Economics of Broiler Chicken Production in Egypt, Aswan Governorate

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ABSTRACT

The research aimed to estimate the production functions of two breeding systems and the preferences between them by analyzing the primary data of the field study sample, a comparative study between the two breeding systems, and estimating the production functions and costs for each system separately. The research found that the average number of chicks in the semi-closed system was about 9 chicks per square meter, while the average number of chicks in the semi-closed system was about 15 chicks per square meter, which demonstrates the high density in this system. It was also shown that the percentage of dead birds at the end of the cycle in the semi-closed system amounted to about 6% of the total chicks, while the percentage of dead ones at the end of the cycle in the average semi-closed system was about 4% of the total chicks, which shows the low percentage of dead ones in the average semi-closed system, and it became clear that the average amount of feed consumed In the semi-closed system, it was about 4.8 kg per chick, while the average amount of feed consumed in the average semi-closed system was about 4.1 kg per chick. The feed conversion efficiency in the semi-closed system was about 60%, while the feed conversion efficiency in the system was about 4.1 kg per chick. the semi-closed system rate is about 74%, which shows the high rate of food conversion, which provides large amounts of feed, which is a major problem these days in terms of their availability and prices. It was also shown that the total costs in the semi-closed system amounted to about 55 pounds per chick, while the costs amounted to the average total revenue in the semi-closed system was about 47.5 pounds per chick. The total revenues in the semi-closed system amounted to about 60 pounds per chick, while the total revenues in the average semi-closed system amounted to about 69.2 pounds per chick.

Studying the difference between the two systems using formal variables shows an increase and superiority of the semi-closed system modified due to the closed system in the density of birds, the percentage of vitality, the average weight of the bird, the rate of production efficiency, and total revenues in pounds, and a decrease in it in each of the total variable costs in pounds, the total costs in pounds, and the amount of feed User for each bird.

It was also shown from the total output function of the modified semi-closed system that the most important production elements that have a significant impact on the total output of one cycle of chicken farms in broiler houses is the amount of feed provided throughout the production cycle, whereas in the semi-closed system it was the amount of feed provided throughout the production cycle and bird density. The cost elasticity for the modified semi-closed system was 0.87, while for the semi-closed system it was 0.99.

Keywords: Cost flexibility - Formal variables - Optimal size of production.

INTRODUCTION

The Egyptian agricultural sector is considered one of the most important Egyptian economic sectors and the most important productive sectors that provide food, clothing, and productive job opportunities for the majority of members of society, provide the raw materials necessary for many Egyptian local industries, and provide the requirements of other economic sectors. the poultry production sector is considered to have an important place among the animal production sectors in Egypt, as the poultry industry has a major role in providing a source of animal protein, which is characterized by its high nutritional value. It is considered one of the main sources of national agricultural income, with a value of about 55.9 billion pounds, which represents. About 29.8% of the value of animal production, amounting to about 187.4 billion pounds in 2019. This industry is also linked to many other industries, such as the manufacture of animal feed, medicines, and veterinary supplies.

Research problem:

The problem of the research is that despite the increase in chicken production rates in Egypt, there is fluctuation and rise in consumer prices, which is a major problem facing the Egyptian consumer, as estimates indicate the monthly prices of chicken in October 2022, which were estimated at about 38.93 pounds per kilo on average, which is higher than that in his estimates. In October 2021, which was about 33.75, a change of 15.4%. While the producer faces many problems in production, such as high prices of feed and production requirements, and this has been observed recently.

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Consequently, there are production problems, which makes the poultry industry in Egypt face major obstacles, which requires finding a solution to these problems facing poultry production in Egypt (Zaatar, 2022).

Research aims:

The research aimed to estimate the production and cost functions of the two breeding systems and what is preferable between them through:

1- The preference between the two breeding systems through analysis of the primary data of the field study sample

2- A comparative study between the two breeding systems.

3- Estimating production functions and costs for each system.

