ECONOMIC ANALYSIS OF DAIRY CATTLE ACTIVITY IN AFYONKARAHISAR PROVINCE*

Hasan CICEK[a] Murat TANDOGAN
Department of Animal Health Economics and Management, Faculty of Veterinary Medicine,
University of Afyon Kocatepe, 03200 Afyonkarahisar, Turkey

Accepted 17 September 2008

Abstract

The purpose of this research was to determine dairy enterprises's production activities by doing economic analysis and economical principle how can redeem under present economical conditions in enterprises in Afyonkarahisar. According to the finding results, cost factors, include firstly 47.82% feed, after 26.97% labor, 7.84% amortization, 7.28% other costs (energy + liquid fuel + liability capital interest + other current costs), 4.25% vets and meds, 3.25% repair and maintenance, 2.59% general management costs. Average income distribution observed in these enterprises were as follows; milk sales, change of inventory value, calf revenues, 52.68%, 40.83% and 6.49% respectively. In the enterprises, it was founded that average financial profitability is -3.77%, economic profitability is -3.56% and profitability factor is -22.40%. Returns to scale was 0.99.

Keywords: Dairy Cattle, Cost, Profitability, Afyonkarahisar

Afyonkarahisar İli'nde Süt Sığırcılığı Faaliyetinin Ekonomik Analizi

Özet

Bu araştırmanın amacı, Afyonkarahisar'da süt sığırcılığı işletmelerinde gerçekleştirilen üretim faaliyetlerinin ekonomik analizini yapmak ve mevcut ekonomik koşullar altında işletmelerde iktisadilik prensibinin ne ölçüde yerine getirildiğini belirlemektir. İşletmelerde maliyeti oluşturan masraf unsurları arasında, % 47,82 ile yem ilk sırayı almakta, bunu % 26,97 ile işçilik, % 7,84 ile amortisman, % 7,28 ile diğer giderler (enerji+akaryakıt+yabancı sermaye faizi+diğer cari giderler), % 4,25 ile sağlık, % 3,25 ile bakım-onarım ve % 2,59 ile genel idare giderlerinin izlediği belirlenmiştir. Elde edilen toplam gelirler arasında süt satış geliri % 52,68 ile ilk sırada yer almaktadır. Bunu % 40,83 ile envanter kıymet artışı, % 6,49 ile buzağı geliri izlemiştir. İşletmelerin ortalama mali rantabilitesi % -3,77; ekonomik rantabilitesi % -3,56 ve rantabilite faktörü % -22,40 olarak gerçekleşmiştir. Masraf-hasıla oranı (O/I) da 0,99 bulunmuştur.

Anahtar Kelimeler: Süt Sığırcılığı, Maliyet, Karlılık, Afyonkarahisar

1. Introduction

Major problems exist in term of production, processing and marketing and, production units are serviced all together that have qualities and scale which change from traditional enterprises to modern enterprises in dairy sector in Turkey. 40% of produced milk when reach to consumer as raw that is processed 50% of milk in dairies, 10% rate of milk in modern dairy plants. However 99.5% rate of produced milk is transferred to modern enterprises in developed countries (Gonc et al., 1993). Besides many problems belong to production and marketing, continuous increases that occurred at production cost

* This research is a part of Murat TANDOGAN's MSc thesis. In addition this project (Project No: 06-VF-06) was supported by Afyon Kocatepe University Research Foundation.
[a] İletişim: H. Çiçek, e-Posta: hascicek@hotmail.com

and price, are affected to producer and consumer (Sahin et al., 2001).

On the other hand, present economic conjecture is changed continuously in Turkey. As a matter of fact economical crisises had caused important changes on macro economic indicators (national income, inflation, employment, etc.) that occurred from the beginning of 1990's years up to now. These developments are affected enterprise's results in term by term and that are grown difficult plans of future in production sector. Consequently, results of sectoral activities have updated continuously in place where macro economic indicators continuously show to variability (Sahin, 2001; Gunlu and Sakarya, 2001; Turyılmaz, 1999; Icoz, 1999; Uyanık, 2000; Groen et al., 1997; Kundu and Basu, 1988; Kebede and Schreiner, 1996).

Afyonkarahisar is among of Turkey's important provinces with both of geographical position and present livestock potential. Cattle fattening and poultry are very important livestock activities in province's economy. In recently, in dairy cattle sector, production was increased but it's not enough. There are 1215 dairy farms that are registered to Holstein-Friesian Association in different scales (Cicek, 2005).

