Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2013, 3(6):49-53

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Economical evaluation of industrial milk production units in Khuzestan province

Mohammad Aghapour Sabbaghi

Department of Agricultural Management, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran

---

ABSTRACT

This study, because of the importance of milk production in Khuzestan province, was aimed at evaluating the economical situation of milk production in this region`s industrial units. Using the information of the census 2012, 33 industrial units were studied. Cost function approach was used to evaluate these units` economical situation. Results indicate a too large difference between the industrial units in terms of rate of cost, production, and per capita income. In addition, evaluations indicate that the province`s milk production industry has an increasing returns to scale, so it is suggested that, by adopting policies, managers of these units increase their production so that they can achieve suitable economic profit in this industry.

Keywords: Returns to Scale, Milk, Industrial Unit, Khuzestan Province

---

INTRODUCTION

Livestock industry of Iran, because of its favorable capabilities and amenities, has a considerable importance in providing a large part of the society`s food needs. In Iran, with a 5% annual growth , milk production increased from 5/6 million tons in 2000 to 9/5 million tons in 2010, seeing that Iran produces 1/ 2 % of the world`s milk [1]. Rate of daily milk and dairies consumption per person in a country indicates the situation of that country's nutrition, health, and somehow safety. Thus, self-sufficiency in milk production, as a strategic product, has always drawn the authorities` attention, so, by various form of development planning, a part of credits was allocated to the development of industrial and semi-industrial cattle breeding farms[2]. But in the country`s cattle breeding industry, like all production sections, there is a big gap between potential and actual capacities of production. Using the capacity of returns to scale of production units is one of most important ways to increase the production and appropriate use of available capacities. It seems that the needed inputs` restriction and cost of buying them from domestic or offshore suppliers indicate the necessity of evaluating the production economic structure and its decisive factors such (as returns to scale) in dairy cattle breeding units in order to have an economic use of inputs.

Cost structure is an important resource affecting productivity and reduction of production costs as well as the increase of competitive power of production unit, which is influenced by the production structure, kind of product, and socio-economic situations of each region [3]. Evidences indicate that along with the investment growth in this industry, production is often carried out on small scales and, in fact, the reason of most traditional production units` endurance is the governmental supports as subsidies [3].In fact this indicates that savings resulted from scale did not draw any attention in this sector`s production. Given the role of milk for food security, economical evaluation of milk-producing units was greatly considered by the researchers of different fields of sciences. Eric et al.(2010) evaluated the relationship between the profitability of cattle breeding units and qualitative risk, production, and risk of price. They calculated an exchange relationship between quality, performance, and production like the average daily production and nutrition efficiency[4]. Using data envelopment analysis, Akbari and et al evaluated the

performance of livestock industry`s efficiency in different provinces of Iran and concluded that among Iran`s provinces, Ardabil and Boshehr have the maximum and minimum efficiency in dairy cattle breeding units, respectively [5].

Islam and et al compared the the profitability of crossbred and native cattle in west Bengal. They concluded that the crossbred ones are more profitable[6]. Morgan addressed the maximization of livestock units` profit in his thesis and concluded that in dry years, renting a farm for hay supply is more profitable than reducing the number of livestock during these years [7]. Yazdanpanah and Najafi evaluated the optimum size of dairy cattle breeding units in Fars province and concluded that there is a difference between the optimum size of production units and their current capacity[8]. Given the importance of milk production in Khuzestan, which ranks the sixth milk producer of Iran, this study was aimed to evaluate the economical situation of milk production units of this province.

MATERIALS AND METHODS

In terms of orientation, this study is an applied one and, in terms of time horizon, is a periodic one. Cost function method was used for the economic evaluation of these units. General form of the function is:

$$C = c(p_1, p_2, p_3, \dots, p_n, Q) \quad (1)$$

In the relation above, total cost of production(C) is a function of each unit`s input cost and amount of product. Average cost is attained from subtracting the total cost from the amount of product:

$$AC = \frac{C(p_1, p_2, p_3, \dots, p_n, Q)}{Q} \quad (2)$$

Marginal cost is equal to the variance of total cost resulted from producing 1 additional unit of product:

$$MC = \frac{dc(p_1, p_2, p_3, \dots, p_n, Q)}{dQ} \quad (3)$$

These functions are implicit; practically, one suitable functional relation is selected using statistical tests and econometrics. One criterion explaining the existence or nonexistence of economic saving resulted from the size of production units is the elasticity of cost (EC), which indicates the relative variance of total cost because of the relative variance of production amount and is expressed by the relation below:

$$E_c = \frac{\partial C/C}{\partial Q/Q} = \frac{MC}{AC} \quad (4)$$

EC indicates the ratio of marginal cost to the average cost in each production stage. When EC is less than 1, it means that by producing a product with 1 % increase, cost of production will have a less than 1 percent increase. In this case, there is a saving resulted from size and, consequently, larger units act more economical than the smaller ones. Lack of saving is contrary to mentioned case and if it is equal to one, there will be not any difference in terms of economic saving or lack of economic saving [9]. Return to scale has an inverse relationship with EC. When EC is downward, return to scale will be upward, and when it is upward, return to scale will be downward. Thus, it is indicated that cost function should be used to calculate the EC and evaluate the economic savings. Functions used in this study are flexible. This kind of functions having a sufficient number of parameters does not limit the production structure. Since the three areas of production are separable, the economic restriction of production can be identified. Because of the wide use of functions such as translog, second-order generalized, and generalized Leontief, in this study, as well, the appropriate function, based on the selection criteria, the best function is determined from these three functions. Likelihood Ratio is used to evaluate the model`s significance [10]. Statistical society of the present study is all Khuzestan milk-production industrial units and, because they are numerous, only ones having operation license were studied. Number of these units in 2012 was 33, and their information was collected by census. Shazame software was used to estimate the econometric models.

RESULTS AND DISCUSSION

In the study society, average number of livestock in the units is 118. Number of livestock is varied between 25 to 580 animals per province. High variance of of this variable indicates the high difference between the numbers of

livestock kept in the province breeding units. In addition, primary evaluations indicated that a major part of production variable`s costs in the livestock breeding sector includes the nutrition, workforce, and fuel costs.

Table1: Percaipta cost of milk production in Khozestan province industrial units

COST (Rial)	Average	Max	Min	Standard deviation	Cost share %
Labor	2422.8	13150.6	493.3	3216	15
nutrition	11408	76870	3567	12768	71
Fuel and other cost	2088.2	13162.7	164.3	2318	14

In the table above, it is indicated that 70% of per capita costs is related to the livestock nutrition. As indicated, averagely, costs of workforce, nutrition, and fuel as well as health and treatment for 1 kg milk are 2422, 11408, and 2088 Rials, respectively. In other words, cost of 1 liter of milk in the studied units is about 15918 Rials. Undoubtedly, achieving the optimal production rate is one of the main objectives of each unit. Evaluation of units` rate of production in an industry with activities in relatively similar conditions can indicates the general situation of the industry and, comparing the production rate of enterprises working in that industry, indicates the efficiency and productivity of its units.

Table2: Percapita production in Khozestan province industrial units

Variables	Average	Max	Min	Standard deviation
Percapita production(Liter)	2591.8	3929.5	1237.3	790

It is illustrated in the table above that there is a 2700 liters difference in the rate of the studied units' production per capita. In other words, ignoring the the impact of units` size, it is concluded that a major part of the difference in the studied units` production rate is related to their management`s capability of using production inputs or ,more precisely, efficiency of the units. Therefore, it is obvious that the producers of this industry are highly capable of increasing their production rate and getting the optimal production.

Findings indicated that the dairy units` owners obtain an average income of about 45 million Rials per each cattle. This income ranges between 13 and 66 million Rials.

Table3: Percapita income in Khozestan province industrial milk production units

Variables	Average	Max	Min	Standard deviation
Percapita income (Rial)	45850522	66751504	13664931	1265664

Difference in this per capita income , which can be a sign of production units production, indicates that units experienced lower per capita income can increase their unit`s income by putting policies as well as better and more efficient input management into consideration. As discussed, cost function approach was used for the economic evaluation of studied units. First step of using this methodology is the selection of an appropriate form of function. Linear, Cobb-Douglas (logarithmic), transcendental, translog, quadratic, Leontief forms are the most important forms used in the cost functions mentioned in the literature of several studies. To choose the best functional form, all models above were fitted in the present study. It should be mentioned that given the methodology indicated in the third section of the present study, cost function used in this study is as below.

$$C = c(p_1, p_2, p_3, p_4, Q) \qquad (5)$$

In the relation above, C is the total cost of milk of the province dairy industrial units. In addition, p_1 is the concentrate input price, p_2 is the input price of forage maize, p_3 is the input price of alfalfa, p_4 is the labor price, and Q is the rate of annual milk production. Different indicators were used to determine the superior model. A summary of these indicators in illustrated in the table below.

Table 4: Model selection terms for industrial milk cost production function

Models	SIGNIFICANT COFFICIENT	R^2	AIC
Linear	2	0.85	2.2
Cobb-Douglas	2	0.75	-1.8
Transcendental	4	0.78	-1.71
Quadratic	2	0.82	-1.33
Leontief	6	0.91	1.5
Translog	14	0.93	-1.74

As indicated, based on all three criteria evaluated in the present study, translog model can be considered as the best functional form.