Research Method and Data Resources:

In achieving its objectives, the research relied on the use of descriptive and quantitative analysis, through the use of some mathematical and statistical methods such as averages, percentages, and dummy variables, relying on primary sources of data by collecting questionnaire forms.

RESULTS AND DISCUSSION

Firstly: Primary Data Analysis of the Field Study Sample:

Actually, Aswan governorate was chosen as a sample for the field study as the analysis of the research mainly depended on the results of the intentional sample to achieve the objectives of the study. In addition, the field study sample included 36 individuals from broiler chickens farms from Aswan governorate, which were intentionally selected according to what was available.

Selection of the Study Sample:

Intentional sampling was used to select a sample of chicken farms in broiler houses in Aswan governorate centers and sample data was collected during the time period (2021/2022).

Description of the Study Sample of Chicken Farms in Broiler Houses:

According to the questionnaire forms that were intentionally chosen by the mayor of Aswan governorate, the sample of the field study shows that the sample size amounted to about 36 individuals for chicken farms in broiler houses for the production season (2021/ 2022). Additionally, they were divided into two groups of farms: (the first group; which is semi closed farms, numbering 28 farms) and (the second group; which is the modified semi closed farms, numbering 8 farms).

The Distribution of the Sample According to the number of the Number of Wards:

Table (1) shows the total number of wards in the semi-closed system was 125 wards with a relative importance of about 93.9%. On the other hand, the total number of wards in the average semi-closed farms system was about 8 wards with a relative importance of about 6.1%.

Ward Space:

Table (2) shows that the average space of the ward in the semi- closed system was about 556 m^2; though the average space of the wards in the modified semi-closed system was about 583m^2.

The Number of the Received Chicks:

Table (3) shows that the average number of chicks at the beginning of the cycle in the semi-closed system was about 21107 chicks per cycle, while the average number of chicks at the beginning of the cycle in the average semi-closed system was about 9625 chicks per cycle.

Table 1. Distribution of the number of wards according to the breeding system

Breeding system	Number	Relative importance
The system is semi-closed	125	93.9
The system is semi-closed rectifier	8	6.1
Total	133	100

Source: Collected and calculated from the study sample.

Table 2. Average space of the ward according to the breeding system

Breeding system	Average
The system is semi-closed	556
The system is semi-closed rectifier	583

Source: Collected and calculated from the study sample.

Table 3. Number of chicks per cycle according to the breeding system

Breeding system	Number of the Received Chicks	Bird Density	Number Of The Sold Chicks
The system is semi-closed	21107	9	19754
The system is semi-closed rectifier	9625	16	9301

Source: Collected and calculated from the study sample

Bird Density:

Table (3) shows that the average number of chicks in the semi-closed system was about 9 chicks per square meter , while the average number of chicks in the semi-closed system was about 16 chicks per square meter. This definitely reflects the high density in the system.

The Number of the Sold Chicks:

Table (3) shows that the average number of the chicks at the end of the cycle in the semi-closed system was about 19754 chicks per ward. Additionally, the average number of chicks at the end of the cycle in the average semi-closed system was about 9301 chicks per ward.

Vitality Ratio:

Table (4) shows that the percentage of the payment at the end of the cycle in the semi- closed system amounted to about 6% of the total chicks, while the percentage of the payment at the end of the cycle in the semi-closed system was about 3% of the total chicks. This basically reflects the low percentage in the modified semi-closed system.

Table 4. Percentage of hypocrite according to the breeding system

Breeding system	%
The system is semi-closed	6
The system is semi-closed rectifier	3

Source: Collected and calculated from the study sample

The Amount of the Consumed Food:

Table (5) shows that the average amount of feed consumed in the semi-closed system was about 4.8kg per chick ,while the average amount of feed consumed in the modified semi-closed system was about 3.9 kg per chick.

Table 5.The amount of feed consumed in kilograms according to the breeding system (Kg Per Chick)

Breeding system	Quantity of feed
The system is semi-closed	4.8
The system is semi-closed rectifier	3.9

Source: Collected and calculated from the study sample

Average Weight Of The Bird:

Table (6) shows that the average weight of the bird in the semi-closed system was about 2.9 kg, while the average weight of the bird in the modified semi-closed system was about 3 kg.