The aim of this research is to analyze the economic function of conducted production in dairy enterprise and to examine principle of economy under present conditions in enterprises in Afyonkarahisar.

2. Materials and Methods

Data of research was obtained by questionnaires from 78 dairy cattle enterprises which related with Holstein-Friesian Association in Afyonkarahisar. This data include production records between May 2005-May 2006.

The dairy farms were chosen with randomly sampling method, and they were classified as small (1-15 cattle), medium (16-35 cattle) and large scale (36 and over cattle) (Gunlu and Sakarya, 2001).

Factors which consist the costs were determined and were calculated which related with these (Cetin and Koyuncu, 1991; Cicek and Sakarya, 2003). When consisting capital inventories of enterprises, acquisition values of building and equipments were calculated with year of 2006's prices. With this aim, coefficients are determined according to the PPI (Producer Prices Index) of 2006 and prices were purified affect of inflation.

Change of inventory value method was applied when calculating herd value at the end of year and beginning of year in enterprises. For amortization is allocated to cows; heifer, veal calves (6-12 months calves) and bull are incorporated, calves (0-6 months) were not incorporated to this calculation in enterprise (Gillespie, 2004; Gunlu and Sakarya, 2001).

With this aim, the following formula was used:

$$CIV = VEY + VCS + VCC - (VBY + PVC)$$

In this formula;
CIV: Change of inventory value (New Turkish Lira-YTL),
VEY: Herd value at the end of year (YTL),
VCS: Value of cattle sold (YTL),
VCC: Value of consumed cattle (YTL),
VBY: Herd value at the beginning of year (YTL),
PVC: Value of purchased cattle (YTL)

If the change is negative, it is showed in the costs. If the result is calculated as positive, it is added to dairy farms incomes.

Milk sale was estimated as main income, calf and change of inventory value (positive values are determined with calculations of change of inventory value) were estimated as the second income.

Related incomes were constituted gross production value in enterprise. Gross margin was calculated by substracting total variable costs from gross production value, and net margin was calculated by substracting total fixed costs from gross margin (Erkus and Demirci, 1985).

Profitability and output-input ratios which were calculated shown below (Cicek and Sakarya, 2003; Muftuoglu, 1999):
Financial profitability: Net income / equity capital
Economic profitability: (Net income +

interest of liability capital) / active capital
Profitability factor: Net income / (milk sale income + secondary income)
Output/Input: Total income / total cost.

The research's data analysis and evaluations were determined in SPSS packet programme with GLM method in Microsoft Excel with significant level of variables in groups (SPSS, 2006).

3. Results

In enterprises which were examined, results of related with annual production activities, distribution of factors which consists the cost and getting incomes according to scales and calculated profitability and output-input ratios at the end of period were showed in Table 1, 2 and 3.

According to table large scale enterprises have higher ratio for capacity usage and lactation milk yield. As for average milk production costs, large scale enterprises have lower value according to other two groups. However, values that related to both milk yield and production cost were ascertained not to point at significant difference as statistical in every three groups ($P > 0.05$).

In Table 2, incomes that formed gross production value that arrayed in a row like income from milk sale, change of inventory value and calf revenue from large to small in all goups. When examining the gross profit and net profit values, it can be said the large scale enterprises have materialized a profitable production according to other two groups. Significant difference was determined as statistical in gross production and gross profit values in every three groups ($P < 0.05$). In net profit, the value of large scale enterprises has significant difference from other two groups ($P < 0.05$).
In Table 3, it is seen that enterprises have made production activities with equity greatly and that used liability capital rarely. According to financial and economical profitability values, while large scale enterprises were making profit, other two groups completed production period with loss. As for O/I values significant difference was ascertained as statistical in every three groups ($P < 0.05$).

4. Discussion and Conclusion

In this research, generally, breeding of Holstein cattle were established. Lactation milk yield has been calculated 5187 liters in research which was founded higher than Gunlu and Sakarya, 2001 and Turkyılmaz, 1999 (3530-4937 liters between) and it was founded at parallel values as for Icoz, 1999, Erkuş et al., 1996 and Uyanık, 2000 (5621-6028 liters between).

