyed, enterprises-average gross profit was $90,524.34 and net profit is $50,028.19. In the enterprises analysed, the share of gross profit in milk's GPV is found to be 46.48%. In the study by Bayramoğlu and Direk (2006), this share was 36% and in the study by Dağıstan (1999), it was 55.51%. The net profit was calculated to be $50,028.19, while Bayramoğlu and Direk (2006) estimated the net profit to be negative and Dağıstan (1999) found it positive.

Tab 7. Gross Profit and Net Profit in the Enterprises Surveyed ($)

	Enterprise Groups			
	0–50	51–150	151-+	Enterprises Average
GPV	61,524.67	237,748.32	725,382.24	194,759.57
Variable Costs	38,268.71	127,758.42	361,282.43	104,235.23
Gross Profit	23,255.96	109,989.90	364,099.81	90,524.34
Prodution Costs	59,622.93	172,288.24	483,441.17	144,731.37
Net Profit	1,901.73	65,460.08	241,941.06	50,028.19

3.5 Milk Production Cost in the Research Area

In this research, the cost of 1 lt of milk was calculated to be $0.31/lt (Tab 8). In 2015, the average milk sale price was $0.42/lt among the enterprises. Variable costs per unit production is calculated at $0.27. In a similar study, variable cost per unit production in milk enterprises in Konya provice was calculated at $0.28 (Yener and Oğuz, 2014). In the study, it has been pointed out that there are differences in the costs owing to the size of the enterprises and this is disadvantageous for the enterprises. It is concluded that an efficient production organisation is obligatory in order to decrease the disadvantages of the small enterprises.

Tab 8. Unit Milk Cost in the Enterprises Surveyed ($)

	Enterprise Groups			
	0–50	51–150	151-+	Enterprises Average
Milk Production Cost	48,330.26	147,753.86	416,478.89	122,732.87
Milk Production Amount	47,667.06	167,795.29	494,506.45	137,806.77
Unit Milk Cost	0.36	0.31	0.30	0.31
Variable Costs (per Unit milk Production)	0.28	0.27	0.26	0.27

3.6 Financial and Economical Profitability in the Enterprises Surveyed

In the enterprises surveyed, economical profitability and financial profitability are calculated at 2.04% and 2.02%, respectively. In the research area, in comparison with the interest rate in the market (8%), dairy cattle enterprises desire investment profitability to be above this rate. It can be said that dairy cattle enterprises hardly keep work going. In the study in Konya, profitability factor is estimated to be 0.06 (Murat and Sakarya, 2012). In another study in Afyon, economic profitability and financial profitability were found to be at -3.56 and -3.72, respectively (Çiçek and Tandoğan, 2008). In another study conducted in Hatay, economical and financial profitability are estimated to be approximately 7.2% and 5.6%, respectively (Semerci et al., 2015; Dağıstan, 1999). In a study in Tekirdağ, the financial and economic profitability rates were found to be at 12.73% and 14.06% in culture crossbred dairy cattle enterprises, and 9.03% and 11.08% in import daily cattle enterprises, both respectively (Erkuş et al., 1996).

4. Conclusion

In this study, the economical analysis of dairy cattle enterprises were performed by using data obtained through questionnaire from 125 enterprises which were selected according to simple stratified random sampling method among dairy cattle enterprises in Konya.

In the enterprises analysed, livestock production variable cost was estimated at $104,235.23 and fixed cost at $40,496.15. The largest shares in the livestock production variable costs are of concentrate feed, 63.53%, and roughage, 20.84%. For reduction in feed costs which constitute an important rate in milk costs, it would be beneficial for enterprises to produce their own roughage and prepare their own ration. Therefore, awareness-rising education on feed plant production should be provided in enterprises and encouraging incentives should continue. According to Konya milk commission (2010), when roughage plant is grown in a 3 decare area per animal on average in dairy cattle farms and feed ration is prepared in the enterprise, milk cost would be $0.40. In the enterprises surveyed, average gross production value per enterprise was calculated at $194,759.57. Of this value, 85.08% is milk, 5.67% is livestock, 4.99% is farm manure and 4.25% is PFAVI. In order to increase milk efficiency per animal, farmers should be provided with education of ration preparation. Moreover, milk in the cold chain would increase its price and hence income. Cooling tanks, which enterprises may share should be increased through cooperatives and unions.

In the enterprises, the shares of capital elements are ranked according to importance as land capital, stock capital, material and supplies capital, money capital, building capital, tool and machine capital, plants capital and land improvement capital. Population pressure on land capital is increasing every day. Farmers should be informed about soil usage.

In the enterprises surveyed, average gross profit per enterprise was estimated at $90,524.34 and net profit was estimated at $50,028.19. In the enterprises surveyed, financial profitability was found to be 2.02% and economic profitability was found to be 2.04%. When the rates obtained were compared to the market interest rate (8%), dairy cattle business could not be said to be a profitable investment for the years 2015–2016, in which the research was conducted.

Acknowledgement

This study was supported as a whole project by Scientific Research Projects (BAP) Coordinatorship No. 15401020.

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