Table 6. Average weight of the bird in kg according to the breeding system

Breeding system	Average weight of the bird
The system is semi-closed	2.9
The system is semi-closed rectifier	3

Source: Collected and calculated from the study sample.

Conversion Efficiency:

Table (7) shows that the feed conversion efficiency in the semi-closed system was 60%, while the feed conversion efficiency in the modified semi-closed system was about 78%. This showed the high rate of feed conversion ,which provides large quantities of feed, which is currently a major problem in terms of availability and prices.

Table 7. Feed conversion efficiency according to the breeding system

Breeding system	Conversion Efficiency
The system is semi-closed	60%
The system is semi-closed rectifier	78%

Source: Collected and calculated from the study sample

The Price of the Chick:

Table (8) shows the price of the chick in the semi-closed system was about 7.3 pounds per chick, while the price of the chick in the average semi-closed system was about 7.3 pounds per chick.

Table 8. The price of a chick is in pounds according to the breeding system

Breeding system	The price of a chick
The system is semi-closed	7.3
The system is semi-closed rectifier	7.3

Source: Collected and calculated from the study sample.

Prices of Vaccines and medications:

Table (9) reflects that the prices of vaccines and medications in the semi-closed system amounted to about 6.01 pounds per chick, while they amounted to 5.3 pounds per chick in the average semi-closed system

Table 9. The price of vaccines and medicines is in pounds according to the breeding system

Breeding system	Prices of Vaccines and medications
The system is semi-closed	6.01
The system is semi-closed rectifier	5.3

Source: Collected and calculated from the study sample

Heating Price:

Table (10) shows that the price of heating in the semi-closed system was about 4.3 pounds per chick, while it was about 1.7 pounds per chick in the average semi-closed system.

Table 10. The price of heating is in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Heating Price
The system is semi-closed	4.3
The system is semi-closed rectifier	1.7

Source: Collected and calculated from the study sample

The Price of Mattress:

Table (11) shows that the price of the litter in the semi-closed system was about 0.41 pounds per chick, while the price of the litter in the modified semi-closed system was about 0.57 pounds per chick.

Table 11. The price of the mattress is in pounds according to the breeding system (Pounds Per Chick)

Breeding system	The Price Of Mattress
The system is semi-closed	0.41
The system is semi-closed rectifier	0.57

Source: Collected and calculated from the study sample.

Temporary Workers' Wages:

Table (12) shows that the wages of temporary workers in the semi-closed system amounted to 0.12 pounds per chick, while the wages of temporary workers in the average semi-closed system amounted approximately to 0.12 pounds per chick.

Table 12. Temporary workers' wages are in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Temporary Workers' Wages
The system is semi-closed	0.12
The system is semi-closed rectifier	0.12

Source: Collected and calculated from the study sample.

Maintenance, Electricity and Water Costs:

Table (13) highlights that these costs amounted to 3.7 pounds per chick in the semi- closed system , while they amounted to about 2.1 pounds per chick in the average semi-closed system.

Table 13.Maintenance, electricity and water costs in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Maintenance, Electricity and Water Costs
The system is semi-closed	3.7
The system is semi-closed rectifier	2.1

Source: Collected and calculated from the study sample.

Variable Costs:

Table (14) shows that these costs amounted to 52.4 pounds per chick in the semi- closed system, while they amounted to 42.8 pounds per chick in the modified semi- closed system.

Table 14. Variable costs in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Variable Costs
The system is semi-closed	52.4
The system is semi-closed rectifier	42.8

Source: Collected and calculated from the study sample.

Total Costs:

Table (15) shows that the total costs in the semi-closed system amounted to about 55 pounds per chick, while they amounted to about 46 pounds per chick in the modified semi- closed system.

