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THE PRODUCTIVE EFFICIENCY OF THE BROILER
INDUSTRY IN EGYPT

by

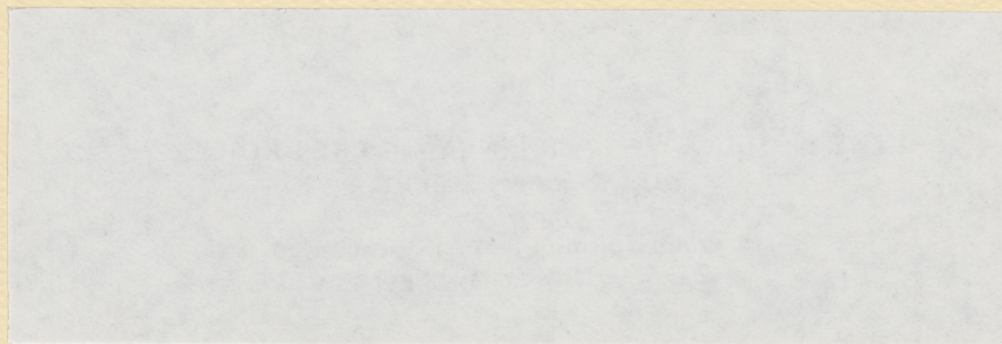
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Agricultural Development Systems:
Egypt Project
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Productive Efficiency of the Broiler Industry In Egypt

by

Dr. Ibrahim Soliman and Dr. Ali Ibrahim

Intoduction

The government strategy of food security supports broiler production as the leading edge of its program to approach self sufficiency of meat. The number of the broiler farms increased from 2338 units in 1978 to 3035 units in 1980. About 1000 additional units were under construction in 1981.

Several questions relate to this strategy are. What are the trade-offs between producing broilers locally (including feed ingredients imports) against importation of slaughtered frozen broilers. Also, broiler enterprises as an intensive capital use industry, raises the question about feasibility of investment in such industry. The current economic policies orient available investments towards this industry more than other agricultural activities, especially other livestock activities.

Therefore, the objectives of this study are to analyse the production efficiency, return to investment and comparative advantage of Egypt in producing broilers. Barriers to and impacts of current policies on broilers production efficiency were also examined in this static comparative analysis.

Most of the current policies affecting the broiler industry are financial policies: (a) the feed price subsidy, (b) the baby chick price subsidy and (c) low intrest rate loans for food

security projects (currently 6 percent per annum, compared to about 14.5 percent at commercial banks).

The study depends upon a sample survey of 32 farms for broiler production in Sharkia Governorate (the third most important are in Egypt in terms of number of production units). The sample reflects location, scale classes and strains. It is a stratified proportional random sample.

The budget analysis approach was used for production efficiency measurement. Farms were classified into four classes according to the capacity per lot (number of birds), as seen in Table 1.

Effects of the Broilers Strain on Response Measures:

The general company for poultry production changed the strain of its parent stock from Nichols to Hubbard in 1978, assuming that this would increase efficiency. However, from Table 2, there is no statistically significant difference between the newly introduced strain (Hubbard) and other strains (mainly Nichols), with respect to all response variables. This implies that the interaction between management and environmental factors, on one hand, and genetics, on the other, is more important than genetic improvement per se.

Mortality rate:

This variable is characterized by wide dispersion. It ranges from 40% to 4%. Its coefficient of variability is high, varying from 50% to 120% among different farm scales and regions. This indicates that this industry in Egypt is highly risky and

far more unstable than would be expected for a "high technology" system.

Total Output:

The value of total output (more than 97% of it from selling broilers) shows an interesting trend. The value per day increases as farm scale increases (Table 1). It means that the economic decision in this industry is mainly a function of time more than per unit of output. It indicates that the larger the scale, the greater the tendency towards maximizing profit over time for successive lots, rather than to maximize profit per unit of output per lot.

Costs of production:

Costs of production were calculated for the four farm scale classes under two scenarios: (1) costs of production under current financial policies, and (2) costs of production under shadow prices of inputs (feeds, interest rate for invested capital, baby chick price).

Table 3 shows that the average variable cost per bird for all sample farms is P.T. 80.5. This represents 61.8 percent of total costs. Feed costs by themselves are about 51.7 percent of total costs. Average fixed cost per bird is P.T. 49.2, i.e. approxy 38.2 percent of total costs. Purchase cost per 1-day old chick is, on the average, about 24.2 percent of total costs. Average total costs per bird is about P.T. 129.7.

With shadow prices for inputs (Table 4), average variable cost per bird increases to P.T. 91.6, while average fixed costs reach P.T. 64.1 and average total costs per bird increase up to

P.T. 155. This shows that pricing inputs at their full economic (international-equivalent) cost would add, on the average, P.T. 26 per bird, i.e. 20% of present average total costs.

