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CONSTANT TECHNICAL REPLATIONSHIPS BETWEEN INPUTS AND OUTPUTS IN THE NATIVE HATCHERY INDUSTRY

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Introduction

Eggs is one of the most essential food to supply people with animal protein.

Egyptian total production of eggs/ year are about 455 million eggs by 1952, increased to about 1466 million eggs by 1974 and amounted 1925 million eggs by 1979[1], i . e . it can be explained that eggs production had been multiplied more than four times during 25 years.

Eggs production distributed between three purposes the 1 st as a table consumption , the 2 nd purpose for native and mechanical hatcheries, and the 3 rd for sweet industries and bakery.

Eggs are production either in rural flocks of small size or in large commercial firms which exceed more than 1400 firms by 1979.

Native hatcheries depend upon rural flocks in obtaining its requirements of fertil eggs, while mechanical hatcheries obtains, its requirment from layer commercial firms.

Rural flocks production of eggs are of mixed varieties. A lot of workers for collecting eggs from the individual farmers are needed . Mechanical hatcheries don't use this varieties of eggs as a source of row material.

Source : Table (1).

Total number of native and mechanical hatcheries amounted 854 and 351 laboratories respectively. Total number of hatched eggs are about 75 million eggs by 1952, increasded to about 230 million eggs by 1979 .

The hatched chicks represent about 45 million chicks by 1952 increased gradually around 156 million chicks by 1979. It means that technical hatching efficiency had increased from 60 % by 1952 to 68 % by 1979(1) , due to the increasment in number and capacities of mechanical hatcheries.

Native hatchery industry is one of the agricultural traditional industries in Egypt. It is one of the transfering industries, which use eggs as a source of row material. Quantity of hatched chicks produced depend upon many factors. These are number of eggs set, fertility ratio, and mortality ratio before hatching.

In this industry eggs set incubated for 19 days, then transfered to hatching unit for 2 days.

The relationship between number of eggs set and hatched chicks produced was estimated during the period 1970/ 1971-1981 for lower., Middle and Upper Egypt.

Source: (1) Table (1).

Tables (1) Total number of eggs
produced / year (in million)

Year	Unit	1952	1974	1975	1976	1977	1978	1979
Eggs	Million	455	1406	1505	1566	1616	1778	1825
In cub.eggs	"	464	716	713	718	738	716	822
Hat.eggs	"	75	199	204	215	228	230	230
Hat.chicks % of Hat.eggs	"	60	64	65	65	66	67	68

Source: Ministry of Agriculture, Depart. of Agr. statistics years, from 1974-1979.

Imperical Results

Constant techinical relationships

The first investigation estimated the relationship between hatchery eggs set and produced chicks in Egyptian hatcheries through the period 1952/1953 - 1979/1980.

This relation was found to be in the form[1],

$$Y_i = 3.8 + 0.54\ X_i$$

$$(.06) \quad (52.8)$$

$$R^2 = .998$$

Where as,

Y_i = estimated number of hatched chicks by 100 thousands.

X_i = number of eggs set by 100 thousands.

i = 1, 2, ... 30

This equation shows an insignificant statistic for the parameter (&), while (B) was found to be statistically significant.

So this relation was reestimated in the form:

$$Y_i = B\ X_i$$

$$= 0.596\ X_i$$

$$(119.2)$$

$$R^2 = .998$$

From the preceeding equation it can be said, that

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(1) Source : Table (2).

a liner relation was found between eggs set and chicks hatched with a slope of 0.6.

In the time R^2 of about 0.998 represents that set eggs are the unique factor that determines the number of chicks hatched assuming other factors being constant.

The second relationship estimates eggs set in mechanical hatcheries and chicks produced" this investigation was found to be in the form

$$Y_i = 1.35 + 0.75 X_i$$
$$(.24) \quad (46.9)$$
$$R^2 = 0.99$$

as,

Y_i = represent the estimated number of chicks produced by 100 thousands.

