



# **Evaluating the effect of managerial and economic factors on broiler poultry production in Qom province**

*Ghasem Gholami<sup>1</sup>, Sahar Dehyouri<sup>2\*</sup>*

<sup>1</sup>*Department of agriculture, Islamshahr branch, Islamic Azad university, islamshahr, Iran*

<sup>2\*</sup>*Environmental Science Research Center, Department of agriculture, Islamshahr branch, Islamic Azad university, islamshahr, Iran.*

*Email: dehyouri.s@gmail.com*

## **Abstract**

Considering the importance of chicken meat production as a strategic protein product, it is necessary to pay attention to the effective managerial-economic factors in strengthening the poultry industry. The purpose of this study was to investigate the managerial-economic factors affecting the poultry production process in Qom province, including five parts: Central section, Salafchegan, Kahak, Jafarabad, Khalajestan; It is during the years 1393-1390. The required data were collected by completing a researcher-made questionnaire with validity and reliability approved by the managers of selected poultry units. The collected data were analyzed using Eviews7 and Excel software. The main findings of this study show that the variable of production capacity, variable of feed value and variable of working capital have a positive and significant effect on the amount of production in selected production units. The variable of production and administrative payments has a negative and significant effect on the amount of production and also the amount of production has the highest sensitivity to working capital and the least sensitivity to production capacity.

**Keywords:** Meat Poultry, Cobb Douglas Production Function, Economic and Managerial Factors, Qom Province.

## **Introduction:**

The main reason for the existence and responsibility of managers is to play the role of leadership in order to increase effectiveness and provide better use of resources. Peter Drucker believes that one of the main and determining factors of growth in any society is the success of managers, which has a fundamental role in the growth and promotion of any society (Nazem, 2007). However, the results of some studies show that the production and productivity of

agricultural production units, especially broiler breeding units in the country is not in a good condition (Shirani et al., 2007; Rahimi and Karimi, 2009; Rafiei et al., 2011). Nuthal (2006) has conducted studies on how management and managerial factors can affect production and productivity. The results of these studies show that with proper planning, rationality in decision making, risk-taking, Information retrieval, the use of advanced work methods, the ability to coordinate activities and the ability to market correctly and logically, provide

the possibility of increasing production and improving productivity. Al-Hayari (2011) has shown that the use of appropriate technologies, having farm management skills and most importantly, the type of relationship between unit management and its manpower, has played a decisive role in increasing production and improving productivity. Broiler breeding industry is one of the important sub-sectors of agriculture in the country, which has distanced itself from peasant and traditional agriculture and has been able to attract a lot of capital and use the latest technologies in the world to find a special place in agricultural production and employment. For this reason, this industry needs to follow new management methods and in accordance with economic and managerial principles to ensure maximum efficiency. Mojahedfar (2001) in the study of productivity in broiler farms in Yazd province concluded that the inputs of day-old chicks and labor in the units are less than optimal and the input input is more than optimal.

Shokri (2004) in a study investigated the production structure in broiler breeding units and determined how to return to scale in the Iranian poultry industry by estimating the costlog function of translog. The results showed that the amount of return to scale varies at different levels of production in poultry units. Also, a meat poultry unit with a capacity of 50,000 pieces in each period is the most suitable size for poultry.

Mohammadi (2008) has studied the poultry units of Fars province by data envelopment analysis method. The results of his research showed that larger units have a better

economic situation than smaller units. According to him, the use of advanced equipment (feeding system and automatic ventilation system) has led to the improvement of this situation.

Talezari (1997) measured the productivity of production factors in the poultry industry of Semnan province and concluded that in Semnan province, grain inputs, day-old chicks and over-optimal labor force have been used. In his study, the average technical efficiency of the units was equal to 90% and it was stated that in the poultry breeding units of Semnan province, there was a constant return to the scale.

Soltani (1373) using the production function approach, after reviewing and analyzing the situation of poultry farms in Fars region in terms of profitability and activity, concluded that in these units, input, drug labor and vaccines are used in the economic area.

Dashti (1374) using the data of 64 broiler units of Tabriz city to estimate the production function. The results showed that the Cobb-Douglas production function was suitable to explain the relationship between chicken meat product and production inputs. Poultry feed had the highest production elasticity and the labor elasticity coefficient was much smaller and the health coefficient was negative.