Table 15 .Total costs in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Total Costs
The system is semi-closed	55
The system is semi-closed rectifier	46

Source: Collected and calculated from the study sample.

Fertilizer Revenues:

Table (16) reflects that they amounted to about 0.19 pounds per chick in the semi- closed system, while they amounted to about 0.26 pounds per chick in the average semi-closed system.

Table 16. Fertilizer revenues in pounds according to the breeding system (Pounds Per Chick)

Breeding system	Fertilizer Revenues
The system is semi-closed	0.19
The system is semi-closed rectifier	0.26

Source: Collected and calculated from the study sample.

Revenues Per Chicken:

Table (17) shows that the revenues of 1 chicken in the semi-closed system amounted to about 59 pounds, while they amounted to about 73 pounds in the modified semi-closed system.

Table 17. Total revenues in pounds according to the Breeding **system (Pounds Per Chick)**

Breeding system	Revenues Per Chicken
The system is semi-closed	59
The system is semi-closed rectifier	73

Source: Collected and calculated from the study sample.

Revenue:

Table (18) shows that the return in the semi-closed system was about 4 pounds per chick, while it reached about 27 pounds per chick in the modified semi-closed system.

Table 18. Revenue according to the Breeding system

Breeding system	Revenue
The system is semi-closed	4
The system is semi-closed rectifier	27

Source: Collected and calculated from the study sample

Ratio of Revenues to Costs:

Table (19) shows that the ratio of revenues to costs in the semi-closed system was about 1.07, while it reached about 1.58 in the modified semi-closed system.

Table 19. Ratio of Revenues to Costs according to the Breeding system

Breeding system	Ratio of Revenues to Costs
The system is semi-closed	1.07
The system is semi-closed rectifier	1.58

Source: Collected and calculated from the study sample.

Secondly: The difference between the two breeding systems (Abdel Qader, 1990 and Rayhan, 2021):

1- Bird density:

It is obvious from the following equation that the density of birds per square meter in the modified semi-closed system is greater than its density in the semi-closed system by 7 birds per square meter (Table 20).

2- The Percentage Of Vitality:

The following equation indicates that the percentage of vitality in the modified semi- closed system is getting increased by 3 than in the semi-closed system.

3- The Amount Of Feed Used for Each Bird Per Kg:

The following equation shows that the amount is being decreased by 0.7 kg per bird in the modified semi-closed system than in the semi-closed system.

4- Average Weight Of The Bird:

It is clear from the following equation that the average weight of the bird in kg in the semi-closed system is greater than the weight of the bird in the semi-closed system by an amount of about 0.2 kg per bird.

5- Total Variable Costs In Pounds:

It is clear from the following equation that the total variable costs in pounds in the modified semi-closed system are lower than in the semi-closed system by 9.6 pounds per bird.

6- Total Costs In Pounds:

It is clear from the following equation that the total costs in pounds in the modified semi-closed system are lower than in the semi-closed system by 9.1 pounds per bird.

Table 20. The difference between the two breeding systems

S	Variable	Equation	R^2	F
1	Bird density	Yi = 9.2 + 7.3 D (49.3) ** (18.4)**	0.91	338.7**
2	The Percentage Of Vitality	Yi = 93.7 + 2.9 D (271.3) ** (3.9)**	0.31	15.1**
3	The Amount Of Feed Used for Each Bird Per Kg	Yi = 4.8 - 0.7 D (171.8) ** (-10.9)**	0.78	119.2**
4	Average Weight Of The Bird	Yi = 2.9 + 0.2 D (82.8) ** (2.5)*	0.15	6.2*
5	Total Variable Costs In Pounds	Yi = 52.4 - 9.6 D (54.9) ** (-4.7)**	0.40	22.3**
6	Total Costs In Pounds	Yi = 54.9 - 9.1 D (58.4) ** (-4.6)**	0.38	20.9**
7	Total Revenues	Yi = 59.4 + 13.8 D (35.2) ** (3.9)**	0.30	14.8**

Where
Yi = The estimated value of the indicator under study
D=It indicates the value of the transitional variable in the farming system and it takes the value (1) in observations of the average semi-closed breeding system, and it takes the value (0) in observations of the semi-closed breeding system.
R^2 – coefficient of determination
F – Significance of the model
indicates the T value of the features – ( )
Significant at level (0.01)**
Significant at level (0.05)*
Source: Collected and calculated from the questionnaire data table

7- Total Revenues:

It is clear from the following equation that the total revenues in pounds in the modified semi-closed system are higher than in the semi-closed system by 13.8 pounds per bird.