As might be expected, costs of production per technical unit decrease as farm scale increases. This performance is found either under current policies or under the shadow price scenario. Average total costs per bird decrease from P.T. 136 for the smallest farm scale to P.T. 117.9 for the largest scale, under subsidized inputs. Under shadow prices of inputs it decreases from P.T. 162.8 for smallest scale to P.T. 142.3 for largest scale.

Productive Efficiency of Broiler Enterprises:

Productive efficiency measures were calculated under three scenarios which reflect three optional policies:

Scenario (1): Existing subsidized prices for broiler inputs and existing average local farm gate price for broilers (L.E. 1045 * per ton).

Scenario (2): Shadow prices (world market equivalent) prices for broiler inputs, and average local farm gate price of broilers.

Scenario (3): Shadow prices (free prices) of both inputs and outputs. The shadow price of 1-ton liveweight of broilers at farm gate was L.E. 10093 (Annex).

Productive efficiency measures used per one ton liveweight are:

(1) Gross Margin = Return above explicit variable costs. It is a minimum accounting measure for efficiency.

(2) Net farm income = Total value of output - total explicit

costs. It is an indicator for the return to resources provided by farm owners. These resources include investment capital, family labor, family management, enterpriser share (for bearing risk and creation of the project idea).

(3) Normal profit = Net farm income - (opportunity costs of capital invested + costs of family labour). It is the return to management and enterprising.

(4) Net profit = Normal profit - management costs. Actually, this is the real incentive to the entrepreneur to enter this industry and to expand the scale of their firms.

(5) Average Return to Capital Invested = $\frac{[(\text{Net Farm Income} - (\text{Family Labor Costs} + \text{Management Costs})) / \text{Capital Invested}] \times 100}{100}$. This is an average tentative estimate for IRR under steady state condition of the farm.

(6) Producer margin = $\frac{(\text{Sale price} - \text{Net total costs of broilers}) / \text{sale price} \times 100}{100}$.

(7) Net total costs per 1-ton liveweight = $\frac{[(\text{Total (gross) costs} - \text{value of by products}) / \text{tons produced}]}{1}$. This is a measure of the economics of scale on long run (planning) cost curve.

Major Conclusions and Policy Implications From the Results of the Analysis:

(1) Under current policy conditions all productive efficiency measures are positive, indicating economic feasibility. However, the magnitudes of these measures increase as farm scale increases, Table 5.

(2) Under current policies the annual gross earning per family farm in broiler enterprising (net farm income) reaches an

average of about L.E. 16,767, while the average annual family income in Egypt, in 1980, reached only L.E. 1,700. That is, a broiler enterprise yields earnings about 10 times the average income in Egypt.

(3) Under Scenario 2 (free market prices of inputs and average local market price of output), the smallest scale class (less than 5,000 birds per lot) would experience negative pure profit, negative producer margin and negative return to investment.

(4) Under Scenario 3 (free market prices of both inputs and outputs) it seems that only a farm scale above 24,000 birds per lot would be able to stay in the market with positive returns to investment. Small scales of 5,000 birds per lot and less would have to leave the market, because they either have negative gross earning, or at least they would acquire gross earning less than average annual family income in Egypt.

(5) As a matter of fact, the current subsidy for the broilers industry represents about 80 percent of its pure profit, Table 6. On the average, a family with a broiler farm receives on the average about L.E. 12,653 annually as a subsidy; this is about 79.6% of their pure profit. Farms in the smallest size class receive a subsidy which reaches 116% of their pure profit. It might be claimed that it is not fair that a family that owns a broiler farm earns about 10 times the average family income in Egypt, under food security umbrella, when 80 percent of this earning is a subsidy from the Egyptian economy!!

(6) In general, the average subsidy per 1-kg liveweight is about P.T. 17.5, i.e. about 17% of total costs of production.

(7) It seems that low producer margin for the largest scale farm class is contrary to the finding that larger scale is recommended to obtain better efficiency. However, it is in favour of rationalizing the economics of this industry in Egypt. The broiler industry, internationally, is an industry enjoying the advantage of mass production with low producer margin per unit, depending heavily on vertical and horizontal integration systems. In Egypt, the subsidy policy lowers artificially the costs of production, while demand for meat raises the sale price. The result is a high margin of the producer (19 percent, Table 5). This performance hinders efficiency in this industry with respect to input-output relations.

(8) Concerning the comparative advantage principle: The net total costs per 1-ton liveweight at shadow prices of inputs, Table 5, were used to calculate the net economic protection coefficient, where the border price in 1980/81 was L.E. 1009.3 (Annex). It was found that for the farm scale less than 5000 birds per lot, this coefficient reached 1.07. By increasing farm scale this coefficient decreased to be less than one for the farm scale 50,000 birds per lot. The average value of this coefficient was 1.022. When this coefficient is one or less, it means that there is a comparative advantage. The results indicate that at farm scale greater than 24,000 birds per lot, Egypt has a comparative advantage in white meat production.