Table 1 Main indicators of investigated dairy farms

Parameters	Farm size			General
	Small (1-15 cattle)	Medium (16-35 cattle)	Large (36+ cattle)	
Number of dairy farms	22	41	15	78
Average number of cows	5.70±0.27094	11.66±0.62598	32.47±3.94317	13.98±1.34106
Average herd size (head)	10.42±0.45274	22.65±0.86231	69.26±8.91812	28.17±2.92862
Average farm land (ha)	484.09±70.274	832.68±119.229	1696.00±323.210	900.38±100.803
Capacity utilisation (%)	60.23	70.42	75.32	68.49
Lactation milk yield (Lt/cow/305 days)*	5159±255.64[a]	5155±226.62[a]	5313±284.88[a]	5187±148.11
Milk sale price (YTL/Lt)*	0.376±0.0038	0.366±0.0030	0.377±0.0048	0.371±0.0022
Average milk production cost (YTL)*	0.591±0.04[a]	0.597±0.09[a]	0.300±0.05[a]	0.538±0.05

*X±Sx
[a, b, c] means with the same superscripts on the same row are not different ($P > 0.05$)

Table 2 Production costs and incomes (YTL*)

Costs and incomes	Farm size						Average	
	Small (1-15 cattle)		Medium (16-35 cattle)		Large (36+ cattle)			
	Value	%	Value	%	Value	%	Value	%
Feed	9505	39.95	18961	44.25	59918	54.06	24170	47.82
Vets-meds	910	3.83	1962	4.58	4478	4.04	2149	4.25
Others (energy+liquid fuel+other) current costs	2036	8.56	2967	6.93	5730	5.17	3236	6.40
A. Total variable costs	12451	52.34	23890	55.76	70126	63.27	29555	58.47
Labor	7733	32.50	13041	30.44	23899	21.56	13632	26.97
Foreign capital interest	63	0.26	241	0.56	1562	1.41	445	0.88
Building and equipment amortization	1589	6.68	2316	5.40	6229	5.62	2863	5.66
Cow amortization	432	1.82	897	2.10	2635	2.38	1100	2.18
Repair and maintenance	915	3.84	1347	3.14	3508	3.17	1641	3.25
General management	607	2.56	1115	2.60	2868	2.59	1309	2.59
B. Total fixed costs	11339	47.66	18957	44.24	40701	36.73	20990	41.53
C. Production costs (A+B)	23790	100.00	42847	100.00	110827	100.00	50545	100.00
Income from milk sale	11221	65.85	21768	57.64	61478	46.34	26430	52.68
Calf revenue	1198	7.03	2537	6.72	8251	6.22	3258	6.49
Change of inventory value (CIV)	4621	27.12	13462	35.65	62952	47.45	20486	40.83
D. Gross product Value	17040[a]	100.00	37767[b]	100.00	132681[c]	100.00	50174	100.00
E. Gross profit (D-A)	4589[a]	19.29	13877[b]	32.39	62555[c]	56.44	20619	40.79
F. Net profit (E-B)	-6750[a]	-28.37	-5080[a]	-11.86	21854[b]	19.72	-371	-0.73

*Per farm

[a, b, c] means with different superscripts on the same row are different ($P < 0.05$)

Table 3 Capital inventory (YTL) and rate of profitability and O/I

Capital-profitability-O/I	Farm size			General
	Small (1-15 cattle)	Medium (16-35 cattle)	Large (36+ cattle)	
Assets (YTL) (1)	1553927	5044001	5219633	11817561
Liabilities (YTL) (2)	11500	81000	192000	284500
Equity (YTL) (3)	1542427	4963001	5027633	11533061
(4): 2 / 1 (%)	0.74	1.61	3.68	2.41
(5): 3 / 1 (%)	99.26	98.39	96.32	97.59
Financial profitability (%)	-9.22	-4.25	5.54	-3.77
Economic profitability (%)	-9.03	-3.94	5.47	-3.56
Profitability factor (%)	-43.75	-21.98	7.81	-22.40
O/I	0.72[a]	0.88[b]	1.20[c]	0.90

[a, b, c] means with different superscripts on the same row are different ($P < 0.05$)

In the region, most enterprises called family enterprise, are small and medium scale. When people want to gain advantages from economics of scale, enterprise's scale have to be enlarge and specialization in production must be confirmed. In one research, in dairy enterprises one unit milk increasing 56% more than enterprise's scale increasing, in 44% it is because of productivity increasing (Ahmad and Bravo-Ureta, 1995).

In the large scale dairy farms which have the highest capacity usage, better productivity level and minimum cost was observed. But it isn't enough by itself. In dairy to decrease unit fixed costs in the total costs, herd's genetic capacity and also economic value should be increased; this is emphasized (Groen et al., 1997).