Thirdly: Estimating dual production (Hassan, 2013 and Al-Shaarawy, 2015):

A- Estimating production functions for broiler chickens using the modified semi-closed system sample:

The parameters of the production function for broiler chickens were estimated from the data of the study sample according to the estimated model in the Cobb-Douglas form converted to double logarithmic form to simplify the estimation of the function derivatives and ease their interpretation.

LNQ = - 6.4 + 1.93 LN X_2+ 2.62 LNX_5

(-0.68) (1.04) (3.38) **

$\overline{R}^2$ = 0.76 F = 12.12**

Significant at 1% significance level**
Q=The total output of one cycle (tons/cycle/carton)
X2= Course duration per day
X5= Quantity of feed provided (tons/cycle)
B=Production flexibility for each productive element in the function
Source: Collected and calculated from the results of the study's questionnaire.

It is clear from the function that there is a direct relationship between the quantity of feed and the duration of the cycle per day, and the significance of the estimated model as a whole was proven. This relationship is also economically logical, as increasing the quantity of feed and the duration of the cycle per day actually leads to an increase in the quantity of production, and the production elasticity for these variables has reached about (2.62, 1.93) respectively, meaning that increasing the amount of feed and the duration of the cycle per day by 1% leads to an increase in the amount of production by (2.62%, 1.93%), and the total productive elasticity (E.P.) of the function was estimated at about 4.55. This means that increasing these production elements by the estimated function By 1%, it leads to an increase in the total output of one cycle of broiler chickens by about 4.55%. These variables are responsible for 76% of the changes occurring in the quantity of production.

B- Estimating production functions for broiler chickens using a semi-closed system sample:

LNQ = - 2.4 + 1.16 LN X_5+ 0.01 LNX_9

(-6.09)** (33.3)** (3.37) **

$\overline{R}^2$ = 0.97 F = 553.9**

Significant at 1% significance level**
Q=The total output of one cycle (tons/cycle/carton)
X5= Quantity of feed provided (tons/cycle)

X9= Bird density per square meter
B=Production flexibility for each productive element in the function
Source: Collected and calculated from the results of the study's questionnaire.

It is clear from the function that there is a direct relationship between both the quantity of feed and the density of birds per square meter. The significance of the estimated model as a whole has also been proven. This relationship is also economically logical, as increasing the quantity of feed and the density of birds per square meter actually leads to an increase in the quantity of production, and the production flexibility for these variables has reached About (1.16, 0.01) respectively, meaning that increasing the amount of feed and the density of birds per square meter by 1% leads to an increase in the amount of production by (1.16%, 0.01%). The total productive elasticity (E.P.) of the function was estimated at about 1.17. This means that increasing these elements The productivity function estimated at 1% leads to an increase in the total output of one cycle of broiler chickens by about 1.17%. These variables are responsible for 97% of the changes occurring in the quantity of production.

