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AN ECONOMIC STUDY OF DAIRY FARMS: A CASE STUDY OF DAIRY FARMS AROUND SHIRAZ

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ABSTRACT

To measure the degree of efficiency of dairy farms and ways of improving the economic performance of dairy farms supplying milk to Fars Milk Processing Plant, a sample of 45 dairy farms in four regions surrounding the plant were studied. The results of the study revealed that although the farmers were mostly allocatively efficient, they were not technically efficient. The present study did not investigate the underlying causes; however, managerial and health problems may be involved. Finally policy implications have been clarified and recommendations are made to improve the economic efficiency of dairy farms.

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چکیده

برای یافتن میزان کارآیی ، علل کارآیی پایین وراههای افزایش آن درواحدهای دامداری طرف قرارداد کارخانه شیرپاستوریزه شیراز ، ۴۵ واحد تولیدشیردرچهارمنطقه پیرامون کارخانه موردمطالعه قرارگرفت . نتایج بررسی نشان دادکه هرچندا مداران دارای کارآئی تخصیصی می باشند ولیکن ازلحاظ کارآئی تکنیکی درسطح پائینی قراردارند .نتایج این بررسی ، علل این کارآئی پائین را مشخص ننموده است ،لیکن ممکن است مسائل مدیریتی ، بهداشتی وتکنیکی موثرباشند . درپایان مقاله نتایج ضمنی مطالعه درتدوین سیاست گسترش تولیدات دامی کشورموردبحث قرار گرفته وپیشنهاداتی درجهت افزایش کارآیی اقتصادی تولیدکنندگان شیر مطرح گردیده است .

INTRODUCTION

The increase in demand for livestock products, especially milk, in the last three decades has caused a large increase in import of powdered milk to Iran. Nearly all milk processing plants in the country were largely dependent on using imported milk (1). On the other hand, after the establishment of milk processing plants throughout the country, the number of dairy farms has increased to some extent. But the rate of increase has been far less than what is needed. To ensure the supply of milk by local producers, the milk plants contract with milk producers. On the basis of the contracts, producers are obliged to deliver milk at fixed prices to the plants. The increase in economic efficiency of dairy farms in general and those which supply milk to the government-owned processing plants in particular has been a major concern of the Ministry of Agriculture in Iran.

The economic efficiency of farmers in traditional agriculture has been the subject of controversy over the last several decades. Even the term "efficiency" is often used ambiguously (4). According to Farrell (3) and Jones (6) technical efficiency differs from allocative efficiency and economic efficiency combines these two concepts. The "poor and efficient" hypothesis postulates that

peasant farmers are poor not because they utilize their resources inefficiently, but because of restrictions in the kinds and qualities of resources they command. The results of a study of traditional Indian agriculture by Schultz and Hopper (5, 9), support this hypothesis. The results of another much larger empirical study of Indian agriculture by Yotopoulos and Nugent (13) broadly support the Schultz-Hopper hypothesis that, even in traditional agriculture, farmers allocate resources according to the rules of neo-classical profit maximization. The neo-classical model is static and implicitly assumes that producers are endowed with perfect knowledge. These limitations, and others, have been emphasized by critics of the Schultz-Hopper hypothesis (4). They believe that peasants in underdeveloped agriculture are risk-adverse and their predominant goal is economic survival. Adequate stability and minimizing losses, take precedence over profit-maximization (7)

The results of an empirical study of small holders agriculture in Kenya support the hypothesis that peasant farmers do trade-off lower risk against higher profits (12). The results of the study point firmly to the conclusion that if farmers are risk-adverse, and are obliged to make decisions in risky situations, the neo-classical model of profit maximization mis-specifies their allocative efficiency.

Another assumption of western capitalistic economics is that producers, above all, are motivated by self-interest and desire to maximize their profits. However valid these assumptions may be in developed countries it can be questioned whether they are equally valid in less developed countries, particularly in peasant agriculture. One argument is that in a mainly subsistence agriculture, in particular, competitive forces are likely to be relatively weak (4).

Shapiro (10) attempted to subject the technical efficiency of Tanzanian cotton farmers to objective assessment. For the purpose of this study an outer-bound maximum technical efficiency was

derived. A distribution of technical scores, ranging from 0 to 1 was derived by comparing each farmer's actual out-put with his predicted output on the outer-bound production function. The results showed only a small minority of farms with scores at or near the maximum, signifying that the majority were not operating at the production frontier. The average score was only 0.66 and it was estimated that, farmers by modifying farming practices could increase their output 51% (10). This conclusion is supported by another study (12).

The objective of the present study was to measure the efficiency of dairy farms in four regions around Shiraz which provide milk to Fars Milk Processing Plant.