Beigi Bandarabadi (1999) in order to analyze the efficiency of production factors and evaluate various issues in meat poultry farms in Qom region during 1997 and 1998, respectively, 53 and 44 poultry farms were randomly selected and reviewed the information of their latest production period. According to the research findings, large-scale poultry farms (over 12,000 pieces) had



lower production performance in each period. In each period, Cobb-Douglas functions were the best estimated functions and the input elasticity of input production was high and significant.

Abdoli and Varhrami (2009) have studied this issue in a study entitled "Study of the effect of technological progress on energy saving in industry and agriculture using the Cobb Douglas function". Experimental studies in this paper show that the improvement of technology will reduce the growth rate of energy intensity in industry by an average of 1.53 and the growth rate of energy intensity in agriculture by an average of 1.32. Alrevis and Francis (2003) have studied this issue in the study of Saudi broiler breeding units with the approach of random border production function. According to the research findings, factors such as poultry size, age, and household size of the manager had a positive effect on production and manager experience and length of period had a negative effect on it. Juma (2004) used data from 200 laying poultry units in Osan State and used the Cobb-Douglas production function to show that feed inputs were used too economically. Also, poultry units closer to urban centers were more productive. is. Ojo (2009) studied the production trend of 100 poultry farmers in one of the Nigerian states by estimating the random border production function. Their findings show that factors such as technical equipment and experience have had a positive effect on this process. Alabi and Arona (2005) examined this issue in a study of domestic chicken production in Nigeria by estimating the stochastic production function. They have shown that

farm size, household size, gender, innovation acceptance index have positive effects on production.

### **Research Methods:**

In order to investigate the effects of managerial-economic factors, production function estimation has been used. In order to estimate the broiler production function, after extracting the information of the completed questionnaires, the Cobb Douglas function was estimated. The mathematical form of Cobb Douglas' function is as follows:

$$Y = Ax_1^{\alpha_1} x_2^{\alpha_2} x_3^{\alpha_3} x_4^{\alpha_4} \quad (1)$$

Where in:

Y: Production rate

X1: Production capacity

X2: Value of feed consumed

X3: Production and administrative payments

X4: Working capital.

The Cobb Douglas production function is estimated by agricultural economists for any potential production process that involves the transfer of inputs to agricultural production. However, the simplicity and algebraic subtlety of the Cobb Douglas production function is the reason for its use by agricultural economists has been check the significance of variables

Before estimating the model, it is necessary to test the significance of all variables used in the estimates. Because of the ignorance of variables, false regression problem happened in both the case of time series data and in the case of panel data.

### F Limer test

It must first be seen whether there are any heterogeneities or individual differences at all. In the first case, the panel data method is used, and otherwise, the usual least squares method will be used. Because only the data is stacked and the difference between them is ignored. For this purpose, the significance of individual effects is tested (Abrishami, 2002):

$$F_{N-1, NT-N-K}^* = \frac{RRSS - URSS / N - 1}{URSS / NT - N - K} \quad (2)$$

Where in:

RRSS: Total squares of bound waste

URSS: total Square of unbound waste

K: Number of explanatory variables

N: Number of sections

In the F test:

Hypothesis H0: Same width of origins (integrated data)

Contrary to H1 Hypothesis:

Width Inequality of Origins (Panel Data Method) placed.

Therefore, it can be written:

$$H_0 : \alpha_1 = \alpha_2 = \dots = \alpha \quad (3)$$

H1: At least one width of the origin is different from the rest.

### Fixed or random effects test

There are two methods for estimating the pattern using panel data method, which is the fixed effects method and the random effects method. Determining which of these two methods should be used for a sample of data is done through specific tests. One of the most common of these tests is the

Hausman test, the statistic of which (H) has a  $\chi^2$  distribution with degree of freedom K (number of explanatory variables) and is defined as follows:

$$\begin{aligned} H &= \hat{q}' V \hat{ar}(\hat{q})^{-1} \hat{q} \approx \chi^2(k) \\ \hat{q} &= \hat{\beta}_{FE} - \hat{\beta}_{RE(GLS)} \\ V \hat{ar}(\hat{q}) &= V \hat{ar}(\hat{\beta}_{FE}) - V \hat{ar}(\hat{\beta}_{RE(GLS)}) \end{aligned} \quad (4)$$