As roughage, constituted mainly with barley, wheat straw, clover and dry herb are important part bought from outside the

enterprise. On the other hand, in enterprises definite amount wet sugar beet lees and corn silage are spent. As grown up technique, generally closed tied system are used in enterprises, they use pasture field in limited level. Because there are rarely wide and efficient pasture field in the region. Whereas, in dairy, grassing per animal head gained income is 64% and increase, was reported (Rust et al., 1995).

Family members make up the most part of the labor. The reasons for such a behavior may lie in traditionality, lack of rationality in enterprise management and in efficiency in qualified labor. But in dairy labor is known as continuity in enterprise and also herd's milk efficiency increases (Mwebaze, 2004).

When the questionnaire was done, 14 producers (25% interest rate-annual) enterprise credit was used. Used credits, generally in enterprises were left for buying feed and also it was short term input. In dairy credit usage opportunities increasing affects enterprise's profitability in positive way (Tripath and Kunzru, 1992).

In research enclosure, despite producers are member of association, 71% of their sells its milk to factory or dairy and the rest sells to local cooperative. In the marketing point, Holstein-Friesian Association has no active role. In dairy, it is known that becoming cooperative in marketing has important role, it helps unit cost's decreasing (Kebede and Schreiner, 1996).

In research, cost rate of feed input was found lower than results of Turkyılmaz, 1999, Icoz, 1999, Uyanık, 2000 and Sahin et all., 2001 (56.60% - 74.80% between) and that was founded at value to results of Gunlu and Sakarya, 2001 (49.9%).

Labor cost decreased, when enterprise scale increased. It is because of labor productivity. In large scale enterprises on animal number of per labor catches better productivity than other groups. Labor rate established in the previous researches, between 18.70% and 32.78 (Gunlu and Sakarya, 2001; Turkyılmaz, 1999; Icoz, 1999; Uyanık, 2000).

Veterinary-medication costs generally similar to researches which were done in this subject; energy-fuel-oil, liability capital interest, transport, like these factor's total occurred other costs and maintenance-repair costs found higher than the research which was done about this subject (Gunlu and Sakarya, 2001; Turkyılmaz, 1999; Icoz, 1999; Uyanık, 2000). Reason far higher costs can associate to time of the research was done and economic region differences.

In the research, enterprise's incomes are milk, change of inventory value and calves. In other research done about economic aspect of dairies showed the some income schedule. Only counted milk income rate was lower than other researches (Gunlu and Sakarya, 2001; Turkyılmaz, 1999; Icoz, 1999; Uyanık, 2000), CIV rate was found to be higher. The main reason, when research was done, especially in large scale enterprises, animal sales and purchases occurred more instantly. On the other hand, economical conjuncture differences in the researches in years must not be forgotten. However, in said researches, manure income was considered, but in Afyonkarahisar producers were reported that gave manure to outside of enterprise as free.

In this research, in all scale groups profitability ratios happened negative except large scale enterprises. It means capital which is allocated for production proved not to be profitable. Reasons for this are ratio maintenance-feeding and inefficient management in enterprises. Besides, overall the whole country, wrong economic politics' result between animal products-input prices, product prices disadvantages happen unstable.

Interested in the subject; Turkyılmaz (1999) was determined financial profitability and profitability factor 26.97 and 21.17; Icoz (1999) and Uyanık (2000) was determined financial and economic profitability and profitability factor 14.91, 15.81 and 29.24; -10.57; -8.42 and -32.29 respectively.

Output-input ratio was reported in research which was done in Burdur, Bursa and Aydın; 0.83; 1.10 and 1.66 respectively (Turkyılmaz, 1999; Icoz, 1999; Uyanık, 2000).

As a result, Afyonkarahisar is a brand in some meat products, but it can be said that it doesn't catch the same acceleration in

dairy farming. Because it has some serious problems about dairy sector which has necessary quality animal, labor and also feed. Moreover, traditional understanding of family likes management type and inefficiency of financial sources problems show, farm size doesn't stand on their basement. In addition to these, enterprises which are members of association, don't take any support the point of marketing from it. It makes solution later. Like this atmosphere, it is impossible to wait production activities according to economic principle were done in enterprises.

In the realized cost, despite gained profitability is insufficient, "there is nothing to do". With this idea continuous decision in production, is the document of traditional production understanding and desperation faced. Although this is being a rational production in the region, it must be put much emphasis on the education. For real production and productivity increase, education is necessary.