Table 5: Result of milk cost function (Translog form)

Variables	Coefficient	Standard deviation	T statistic
Price of concentrate	87.23	35.73	2.44
Price of maize	-166.5	72.14	-2.1
Price of alfalfa	69.2	55.8	1.23
Price of labor	11.09	4.42	2.51
milk production	-1.006	0.43	-2.32
Interaction of Concentrate and maize	10.34	4.38	2.36
Interaction of Concentrate and alfalfa	-6.21	3.73	-1.66
Interaction of Concentrate and labor	-3.6	1.78	-2/02
Interaction of maize and alfalfa	-1.4	0.6	-2.3
Interaction of maize and labor	4.09	1.26	3.24
Interaction of alfalfa and labor	-0.048	0.68	-0.071
Interaction of Concentrate and production	-0.96	0.43	-2.2
Interaction of maize and production	1.26	0.41	3.06
Interaction of alfalfa and production	-.038	0.15	-2.42
Interaction of labor and production	0.08	0.25	0.32
Quadratic of Concentrate price	-5.37	1.72	-3.11
Quadratic of maize price	2.46	0.88	2.78
Quadratic of alfalfa price	0.28	1.2	0.24
Quadratic of labor price	-0.54	0.29	-1.83
Quadratic of milk production	0.16	0.06	2.42
C	-162.8	94.9	-1.72
R2 0.93	D. W 2.01	R^2 0.85	AIC -1.74

It can be seen in the table above that in the translog model, in addition of entering the variables in their logarithmic form, logarithm of the inputs interaction and the interaction of milk production rate with inputs was also entered in the translog model. In addition to these variables, in this function, square of all independent variables in a logarithmic form is also considered in this model. Totally, 20 variables were entered in the model of which 14 independent ones are statistically significant. As mentioned, EC to the amount of production can be used to evaluate the return to scale. Given the selected cost function`s estimated coefficients, calculated EC was 0/91, which is less than 1. It shows that if milk production has a 1% increase, costs will have a 0/91 % increase. In other words, milk production units can reduce their average costs of production by increasing their production in Khuzestan industrial units. Increase of the production units' size reduces the cost of producing each product. This increase of size will help the production process to be economic. 93%, of the studied units have an EC less than 1, so they can experience the saving resulted from size; the remaining 7% face the lack of saving resulted from size.

Based on the EC calculation, it can be said that milk production industry in Khuzestan faces an increasing return to scale. A 1/09 return to scale is attained for this industry meaning that if all inputs used in poultry units have 1% increase, it is expected that the rate of milk production has a more than 1% increase (about 1/09%). But given the difference of return to scale at different production levels in the milk production units, it can be said that studied production units` managers can reach a higher level of profitability by increasing the size of their production units and , also, reducing the average cost of production.

CONCLUSION

Results of estimating the return to scale in Tehran province milk production units indicates a possibility of milk average cost reduction and more economic production process. Thus, taking policies is suggested, so the mangers of milk production units can have more products by making appropriate changes in all factors and increasing their production scale. In other words, in this industry, in the studied region, there is an increasing return to scale. In

addition, evaluations indicate a high difference at the cost, production, and per capita income levels of these production units, meaning that optimal and efficient use is possible for the mangers of these units. Consequently, it is suggested that optimal and economic production conditions be granted for all milk production units of the province by taking policies such as holding educational and promotional classes for managers to be more familiar with the dominant economic principals of the production process.

Acknowledgment
This article obtained from research project with subject as Determine Dairy Cattle Optimal Size in Khozestan Province that completed with Islamic Azad University, Shooshtar branch financial support.

REFERENCES

[1] Food and Agriculture Organization of The United Nations,Rom Conference,**2010**,8,10.
[2] Plan and Budget Organization, Informatics and study center,**1992**,18,1.
[3] Dashti G, Shorafa S, *J Agriculture and Development*, **2010**,17,35.
[4] Eric J,Belasco, Ted C,Schroder, Barry K, Goodwin,*J Agricultural and Resource Economics*, **2010**,35, 385.
[5] Akbari N, Samadi S, Dinmohamadi M, *J Agriculture and Development* ,**2008**,13,165.
[6] Islam S, Goswami A, Mazumdar D ,*J Ext, Edu*,**2008**, 8,1, 28.
[7] Murugan S,Thesis for master of science, Profit,**2007**, 80.
[8] Yazdanpanah M, Najafi B, *J Agriculture and Development*,**2005**,52,150.
[9] Chambers R. Applied production analysis, Cambridge ,**1988**,PP 140.
[10] Aghapour Sabbaghi M, Azizan A, *J European Journal of Experimental Biology* ,**2013**,3,149.