(9) The observed economies of scale of larger farms shown in the study are due to: efficient full time skilled management on large farms, availability of veterinarian permanently on farm, and

capability to mix their own feeds, as well as availability of permanent labor. Infrastructure is available to provide continuous power sources, heating is regular and water supply is not contaminated. They get their inputs regularly and they have enough transportation facilities. Finally, average fixed costs per unit decreases as farm scale increases.

(10) In comparison with red meat production, it seems that white meat is more efficient and closer to comparative advantage than red meat. Net economic protection coefficient of red meat was estimated as 1.24 for frozen carcass.

(11) However, the technical coefficient of broilers industry in Egypt are still less efficient than international standard. Feed efficiency is approximately 2.5 kg feeds/1-kg liveweight, while the international standard is 2.0. Average growth period is about 60 days in Egypt, while it is 50 days, internationally. The mortality rate of broilers in Egypt is at least 6 percent, while it is less than 4 percent internationally.

Broiler production in Egypt would be feasible under a free market price policy, even though 90 percent of its inputs are imported, particularly if it operated through large scale farms, improved technical coefficients, and under vertically and horizontally integrated systems.

Table 1: Farm Scale and Technical Coefficients per Farm of Broilers enterprises sample, 1981.

Average per Farm	Farm Scale				All Sample Farms
	(1)	(2)	(3)	(4)	
Birds/Lot	2.755	5.013	14.857	50.000	9.478
Number of Farms				2	32
Broilers for Sale/Year	14.143	24.514	74.285	250.000	47.226
Tons Liveweight For Sale/Year	20.987	36.568	115.516	371.248	71.347
No. Lots/Year	5.13	4.89	5.0	5.0	4.97
Growth period (days)	57	57	59	56	57
Interval between two lots (days)	14	18	14	17	17
Farm Area (suar Meter)	265.7	500.7	1.485.7	5.000	945.9
Kg. of feed/Kg Liveweight	2.656	2.504	2.104	2.610	2.456
Average daily gain (gm)	27.3	27.4	28.0	27.6	27.5
Market weight (Kg.)	1.565	1.568	1.655	1.648	1.585
Mortality rate %	6.06	6.8	6.04	4.23	6.31
L.E. Gross output/day	60	106	339	1042	205

Table 2: Effect of the Strain on Broilers Response

Response Measure	Broilers Strain		Statistical Significance $p < .05$
	Hubard	Others	
Kg Feed/Kg Liveweight	2.502	2.584	NSS
Average Daily Gain	27.61	27.47	NSS
Market Weight (Kg)	1.577	1.580	NSS
Death Rate, %	6.67	4.53	NSS

NSS = Not Statistically Significant

Table 3: Costs of production of broiler enterprise under current financial policies of inputs.

Cost Item	Farm Scale								Average PT./H %	
	(1)		(2)		(3)		(4)			
	PT./H	%	PT./H	%	PT./H	%	PT./H	%		
<u>Variable costs of:</u>										
Feeds	70.3	52.1	67.3	51.9	65.4	52.1	60.5	50.7	67.1	51.7
veterinary care	1.5	1.1	2.1	1.6	1.8	1.3	1.0	.9	1.8	1.2
Drugs	3.2	2.2	3.2	2.5	2.4	1.7	5.7	4.8	3.2	2.9
Mortality (risk)	4.8	3.6	5.6	4.3	5.4	3.9	3.3	2.8	5.2	3.6
Others*	3.4	2.5	3.5	2.7	2.1	1.5	3.9	3.2	3.2	2.4
Sub total (1)	83.2	61.5	81.7	63.0	77.1	60.5	74.4	62.4	80.5	61.8
<u>Explicit fixed costs of:</u>										
Baby chick(1-day old)	27.2	20.2	28.3	21.9	29.2	23.3	26	21.8	28.2	22.2
Farm rent	7.5	5.4	5.4	4.1	5.8	4.7	2.5	2.1	5.8	3.8
Hired Manegement	4.6	3.6	1.6	1.2	2.5	2.1	1.1	.9	2.4	1.6
Depreciation	2.5	1.8	1.4	1.1	1.4	1.1	4.9	5.3	1.9	2.5
Hired permanant labour	2.7	2.0	2.6	2.0	1.6	1.2	2.6	2.2	2.4	1.8
bid	1.8	1.3	1.7	1.3	1.5	1.0	1.3	1.0	1.7	1.1
Maintenance	0.4	0.3	1.2	.9	.7	.6	2.4	2.0	1.0	1.1
Others#	0.2	0.1	.3	.2	.3	.3	0.1	0.1	.3	.2
Sub-total (2)	47.1	34.7	42.5	32.7	43	34.3	40.9	35.4	43.7	34.3
<u>Imputed fixed costs of:</u>										
Family management	1.9	1.3	2.7	2.1	2.7	2.5	000	000	2.4	1.5
Family labour	.8	.5	.7	.5	.3	.2	000	000	0.6	.2
Interest	3.	2.1	2.0	1.6	3.1	2.6	2.6	2.2	2.5	2.2
Sub-total (3)	5.7	3.9	5.4	4.2	6.1	5.3	2.6	2.2	5.5	3.9
<u>Total costs 1+2+3</u>	136	100	129.6	100	126.2	100	117.9	100	129.7	100