Fourthly : Estimating the cost functions for producing broiler chickens in the study sample (Zidane, 2009 and Habash, 2019):

Broiler production cost function for the modified semi-closed system:

The parameters of the total cost function (T.C) for broiler chickens for the semi-closed system modified in the study sample in Qalyubia Governorate were estimated through the equation AC=TC/Q, so the average cost function (AC) was as shown in equation (1):

$$\mathbf{A.C} = 38.38 - 1.75\mathbf{Q} + 0.03\,\mathbf{Q^2} \quad \leftarrow \mathbf{(1)}$$

$$(2.21)^{*} \quad (-1.38) \quad (1.45)$$

$$\mathbf{R^2} = 0.52 \qquad \mathbf{F} = 2.65^{**}$$

where:
A.C = average total production costs (in thousand pounds/cycle) for producing broiler chickens for the semi-closed system modified by the study sample.
Q = actual total output (tons/cycle)
Significant at 1% significance level. *Significant at 5% significance level** Source: Collected and calculated from the results of the study's questionnaire

The function of the average total costs (A.C) of broiler chickens for the semi-closed system modified in the study sample shows that the total output of one cycle (Q) is responsible for about 0.52% of the total changes occurring in the total costs of one cycle of broiler chickens. The significance of the function was not proven. As a whole, one of the features of the function may be proven statistically

By multiplying equation (1) by (Q), we obtain the total costs as shown in equation (2) T.C = 38.38 Q - 1.75Q2 + 0.03 Q3 f (2)
The marginal cost function (M.C) was estimated by performing the first differentiation of the total cost function (T.C) referred to in equation (2) and obtaining the marginal cost function shown in equation (3):
M.C = 38.38 – 3.5 Q + 0.09 Q2 f (3)
The average price of the semi-closed system rate = 23.94 thousand pounds / ton
Average actual production volume = 28.15 tons.

The second step: Estimating the optimal production volume that minimizes costs for producing broiler chickens in the study sample of the average semi-closed system, which amounted to about 29.17 tons/cycle, which is achieved at the lower end of the average variable costs or is achieved when the marginal costs (M.C) are equal to the average costs (A.C). The volume of economic production that maximizes profit reached about 34.16 tons/cycle, which is achieved when the marginal costs (M.C.) are equal to the marginal revenue (M.R.) or the average selling price of a ton of live chicken meat. To find the elasticity of production costs (E.C.), the marginal costs are divided (M.C) amounted to about 11.17 thousand pounds/cycle, while the average costs (A.C) amounted to about 12.89 thousand pounds/cycle, as the elasticity of production costs was estimated at about 0.87.

Broiler production cost function for the semi-closed system:

The parameters of the total cost function (T.C) for broiler chickens for the semi-closed system in the study sample in Qalyubia Governorate were estimated through the :equation AC=TC/Q, so the total cost function (TC) was as shown in equation (1)

$$\mathbf{T.C} = -147.1 + 24.6\,\mathbf{Q} - 0.05\,\mathbf{Q^2} \quad \leftarrow \mathbf{(1)}$$

$$(-0.46)^{**} \quad (2.09)^{*} \quad (-0.46)$$

$$\mathbf{R^2} = 0.89 \qquad \mathbf{F} = 102.3^{**}$$

where:
T.C = average total production costs (in thousand pounds/cycle) for producing broiler chickens for the semi-closed system in the study sample.
Q = actual total output (tons/cycle)
Significant at 1% significance level. *Significant at 5% significance level** Source: Collected and calculated from the results of the study's questionnaire

The total cost function (T.C) for broiler chickens for the semi-closed system in the study sample shows that the total output of one cycle (Q) is responsible for about 0.89% of the total changes occurring in the total costs of one cycle of broiler chickens.

The marginal cost function (M.C) was estimated by performing the first differentiation of the total cost

function (T.C) indicated by equation (1) and obtaining the marginal cost function shown by equation (2):

$$M.C = 24.6 - 0.1\ Q\ f \quad (2)$$

Average price for the semi-closed system = 20.55 thousand pounds / ton Average actual production volume = 57.2 tons.

The second step: Estimating the optimal production volume that minimizes costs for producing broiler chickens in the study sample of the average semi-closed system, which amounted to about 54.2 tons/cycle, which is achieved at the lower end of the average variable costs or is achieved when the marginal costs (M.C) are equal to the average costs (A.C). The volume of economic production that maximizes profit has reached about 40.5 tons/ cycle, which is achieved when the marginal costs (M.C.) are equal to the marginal revenue (M.R.) or the average selling price of a ton of live chicken meat. To find the elasticity of production costs (E.C.), the marginal costs are divided (M.C) amounted to about 18.88 thousand pounds / cycle, while the average costs (A.C) amounted to about 19.16 thousand pounds / cycle, as the elasticity of production costs was estimated at about 0.99.