So that it represents the estimators of the fixed effects method and represents the estimators of the random effects method, and therefore in Hausman test, hypotheses H0 and H1 are defined as follows:

$$H_0 : \alpha = \alpha_s \quad (\text{Random effects method})$$

$$H_1 : \alpha \neq \alpha_s \quad (\text{Fixed effects method}) \quad (5)$$

Therefore, if the H0 hypothesis is not rejected, the random effects method is preferred to the fixed effects method and is selected as a more appropriate and efficient method. Otherwise, the fixed effects method will be efficient. In fact, H0 hypothesis in this test means that there is no relationship between the disturbance component related to the width of the origin and the explanatory variables and they are independent of each other. While Hypothesis H1 means that there is a correlation between the component of the disorder and the explanatory variable, and because there is a correlation between the component of the disorder and the explanatory variable, there will be a problem of bias and incompatibility between the component of the disorder and the explanatory variable. Therefore, it is better



to use the fixed effects method if H0 is rejected (Gujarati, 2004).

Validity and reliability of the questionnaire  
Validity indicates the research tool in measuring the desired traits. In order to determine the validity of the questionnaire, faculty members, experts and thinkers in this field were used and the necessary modifications of standard questionnaires have been made to comply with the subject of this research. To calculate the reliability,

there are different methods such as: re-implementation method (retest), parallel or peer method, baling or halving method and Cronbach's alpha coefficient. In this study, Cronbach's alpha coefficient was used to determine the reliability of the questionnaire.

### Research findings

Demographic characteristics of poultry farms:

**Table 1.** Frequency characteristics of poultry farms in a statistical sample related to Qom province

Geographical characteristics of poultry farms	Frequency	Frequency percentage	cumulative frequency
Central Section	37	20.1	20.1
Salafchegan	47	25.54	45.65
Kahak	45	24.46	70.11
Jafarabad	33	17.93	88.04
Khalajestan	22	11.95	100
total	84	100	

**Table 2.** Status of broiler breeding units in Qom province

Status of poultry breeding unit	Frequency	Frequency percentage
Traditional	5	2.7
Semi-industrial	157	85.3
Industrial	22	12
Total	184	100

**Table 3.** The amount of work experience of the statistical sample of poultry farmers in Qom province

Extensive work experience	Frequency	Frequency percentage	cumulative frequency
Less than 10 years	45	24.45	24.45
Between 10 and 20 years	97	52.71	77.16
Between 20 and 30 years	25	13.58	90.75
More than 30 years	17	9.24	100
Total	184	100	-

**Table 4.** Type of ownership of broiler breeding units in Qom province

Type of ownership	Frequency	Frequency percentage
Private	152	82.6
Cooperative	15	8.16
Corporation	17	9.24
Total	184	100

### **Estimating the research pattern**

In this regard, first, important quantitative and qualitative independent variables such as production capacity, production amount, feed value, production and administrative payments, working capital, status of production unit, type of ownership, age, work experience, level of education and gender, Were entered in the model and then after the initial estimation of the model and obtaining the preliminary results, it was found that only four variables of production capacity, feed value, production and administrative payments and working capital were statistically significant in the Cobb Douglas model. The rest of the variables were removed from the model statistically because their coefficients were not statistically significant.

The Cobb Douglas production function is then estimated using the above four variables. The results of estimating the desired production function are given below. It should be noted that due to the lack of significance of other research variables, the results and tests are presented based on only four variables of production capacity, feed value, production and administrative payments and working capital.

Before estimating the model, it is necessary to test the significance of all variables used in the estimates. It is necessary to test the variability of the variables in a way that can be done by Levin, Lin and Chow test, M test, Sons and Shane test, Bertong test, Fisher test. In this research, Levin, Lin and Chou methods have been used to test the significance of the variables used in the model.

**Table 5.** Mana results of variables

<b>Variable</b>	<b>Levin, Lin and Chu test</b>	<b>Possibility</b>	<b>Result</b>
Production rate	-455.564	0.000	accepted
Production capacity	-150.345	0.000	accepted
Feed value consumed	-27.442	0.000	accepted
Production and administrative payments	-14.201	0.000	accepted
Working capital	-34.491	0.000	accepted

Source: Research calculations

The results indicate the significance of the model variables at the surface. In these tests, Hypothesis H0 is based on non-significance and H1 hypothesis is based on the significance of variables, and as can be seen in Table 4-12, all variables are fixed at zero level.