METHODOLOGY

In 1985, Fars Milk Processing Plant had contracts with 45 dairy farms to supply milk at a fixed price. The farms were located mainly in Shiraz, Kavar, Marvdasht and Beiza. Due to the small population size, it was decided to collect data from all farms. Therefore, all farms were visited and their managers were interviewed. The data were classified based on the regions. Measures of efficiency such as average daily milk production per dairy cow, income produced by 100 Rls. spent on feeds and feeds cost per kg of milk were employed to compare various groups. The break-even analysis was made to find out the economic situation of dairy farms. Dairy farms were also divided into four groups in relation to the size and the average yearly profit was calculated and compared.

FINDINGS AND ANALYSIS

The dairy farms according to their contracts were obliged to deliver milk to the plant at fixed price of 66 Rls [1] per kg of which only 23 Rls. were paid by the plant and the difference (43 Rls.) was paid as a subsidy by the government. This shows

[1]The official exchange rate of one US dollar is 75 Rials.

that 65% of the producers price were a subsidized and indicated that the subsidy which is paid to protect urban consumers was substantial.

As Table 1 shows the dairy farms are concentrated in four agricultural regions surrounding the city of Shiraz, namely, Kavar, Beiza, Marvdasht and Shiraz vicinity with the highest concentration in Kavar.

Table 1. Distribution and size of the dairy farms.

Region	No. of farms	% of farms	No. of dairy cows	Ave. No. of dairy cows/farm
Kavar	17	38	126	7
Beiza	15	33	190	13
Shiraz	8	18	507	63
Marvdasht	5	11	108	22
Total	45	100	931	-

The number of dairy cows varied among the regions and was concentrated mostly in Shiraz (Table 1). The relatively high number of dairy cows in Shiraz region was mainly due to existence of a large, modern farm in the region which owned 309 dairy cows. This caused the average size of farms in terms of the number of dairy cows in Shiraz to increase to 63. If we omit this unique farm, the average size of farms in Shiraz will be reduced to 28 dairy cows. This indicates that most of the dairy farms in the population were small. The number of cattle held in the farms were more

than twice the number of dairy cows. Proportion of dairy cows to total number of cows ranged from 35% in Kavar to 43% in Beiza.

Table 2 shows the average and limits of daily production of milk per farm in four regions. As Table 2 indicates apart from a few relatively large farms (one in Shiraz and one in Beiza) the size of farms in terms of daily milk production is relatively small. Table 2 also shows that there is an indirect relation between the size and the distance of dairy farms from the urban market. In other words, the shorter the distance from urban market, the greater the size of dairy farms.

Table 2. Daily production of milk per farm and average daily milk production per cow.

Regions	Daily milk production per farm (kg)		Daily milk production per cow (kg)	
	Limits	Average	Limits	Average
Kavar	20- 352	100.4	10.0-16.7	13.5
Beiza	30-1085	172.0	10.0-17.5	12.1
Marvdasht	150- 626	257.9	10.8-15.0	12.9
Shiraz	150-6180	1078.2	8.8-20.0	12.6

As indicated in Table 2, there is no significant difference in daily milk production per cow among four regions ($F = 0.83$). However there is a considerable difference among dairy farms in each

region when one looks at limits of daily milk production per cow. The largest difference between upper and lower limits exists in the Shiraz region where the maximum daily milk production per cow (20 kg) is more than twice of the minimum (8.8 kg). This indicates that there exists a difference in technical efficiency among farms within each region. It is interesting to note that 71% of total dairy cows in the Shiraz region belong to the two rather large farms and their daily milk production per cow was 18.7 and 20 kg, which were the highest among all farms under study.

One source of technical inefficiency may be related to the quantity and quality of bulls. Table 3 shows proportion of bulls in relation to cows.

Table 3. Proportion of bulls to cows.

Regions	Limits	Average	Farms without bulls
Kavar	0-18	7.0	5
Beiza	0-28	9.0	1
Marvdasht	0-16	9.0	1
Shiraz	0-6	3.5	1

Another factor affecting the efficiency is the quality of ration. Shortage and lack of access to concentrates have caused some problems and have affected the quality of rations. Table 4 shows various kinds of concentrates used in the ration in four regions. Accordingly 95% of dairy farms used bran, 84% molasses, 47% cotton seed meal and 40% barley. These were most commonly used items in the regions. Dried bread was used in 82% of dairy farms in Kavar region.

Table 4. Kinds of concentrates used in dairy farms of various regions.