X_i = number of eggs set hatched by 100 thousands.

$i = 1,2, \ldots\ldots\ldots 30$

(X) estimate was found to be insignificant, meanwhile (B) was found to be significant statisticly. So this relationship was reestimated in the form[1].

$$Y_i = 0.755 X_i$$
$$(52.0)$$
$$R^2 = 0.99$$

Source (1) table (2)

This relation indicated a linear transformation between eggs set and hatched chicks. In the same time it refers to a rate of transfer from eggs to chicks estimated by about 76 % i,e. if number of eggs set increased by 100 eggs , the number of chicks produced will increase by about 76 chicks.

The determination cefficient (R^2) represents that about 99% of chicks produced is due to the change in the number of eggs set used.

Another relationship was investigated between the number of set eggs and produced chicks in native hatcheries during the same period. This relation was found to be in the form(1),

$$\hat{Y}_i = 1.19 + 0.68\ X_i$$
$$(0.22)\quad (45.0)$$

$$R^2 = 0.99$$

Where as

$\hat{Y}_i$ = estimated number of hatched chicks by 100 thousands.

X_i = number of eggs set by 100 thousands.

i = 1,2, ... 30

It was found that ($\hat{Y}$) estimate is statistically insignificant, meanwile ($\hat{B}$) was found to be statistically significant. So this relation was reestimated in the

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(1) Source : Table (2).

Form(1) .

$$Y_i = 0.7\ X_i$$

(18.3)

$$R^2 = 0.99$$

This form fefers to a rate of transfer from eggs set to chicks produced estimated by about 70 % , i.e, if number of eggs set increased by about 100 eggs, chicks produced will increased by about 70 chicks, assuming ether variable except number of eggs being constant. The determination coefficient (R^2) of 0.99 represents that about 99 % of change in the number of produced chicks is due to fluctuation in the number of eggs sets.

Source : 1 - Table (2).

Table (2):,Number of Hat.eggs and of hatching chicks in Mechanical and native hatcheries during the period 1952/1980

(in millions)

	Total eggs	/mill chicks	Mechanical eggs	/ chicks	Native eggs	Hatcheries chicks
1952	95.	54.3	83.1	46.0	11.9	8.3
1953	35.	23.8	17.1	9.2	17.9	14.6
1954	31.4	19.3	15.8	6.8	15.6	12.5
1955	97.9	55.7	73.3	36.5	24.6	19.2
1956	37.5	25.7	11.4	4.5	26.1	21.2
1957	30.5	18.9	13.1	5.0	17.4	13.9
1958	86.7	49.8	66.0	34.5	20.7	15.3
1959	35.4	23.3	11.9	4.8	23.5	18.5
1960	31.2	20.1	20.2	11.9	11.	8.2
1961	93.0	53.3	64.5	32.3	28.5	21.
1962	30.2	20.8	6.8	3.0	23.4	17.8
1963	34.8	22.2	13.5	5.4	21.3	16.8
1964	93.1	54.3	70.1	36.6	23.	17.7
1965	30.6	20.2	11.9	4.6	18.7	15.6
1966	33.7	21.2	11.1	3.1	22.6	18.1
1967	92.7	53.8	46.1	20.7	46.6	33.1
1968	29.1	19.8	7.3	2.8	21.8	17.
1969	35.2	22.7	16.5	4.0	24.7	18.7
1970	96.0	56.7	50.9	21.2	45.1	35.5
1971	28.	19.	6.7	2.1	21.3	16.9
1972	36.	22.8	11.8	3.5	24.2	19.3
1973	86.7	50.8	51.2	23.4	35.5	27.4
1974	28.4	16.5	6.4	1.5	22.	15.
1975	34.1	22.3	11.3	4.6	22.8	17.7
1976	83.9	50.	36.6	13.7	47.3	36.3
1977	30.4	21.2	3.1	.3	27.3	20.9
1978	32.5	21.3	—	—	32.3	—
1979	89.2	52.6	61.2	30.1	28.	22.5
1980	27.8	19.	5.3	—	22.5	—

Source : Ministry of Agr - Dep. of Agr. Statistics, from 1952/1980.