After examining the significance of the variables, the research model is estimated using the panel data method with fixed effects for the production units under study.

To select the estimation method based on panel data or combined data method, F-Limer statistic was used. In this test, Hypothesis H0 is the combined data method and Hypothesis H1 is the estimation method based on panel data. Limer F statistic shows the number 142.32 with zero probability, which indicates the confirmation of the panel data method, and therefore according to this statistic and the test, the panel data method is acceptable.



**Table 6.** F Limer test results

<b>F Limer</b>	<b>Statistics</b>	<b>probability</b>
	142.32	0.0001

Source: Research Findings

The Hausman test was used to decide whether to use the fixed effects method or random effects.

**Table 7.** Hausmann test results

<b>Hausman test</b>	<b>Statistics</b>	<b>probability</b>
	3.030994	0.5527

Source: Research Findings

This test is, in fact, a test of the interdependence of individual effects and explanatory variables, according to which the generalized least squares estimate is consistent under hypothesis H0 and inconsistent under hypothesis H1. In other words, using the random effects method, which uses generalized least squares estimators. Hypothesis H0 shows the compatibility of coefficients, while Hypothesis H1 is based on the rejection of this compatibility. If hypothesis H0 is not rejected by performing the Hausman test, the method used for estimation will be the random effects method (Baltaji, 2005). Hausmann test number is 32156/110 with a probability of zero, which indicates the confirmation of the fixed effects method. In the following, Cobb Douglas production function is estimated based on panel data method and fixed effects.

Estimation of Cobb Douglas production function by panel data method with fixed effects

Cobb Douglas production function form has been selected according to simplicity and compatibility with economic logic, good fit and previous use history to study broiler production (Nabi Ian, 2005) and the basis of production function estimation in order to investigate the effects of managerial-economic factors on Production of broiler units is located in Qom province. The results of this estimate are presented in Table (4-13). In this model, the coefficients of the function are the production tensions. R2 also shows that 87% of the changes are explained by the four variables of production capacity, feed value, production and administrative payments, and working capital.

**Table 8.** Estimation of Cobb Douglas production function using panel effects model with fixed effects

Variable	Coefficient		T test	probability
	size	Mark		
Constant	-1.651892	-	-1.022467	0.3069
Production capacity	0.001479	+	0.107019	0.0048
Feed value consumed	0.229039	+	0.843275	0.0394
Production and administrative payments	-0.01006	-	-0.006857	0.0030
Working capital	0.573306	+	1.193590	0.0045
$R^2=0.87$		$R^2= 1.98$	D.W=-0.84	

### Research results

The main findings of this study show that:

The variable of production capacity has a positive and significant effect on the amount of production in selected production units in Qom province during the study period. However, it can be seen that the effect of this variable, although statistically significant, is somewhat low, which indicates that the production capacity used could not have a favorable effect on the production of the units under study. This conclusion is consistent with the findings of Shokri (1383), Mohammadi (1387), Dashti (1387), Auleris and Francis (2003), Alabi and Arona (2005).

The variable of feed value has positive and significant effects on production in selected production units in Qom province. According to the estimation coefficient for this variable, it can be seen that this variable, after the working capital variable, has been one of the most effective items in the production process. This conclusion is consistent with the findings of Dashti (1374) and Talezari (1376), Soltani (1373).

The variable of production and administrative payments had a negative and significant effect on the amount of

production in the production units in Qom province. Due to the fact that most of the activities in selected poultry farms have been done semi-industrially and manpower has played a small role in this process, the size of this coefficient is in line with expectations. This conclusion is consistent with the findings of Mohammadi (2008).

Working capital variable has a positive and significant effect on the amount of production in the production units. According to the estimated coefficient value for this variable, it is observed that this variable has had the greatest impact on production. Considering that for each broiler breeding, a large amount of capital is needed to purchase the required chickens, health and safety, repair and service of heating and cooling facilities and production area, suitable and specialized workforce, etc., the effect of this variable And its size is in line with expectations. This conclusion is consistent with the findings of Shokri (1383), Mohammadi (1387), Abdoli and Varhrami (1388), Aloris and Francis (2003), Alabi and Arona (2005).