References

Ahmad, M., Bravo-Ureta, B. V., 1995. An Econometric Decompozition of Dairy Output Growth. American Journal of Agricultural Economics, 77: 914-921.

Cetin, B., Koyuncu, M., 1991. Determination of Labor Usage Levels on Production Activity of Dairy Cattle in Central District of Bursa Province. Journal of Uludağ University Agricultural Faculty, 8: 29-38.

Cicek, H., 2005. Livestock Potential in Afyon and Its Contribution to The Economy of Province. Journal of Third Sector Economic Cooperation, 147: 29-36.

Cicek, H., Sakarya, E., 2003. The Profitability and Productivity Analysis of Cattle Fattening Enterprises in Afyon. Journal of Lalahan Livestock Research. Institute, 43: 1-13.

Erkuş, A., Turan, A., Eliçin, A., Tanrıvermis, H., Özçelik, A., Gündoğmuş, E., 1996. Tekirdağ İli Tarım İşletmelerinde İthal ve Kültür Melezi Süt Sığırları ile Üretim Yapan İşletmelerde Süt Sığırcılığı Faaliyetlerinin Karşılaştırmalı Ekonomik Analizi. Türk Ziraat Yüksek Mühendisleri Birliği ve Vakfı Yayınları. No: 14, Ankara.

Erkus, A., Demirci, R., 1985. Tarımsal İşletmecilik ve Planlama. A.Ü. Basımevi, Ankara.

Gillespie, J. R., 2004. Modern Livestock and Poultry Production. Thompson Learning Inc. Seventh edition, USA, pp. 377-378.

Gonç, S., Oysun, G., Ergullu, E., 1993. Problems and Support Politics on Milk Production. Türkiye V. Selling Milk Congress, 20-21 May 1993, Ankara.

Groen, F., Tornstein, S., Colleau, J. J., Pedersen, J., Prbyl, J., Reinsch, N., 1997. Economic Values in Dairy Cattle Breeding, With Special Reference to Functional Traits. Livestock Production Science, 49: 1-21.

Gunlu, A., Sakarya, E., 2001. The Analysis of Profitability and Productivity of Dairy Cattle Enterprises in Konya Province and Their Production and Marketing Problems. Journal of Veterinary Science, 17: 97–105.

Icoz, Y., 1999. The Analysis of Profitability and Productivity of Dairy Cattle Enterprises in Bursa Province. Phd thesis, Ankara University Graduate School of Health Sciences. Ankara.

Kebede, E., Schreiner, D. F., 1996. Economies of Scale in Dairy Marketing Cooperatives in Kenya. Agribusiness, 12: 395-402.

Kundu, A. K., Basu, S. B., 1988. Efficient Use of Farm Resource For Optimum Net Income From Dairying Farmer. Indian Journal of Animal Production and Management, 4: 1-4.

Mwebaze, T., 2004. Profitability of Dairy Farming in Uganda, Focusing on The Factors of Production and Marketing. Ph.D. Research Project, Johannes Kepler University, Linz.

Muftuoglu, M. T., 1999. Managerial Economics. Turhan Bookshop, Third edition, Ankara, pp. 284.

Rust, J. W., Sheaffer, C. C., Eidmen, V. R., Moon, R. D., Mathison, R. D., 1995. Intensive Rotational Grazing For Dairy Cattle Feeding. American Journal of Alternative Agriculture, 10: 147-151.

Sahin, K., 2001. A Research on Structural Features and Marketing of Dairy Farms in Kayseri Province. Yüzüncü Yıl University Journal of Agricultural Science, 11: 79-86.

Sahin, K., Gul, A., Koc, B., Dagıstan, E., 2001. Intensive Dairy Cattle Production Economics in Adana Province. Yüzüncü Yıl University Journal of Agricultural Science, 11: 19-28.

SPSS for 15.0, 2006. SPSS Inc. Headquarters, 233 S. Wacker Drive, 11th flor Chicago, Illinois 60606.

Tripath, H., Kunzru, O. N., 1992. Productivity of Dairy Animals and Employment Generation Among Rural Women. Indian Journal of Animal Science, 63: 1295-1298.

Turkyılmaz, M. K., 1999. The Efficiency of Resource Usage in Dairy Herds in Aydın Province and Their Marketing and Organisation Problems. Phd thesis, Ankara University Graduate School of Health Sciences. Ankara.

Uyanık, S., 2000. The Analysis of Profitability in Dairy Cattle Farms in The Burdur Region. Phd thesis, Ankara University Graduate School of Health Sciences. Ankara.