

ECONOMIC EFFECTS OF BIRD FLU SPREADING IN THE ARAB REPUBLIC OF EGYPT

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There is no doubt that food no longer become commodities trading, according to the laws of supply and demand, but food issue became at the front of important issues to the State, because it is a strategy issue, which can not be left to contemporary global conditions and variables. Also, it is impossible to say that it will be safe, because food is a vital necessity and indispensable for human. Also local food production with appropriate amounts make stable life and community is turning for construction and development.

The poultry industry is one of the promising industries in Egypt, which enjoyed great support by government since its inception. State has issued several laws and resolutions supporting the industry and encouraging investment on it. It gave the producers the right to obtain supported feed and approving establishment of poultry projects on agricultural land, exempting some industrial projects from taxes for ten years from the date of construction, increasing the credit facilities, and protecting poultry industry totally by banning import of poultry in 1986. Then imposing high tariffs on poultry imports reached 80% in 1997. About feed industry and the most important of is yellow corn. These factors have pushed the process of investment in industry and their rings, where investment amount was 18-20 billion pounds in 2005, in addition to working capital, which amount to about 5 billion pounds a year, and providing about 1.5 million permanent jobs, and nearly a million temporary jobs. Poultry meat, red meat and fish are at the forefront of animal proteins group, which include the strategies of food security in Egypt in general, and as a result of the production of poultry meat more efficient in terms of conversion efficiency, as the conversion rate reached to 2.3: 1 i.e. 2.3 kg of feed given 1 kg of poultry meat. As for red meat production, the conversion rate is 7: 1, i.e. 7 kg of feed given 1

kg of red meat, in addition to that, the production of poultry is a source of low costs protein in Egypt compared to other sources. The total consumption of poultry in Egypt is about 987 thousand tons in 2008, 829 thousand tons from it are fattening chickens, which represent about 84% of the total consumption of poultry in Egypt and 158 thousand tons of local chicken meat, ducks, geese, turkeys and rabbits. The industry consists of a set of interrelated production chains, starting with a schedule and ending with broilers production, egg production, poultry industry, and some relating industries like poultry feed production plants and massacres. Broilers production farms is the most important stage of the poultry industry and widespread in republic governorates, where the other stages of industry depend on it, and the total number of broilers farms in 2008 is about 25.95 thousands farms on the republic and total maximum capacity is 1.62551 billion chickens per year and it has been shown that about 72.7% of poultry production is concentrated in five major governorate, Qaliubiya, Sharqiya, Gharbia, Dakahlia and Behera at the rates of about 30.8, 16.2, 11.4, 9.2 and 5.1%, respectively.

Keywords: bird flu, poultry industry, average gross margin, rate of return, food security, production, consumption, North Sinai

Bird flu is contagious viral disease affecting most species of birds. It has been recognized as a disease since 1878, and the most serious type is that known as H5N1, which has the ability to transfer from birds to humans and water, playing an important role in the transmission and dissemination of influenza between birds and the infect (Ibrahim, 2007). It is transforming also by the tools used in breeding, nutrition, transportation, feed, persons working on farms. Disease symptoms in birds are loss of appetite, sharp decline in egg production, emergence of eggs without shell, secretions of mucous in the nose, drooling out of the beak and feathers wrinkle and break. The percentage of sudden death is about 100%. Its symptoms in humans are headache, chills, muscle aches, dry cough and inflammation of eye conjunctiva and in severe cases it is fatal. In June 2007, it was reported about 100 cases of human infection with virus in the world, although this figure does not represent risk in the number for other deadly diseases to humans, but the ability of influenza viruses to transform easily caused the scientists fear that virus H5N1 could spread easily from person to person. Therefore, the lack of preventive vaccine for humans from infection with the virus commercially increases the risk of disease. Infection of avian influenza virus transfer to humans if he contact with sick chickens in unsterile environment. The virus come out from the body of a bird in their wastes, Egyptian J. Desert Res., **62/63**, 71-86 (2012/2013)