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الملخص العربي

اقتصاديات إنتاج دجاج التسمين في مصر بمحافظة أسوان

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استهدف البحث تقدير دوال الإنتاج لنظامين تربية والمفاضلة بينهم وذلك من خلال تحليل البيانات الأولية لعينة الدراسة الميدانية، ودراسة مقارنة بين نظامي التربية، وتقدير دوال الإنتاج والتكاليف لكل نظام على حده. وتوصل البحث إلى أن متوسط عدد الكتاكيت في النظام شبه المغلق بلغ حوالي 9 كتاكيت لكل متر مربع، في حين بلغ عدد الكتاكيت في النظام شبه المغلق المعدل حوالي 15 كتكوت متر مربع وهو ما يوضح ارتفاع الكثافة في هذا النظام، كما تبين أن نسبة النافق في نهاية الدورة في النظام شبه المغلق بلغت حوالي 6% من إجمالي الكتاكيت، في حين بلغ نسبة النافق في نهاية الدورة في النظام شبه المغلق المعدل حوالي 4% من إجمالي الكتاكيت وهو ما يوضح انخفاض نسبة النافق في النظام شبه المغلق المعدل، واتضح أن متوسط كمية العلف المستهلكة في النظام شبه المغلق بلغ حوالي 4.8 كجم لكل كتكوت، في حين بلغ متوسط كمية العلف المستهلكة في النظام شبه المغلق المعدل حوالي 4.1 كجم لكل كتكوت، أن الكفاءه التحويلة للعلف في النظام شبه المغلق بلغت حوالي 60%، في حين بلغت الكفاءه التحويلة للعلف في النظام شبه المغلق المعدل حوالي 74% وهو ما يوضح ارتفاع معدل التحويل الغذائي وهو ما يوفر كميات علف كبيرة وهي مشكلة كبيرة في الأيام الراهنة من حيث توافرها وأسعارها، كما تبين أن التكاليف الكلية في النظام شبه المغلق بلغت حوالي 55 جنيه لكل كتكوت، في حين بلغت التكاليف الكلية في النظام شبه المغلق المعدل حوالي 47.5 جنيه لكل كتكوت، الإيردات الكلية في النظام شبه المغلق بلغت حوالي 60 جنيه لكل كتكوت، في حين بلغت الإيردات الكلية في النظام شبه المغلق المعدل حوالي 69.2 جنيه لكل كتكوت.

وبدراسة الفرق بين النظامين باستخدام المتغيرات الصورية تبين زيادة وتفوق النظام الشبه المغلق المعدل على النظام المغلق في كل من كثافة الطيور والنسبة المئوية للحيوية ومتوسط وزن الطائر ومعدل الكفاءه الإنتاجية وإجمالي الإيردات بالجنيه، وانخفاضه عنه في كل من إجمالي التكاليف المتغيرة بالجنيه وإجمالي التكاليف الكلية بالجنيه وكمية العلف المستخدم لكل طائر.

كما تبين من دالة الناتج الكلي للنظام الشبه المغلق المعدل أن أهم العناصر الإنتاجية ذات التأثير المعنوي علي الناتج الكلي للدورة الواحدة من مزارع دجاج بدارى التسمين تتمثل فى كمية العليقة المقدمة على مدار الدورة الإنتاجية، في حين كانت في النظام الشبه المغلق كمية العليقة المقدمة على مدار الدورة الإنتاجية وكثافة الطيور. كما بلغت مرونة التكاليف للنظام الشبه المغلق المعدل 0.87، بينما بلغت للنظام شبه المغلق 0.99.

الكلمات المفتاحية: مرونة التكاليف – المتغيرات الصورية – الحجم الأمثل للإنتاج.