Conculsion

From the preceeding equations, it can be indicated that relations between eggs sets and number of chicks produced in a linear relation through the origion, or it can be explained that hatchery industry is a transfering industry with a constant technical relation ship between inputs and outputs, so production function of hatcheries can be written tn the form:

$$Y = K X$$

Where

Y = estimated number of chicks produced

X = number of eggs set

K = constant technical coefficient

The marginal productivity (MP) will be constant and equate to K.

Then applying the principals of profit maximization will yield a constant soole depens upon the ratio between eggs prices and chicks price.

$$MP = K$$

$$V\,MP = \overline{\Pi}\ K$$

$$V\,MP = R$$

$$R = \overline{\Pi}\ K$$

$$\Pi = \frac{R}{\overline{K}}$$

Where

Π $\overline{\Pi}$ = Price of chicks

R = Price of eggs set

i, e Price of chicks will equal the ratio between price of eggs set and hatching technical coefficient.

أثر العوامل التكنيكية على المدخلات والمخرجات
فى صناعة التفريخ البلدى

الموجز

يعتبر البيض من أهم المواد الغذائية اللازمة لامداد الغدد بالبروتين الحيوانى • يلاحظ التزايد المتطرد فى البيض المنتج فى ج • م • ع • خلال الفترة ١٩٥٢ الى ١٩٧٩ اذ تبين انه بلغ ١٨٢٥ مليون بيضة عام ١٩٧٩ مقابل ٤٥٥ مليون بيضة عام ١٩٥٢ أى انها زادت بمعدل أربعة اضعاف فى ٢٥ عام •

يوزع البيض الناتج من القطاع الريفى أو التجارى فى ثلاث اتجاهات ، اذ يستخدم كبيض المائدة أو يدخل فى صناعة الحلويات أو فى التفريخ بالمعامل البلدية والافرنجية •

تبين أن المعامل البلدية تعتمد أساسا على البيض من القطاع الريفى والذى بلغ نحو ٢٣٥ مليون بيضة عام ١٩٧٩ مقابل ٧٥ مليون بيضة عام ١٩٥٢ ، من نفس القطاع تنتج كتاكيت تبلغ ١٥٦ مليون كتكوت عام ١٩٧٩ مقابل ٤٥ مليون كتكوت عام ١٩٥٢ أى بزيادة فى الكفاءة التفريخية بما يعادل ٧١ ٪ عام ١٩٧٩ مقابل ٦٠ ٪ عام ١٩٥٢ التى تعزى الى زيادة القدرة الانتاجية للمعامل الميكانيكية •

تعتبر المعامل البلدية أحد الصناعات القديمة فى مصر اذ يوضع البيض بالمعامل لمدة ٢١ يوما لانتاج الكتاكيت واوضحت دراسة العلاقة بين البيض كمدخلات والكتاكيت كمخرجات خلال الفترة ٧٠ / ٨١ أنها علاقة ثابتة خطية بانحدار يقدر بنحو ٢ر• واوضح معامل التحديد أن ٩٩ر٨ ٪ من كمية الناتج من الكتاكيت ترجع الى البيض المستخدم •

كما أوضحت الدراسة أن العلاقة سواء فى المعامل البلدية أو الميكانيكية عبارة عن علاقة خطية ثابتة من نقطة الاصل بمعامل انحدار يقدر بنحو ٧ر ، ٧٦ر على التوالى كما أوضحت الدراسة أن الانتاج الحدى ثابت وأن سعر الكتاكيت عبارة عن النسبة بين سعر بيض التفريخ الى معامل التفريخ الثابت •