Also, the coefficients of the function in the model estimated in this research, express the production tensions. According to this point, it is clear that among the managerial-



economic factors considered, the amount of production has the highest sensitivity to working capital and the least sensitivity to production capacity.

### **Practical suggestions**

Considering that the variable of production capacity has a positive and significant effect on the amount of production in selected production units in Qom province during the period under review, but the extent of this effect is somewhat low, which indicates that production capacity has not been able to reach the desired level. Affect the production of the studied units. One of the reasons for this could be the lack of economies of scale in the production units under study. As a result, it is suggested that these production units, after conducting sufficient research in this field, increase their production so that they can use all available capacity and increase their profitability.

Considering that the variable value of feed consumption has positive and significant effects on the amount of production in selected production units in Qom province and is one of the most effective factors in the production process; It is suggested that through consultation with agricultural experts in this field, nutrition management and the application of new management methods be considered as an important and serious issue for breeders so that a production unit can have the highest production and profitability.

Considering that the variable of production and administrative payments has a negative and significant effect on the amount of production in the production units in Qom

province, it is suggested that if possible and economical; Industrialization of production units should be done to minimize the negative effects of this variable on production and increase the profitability of the production unit. However, in some cases this is not possible, for example, if the size of the production unit is not large enough to meet the costs associated with the industrialization of the production unit, it is not economically viable. In general, this problem may occur in small and large production units.

Considering that the working capital variable has a positive and significant effect on the amount of production in the production units under study and in each period of production requires a lot of capital, it is suggested in different ways such as receiving production loans from banks, Agricultural jihad and cooperatives, etc. to collect the required budget in order to always have a high level of production and achieve maximum profitability. Because one of the important problems those production units have faced is the problems of liquidity and non-timely receipt of receivables from slaughterhouses and chicken meat shopping centers. This asymmetry in revenue collection and payment of expenses is one of the major problems of production units, which can be solved to a large extent by granting more liquidity (in the form of short-term loans) to these units.

### **References**

- Abdoli Ghahraman and Varhrami Vida (2009) "Study of the effect of technological progress on energy saving in industry and agriculture using Cobb Douglas function",