Region	Molasses		Cotton seed meal		Bran		Barley		Wheat		Dried bread	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Kavar	11	64	1	6	16	94	1	6	3	18	14	82
Beiza	15	100	12	80	14	93	7	47	0	0	0	0
Marvdasht	4	80	4	80	5	100	5	100	1	20	0	0
Shiraz	8	100	4	50	8	100	5	62	2	25	0	0
Total	38	84	21	47	43	95	18	40	6	13	14	31

To evaluate the economic performance of dairy farms within and among the regions gross margin and profit of farms were estimated. As Table 5 shows there were some differences among regions. While the average profit was negative in Beiza and Kavar indicating that dairy farms were facing serious problems in these two regions.

In Kavar with the highest average loss (1,027,000 Rls.), fourteen farms (80%) and in Beiza, the other region with the second highest average loss of 832,000 Rls., eleven farms (73%) were operating below break-even point. Although, it was economical for farms with positive average gross margin to operate in the short-run, but they were facing loss in the long-run. In Kavar and Beiza regions there were three and two farms, respectively, which were operating below shut-down point. These farms were facing loss even in the short-run and it was not advisable, from the economic point of view, to continue their production. The main reason for farms to continue production in spite of loss is that in their calculation they do not include opportunity costs of employing their resources.

The limits of average profit among dairy farms within each region also indicates that there were differences in terms of allocative or price efficiency among them. For example, in Kavar with the highest number of problematic farms, there was a farm with an annual profit of 3,776,000 Rls. and another farm with an annual loss of 3,576,000 Rls.

Other criteria used for measuring the efficiency of dairy farms were income produced by 100 Rls. spent on feeds and feeding costs per one kg of milk. As Table 6 shows income produced per 100 Rls. of feed cost varies between 229 Rls. and 191 Rls. among four regions. It is believed that in dairy farms feed costs could be less than 50% of total cost (11). Therefore, these farms with this indicator below 200 are considered to be inefficient. In spite of wide variations among individual farms within a region, F test showed that there was

Table 5. Comparison of economic indicators of dairy farms in various regions.

Region	Average gross margin (1,000 Rls.)	Average profit (1,000 Rls.)	%	No. of farms below break even point	%	No. of farms below shut down point	%
Marvdasht	8,846	5,227	5	1	20	0	0
Shiraz	14,562	3,882	8	6	75	0	0
Beiza	2,436	-832	15	11	73	2	13
Kavar	1,592	-1,027	17	14	80	3	18

Table 6. Income produced by 100 Rls. of feeds and feed cost kg^{-1} (Rls.).

Region	Income per 100 Rls. of feed cost (Rls.)	Feed costs kg^{-1} of milk (Rls.)
Kavar	229	83
Marvdasht	221	66
Beiza	198	75
Shiraz	191	96

not a significant difference in this respect among regions (F = 1.21). The same conclusion was reached when feed cost per liter was compared (F = 1.5).

Profit and Size

The dairy farms studied could be classified into four categories in terms of number of dairy cows. As Table 7 indicates, there was a relationship between size and type of farming. Farms with less than 20 dairy cows were classified as traditional and suffered an average loss of 367,000 Rls This is contrary to "poor but efficient" hypothesis expressed by Schultz (9) as far as the case study shows.

Traditional farms relied mainly on family labor with minimum investment in buildings and machinery. The economic condition of second category of farms (with 20-49 dairy cows) was worse as the farms were made the same amount of investment on building and machinery but used some hired

Table 7. Average profit of various types of farms.

Size of farms (No. of dairy cows)	Type of farming	No. of farms	% of farms	Average yearly profit (1,000 Rls.)
1-19	Traditional	36	80	-367
20-49	Semi-traditional	5	11	-834
50-99	Modern	3	7	2,199
100 and more	Modern	1	2	38,233

labor. This group of farms faced an average yearly loss of 834,000 Rls. The farms with more than 50 dairy cows were classified as modern. In these farms a substantial amount of investment was made on buildings and other facilities and they were run by well-informed and well-experienced managers. The first group of modern farms which had 50-99 dairy cows made an average profit of 2,199,000 Rls. per year. There was only one large farm with 309 dairy cows which earned an average profit of 38,233,000 Rls. per year.

The result of the study showed that traditional and semi-traditional farms were facing difficulties as they made some losses in the long run. They had no choice but to increase their efficiency if they wanted to stay in business and function as econimically reliable units.

CONCLUSIONS AND RECOMMENDATIONS

The study of dairy farms in four regions around Shiraz revealed that the dairy farms generally and small dairy farms, especially, were facing serious problems. The causes of inefficiency of farms may be technical rather than allocative. As a result the farms were considered as price or allocative efficient but not technically efficient. By providing extension services to farmers to equip them with existing technical know-how the production function of farms could be shifted up and farms' efficiency would increase.

The present study did not investigate the underlying causes; however, managerial and health problems may be involved.

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