PT./H = Costs per bird in L.E.

* Includes: Electricity, Water supply, Heating, Transportation, Feed additives, irrigular tips.

Includes: Advertising, Taxes, Communications, Insurance.

Table 4: Costs of production of broiler enterprise under shadow prices of inputs

Cost Item	Farm Scale								Average PT./H %	
	PT./H ⁽¹⁾ %		PT./H ⁽²⁾ %		PT./H ⁽³⁾ %		PT./H ⁽⁴⁾ %			
Total variable costs	94.8	58.4	92.7	59.9	87.9	57.5	58.9	58.3	91.6	58.4
Total fixed costs	68.5	41.7	62.7	40.1	63.8	42.5	60.0	41.7	64.1	41.6
Total costs	162.9	100	155.4	100	151.4	100	145.9	100	155	100

- (1) Subsidy per 1-ton feed: from the general company for poultry production was calculated as L.E. 30.62, and from private processing plants as L.E. 28.6.
- (2) Price per 1-day old chick at Cairo air port was PT. 38.9
- (3) The interest rate at the Agricultural Development and Credit Bank of Egypt was 14.5% annually in 1980. The food security projects enjoy a low interest rate of 6% only.
- (4) Other cost items have the same values as in table 3.

Table 5: Productive efficiency Measures Broiler Enterprises in L.E
Per 1-Ton Liveweight

Farm scale (birds/lot) and optional policies	Gross Margin	Net farm income	Normal profit	Pure profit	Net total costs	producer Margin %	% return to capital
<u>< 5,000:</u>							
Option (1) *	513	195	204	159	895	15.1	49.4
Option (2) **	434	38	19	(-26)	1080	(-2.5)	(-8.1)
Option (3) #	390	(-6)	(-25)	(-70)	1080	(-7)	(-21.6)
<u>5,000:</u>							
Option (1)	521	236	228	200	854	18.9	69.6
Option (2)	447	91	55	27	1027	2.6	9.4
Option (3)	402	46	11	(-18)	1027	(-1.8)	(-6.1)
<u>10,000 to 24,000:</u>							
Option (1)	553	258	252	212	842	20.1	73.9
Option (2)	481	121	83	43	1011	4.1	15.0
Option (3)	437	76	39	(-1)	1011	(-2)	(-.4)
<u>50,000:</u>							
Option (1)	566	282	272	265	789	25.1	91.6
Option (2)	489	118	83	76	978	7.2	26.3
Option (3)	445	74	39	32	978	3.1	11
<u>All farms</u>							
Option (1)	526	235	231	198	856	18.7	67.5
Option (2)	454	88	55	22	1032	2.1	7.1
Option (3)	410	43	11	(-23)	1032	(-2.3)	(-7.2)

* Costs are as in table (3) and local market price is L.E/045 per 1-ton liveweight.

** Costs are as in table (4) and local market price is L.E/045 per 1-ton liveweight.

Costs are as in table (4) and farm gate shadow price is L.E 1009 table 1, annex.

(12)

Table 6. Impacts of Current Financial policies for broiler enterprises on income distribution (values in L.E.)

Farm Scale

Annual family pure profit (1) (2) (3) (4) Average profit per broiler's farm

Net pure profit under current policies 3,338 7,299 24,531 98,257 15,887

Annual subsidy per farm[†] 3,880 6,315 59,522 70,615 12,653

% of subsidy from profit 116 86.5 79.6 71 79.6

* It equals pure profit per ton liveweight \times annual marketable liveweight of broilers

† It equals the difference between pure profit under current policies and pure profit under free market prices.

Calculated from Tables 1, 3, 4 and 5.

(20)

Table 7. Magnitude of subsidy per technical unit and per unit of output (values in PT.)

Item	Farm Scale				Average
	(1)	(2)	(3)	(4)	
Subsidy per Bird	27.4	25.8	26	28	26.3
Subsidy per kg Live weight	18.5	17.3	16.7	18.4	17.5
Subsidy in Costs of } production }	17.1	16.8	16.7	19.3	17

Calculated from Tables 1, 3, 4 and 5