- Energy Economics Studies, Winter 2009, Volume 6, Number 23, pp. 41-23.
- Abrishami, Hamid (2002) "Applied Econometrics (New Approaches)", Tehran, University of Tehran Press, 2002.
  - Adebayo, O.O. and Adcola, R.G., (2005). "Socio-Economic factors affecting poultry farmers in Ejigbo local government area of Osun state". *Journal of Human Ecological*, Vol. 18, No.1, PP. 39-41.
  - Alrwis, K.N. and Francis, E., (2003). "Technical efficiency of broiler farms in the central region of Saudi Arabia: stochastic frontier approach". Department of Agricultural Economics, College of Food and Agricultural Sciences, King Saud University, Res- Buit, No. 116, PP. 5-34
  - Bakhshudeh, Mohammad (2011) "Production Economics and its Application in Agriculture", Shiraz University, February 2012.
  - Bakhshudeh, Mohammad and Akbari, Hamid (2009) "Principles of Agricultural Production Economics, Bahonar University of Kerman.
  - Blelik, P. and Rajcaniova, M., (2004). "Scale efficiency of agricultural enterprises in Slovakia". *Agricultural Economics Czech*. Vol. 50, No. 8, PP. 331-335.
  - Dashti, Qader and Yazdani, Saeed (1996), "Productivity Analysis and Optimal Allocation of Production Factors in Iran's Poultry Industry", Proceedings of the First Iranian Agricultural Economics Conference, Sistan and Baluchestan University.
  - Haji Rahimi, Mahmoud and Karimi, Ahmad (2009) "Productivity Analysis of Broiler Breeding Industry Production Factors in Kurdistan Province", *Agricultural Economics and Development*, Volume 17, Number 66, Summer 2009.
  - Hosseini, Safdar and Peykani, Gholamreza and Shahbazi, Hamid and Hosseini, Asef (2007) "Study of red meat marketing margin and the factors affecting it", *Journal of Agricultural Economics*, No. 2, pp. 17-1.
  - Ghorbani, Mohammad and Shokri, Elham and Motalebi, Marzieh (2010), "Estimation of the error correction model of the almost ideal demand system for different types of meat in Iran", *Agricultural Economics and Development*, No. 69, Spring 2010, pp. 17-1.
  - Gujrati, Damodar (2004) "Fundamentals of Econometrics", translated by Hamid Abrishami, Volume 2, Tehran, University of Tehran Press, 2004.
  - Juma, A. (2004). "The long run, market power and retail pricing", *Empirical Economics*, Vol. 29, No. 3 (2004), PP. 605-620.
  - Livestock and Poultry Support Company (2000) "Analysis of the poultry industry (past, present and future)", Budget and Organization Planning Office, 2000.
  - Mardukhi, Bayazid (2001) "The Role of Human Capital in Economic Development", *Journal of Political-Economic Information*, No. 3.
  - Mashayekhi, Siamak and Hajizadeh Fallah, Mehrdad (2011) "Study of factors affecting the chicken meat market in Iran (application of self-regression vector model)", *Economic Research*, Eleventh Year, No. 1, Spring 139.
  - Nabi Ian, Sedigheh (2006), "Study of productivity and optimal allocation of chicken meat production factors in both cooperative and private sectors in Kerman province, Proceedings of the Fifth Biennial Conference on Agricultural Economics of Iran, Sistan and Baluchestan University.
  - Ojo, S.O., (2003). "Productivity and technical efficiency of poultry egg production in Nigeria". *International Journal of Poultry Science*. Vol. 2, No. 6, PP. 456-464.
  - Oladebo, J.O. and Ambe-Lamidi, A.I., (2007). "Profitability input elasticities and economic efficiency of poultry production among Youth farmers in Osun state, Ningeria". *International Journal of Poultry Science*. Vol. 6, No. 21, PP. 994-998.
  - Ortega, L., Ward, R.W. and Andrew, C.O., (2007). "Technical efficiency of the Dual – purpose cattle system in Venezuela". *Journal*



- of Agricultural Applied Economics. Vol. 39, No. 3, PP.719-733.
- Pourkand, Sh. Motamed and M., K (2009) "Productivity analysis of production factors in the poultry industry of Guilan province", Agricultural Economics Research, Volume 3, Number 4, pp. 116-99.
  - Research Center of the Islamic Consultative Assembly (2012) "The situation of the livestock and poultry industry in the country", Office of Infrastructure Studies, serial number 9808, 2009.
  - Salimifar Mostafa, Haghnejad Amin, Rahimi Dastjerdi Mohsen (2010) "Study of the effect of factors of production on energy intensity in Iran: an analysis based on the Cobb-Douglas production function", Knowledge and Development, March 2011.
  - Sehboobi, Reza and Yazdani, Ahmad Reza, Hosseini Yakani, Seyed Ali and Heidari Kamalabadi, Reza (2015) "Study of productivity and competitive factors in chicken meat production (Case study: Poultry farms in Neishabour)", Journal of Livestock Research and Poultry, Volume 4, Number 1, Spring 2015, pp. 61-53.
  - Statistics Center of Iran (2012) "Abstract of the results of the census of broiler farms in 2012", Deputy of Strategic Planning and Supervision, Statistics Center of Iran.
  - Talezari, M. (2000) "Measurement and analysis of factor productivity in the poultry industry of Semnan province", Master Thesis, Imam Khomeini Higher Education Center. Tahmasebi, Amir and Moghaddasi, Reza (2010), "Factors affecting the marketing margins of chicken in Iran", Agricultural Economics and Development, Volume 18, Number 71, Fall 2010.
  - Townsend, R.F. and Thirtle, C. (1998) "The effects of macroeconomic policy on South African agriculture: implications for exports, prices and farm incomes", Journal of International Development, Vol. 10, No. 1 (1998), PP.117-128.
  - Unang, I.R., (2003). "Profitability and efficiency of the broiler industry in Tasikmalaya". M.Sc thesis, Faculty of Agriculture, University of Siliwangi Tasikmalaya.
  - Vollrath, T. and Hallahan, C. (2006). "Testing the integration of U.S.-Canadian meat and livestock markets", Canadian Journal of Agricultural Economics, Vol. 54 (2006), PP. 55-79.