which turns into a powder carried by the air. Virus can survive for long periods between 15-35 days in bird droppings, especially in low temperatures, but all the poultry meats does not transfer the virus to humans. The chicken should be cooked on high temperature and in a good way. Pig is a more candidate animal to work as a mediator, where in its tissue avian influenza virus transform into harmful mutation to humans. Therefore, the disease was found spread among the people in the areas of pig farms adjacent to chicken farms. Import vaccine from other countries may not be effective in reducing the spread of the disease, where virus type that infected a country may be different from other countries, because of the rapid evolution of viruses and their unceasing mutations. Each State has been proven that it has infection cases, shall start to separate the virus and produce a serum against it.

The most important protection from this disease is to wash hands with warm water and soap frequently to prevent infection. Many countries have taken precautions to prevent infection, most countries import frozen birds in fear of possible transformation of the virus due to contamination of packaging equipment.

It has been announced outbreak of bird flu in Egypt in the seventeenth of February 2006, that was in three governorates only and it has expanded to 19 governorates, which negatively reflected on livestock husbandry in Egypt (Sawalhi, 2005). Consumers get away from buying birds and poultry, and most of the farms and birds shops were closed. Infection reached to a high level in Sharqua, Qalyubia, Behera and Giza Governorates, where 1000 chickens were executed in Sharqua in the early infection in Egypt, and about 40 thousand birds in Qalyubia, and all infected birds in Giza Governorate were executed and the infected focus was cleaned (Fatima Shafik, 2006).

According to WHO statistics, data in table (1 in annexes), show that Egypt did not have human cases of Avian Influenza before 2006, while the cases of infection and death from the disease were about 51.23 cases during the period 2006-2008, so Egypt occupied the second rank in the world during that period, after Indonesia with relative importance about 20.7 and 13.5%, respectively. While Egypt occupied the first rank for infection cases and death in 2009, of about 71.1 and 33.3%, respectively. In spite of disease restrictions in many countries of the world, Egypt has occupied the third rank for the average number of infected cases and death of human, because of Avian Influenza during the period 2003-2009, with percentage about 18.0 and 10.3% of average infected cases and death worldwide, respectively. Predicting the risk requires efforts consolidation to reduce economic and health damages of this disease (Mohamed, 2007).

The average per capita from chicken meat in Egypt is still relatively low, compared to many countries around the world, where average per capita of chicken meat in Egypt is 9 kg per year in 2008, while it is up to 11.9 kg in

the world, 20.9 kg in the European Union, 50.2 kg in the United States, 35.6 kg in Saudi Arabia and 64.8 kg in the UAE.

The research problem is represented on emergence of bird flu and its spread in Egypt in general and consequences of this crisis in North Sinai Governorate in particular, which caused some of the negative effects on economic variables associated with the poultry industry, which affect the size of investments in this industry as well as their impact on the economics of poultry production and its role in the agricultural and national economy (Samour, 2006 and Al Shatalh and Ali, 2008). This requires identifying the causes of that problem for the policy and decision makers in this area.

The research aims to identify the current status of production and consumption of white meat in Egypt, as well as the current situation for the production of poultry in North Sinai Governorate, as well as to identify the economic impacts of bird flu in some of economic and technical variables of farmers under study areas and the economics of fattening chickens in the farms in North Sinai.

MATERIALS AND METHODS

The research depends on published and unpublished secondary data collected from the relevant official bodies, such as the Ministry of Agriculture and Land Reclamation, Presidency of Cabinet Center for Information and Decision Support (2007 and 2008), and the Central Agency for Public Mobilization and Statistics, as well as a number of researches and studies. That is in addition to the data mentioned in questionnaire forms, which has been prepared for this purpose and it has been applied on a random sample of poultry farms in North Sinai Governorate during 2010. Search also adopted the methods of descriptive and quantitative statistics in data analysis to extract some of the indicators and criteria to measure the impact of avian influenza on the economics of the poultry industry in North Sinai Governorate.

RESULTS AND DISCUSSION

1. Current Status of the White Meat in Egypt

Data in table (1) refer to the increase in local production of poultry meat of about 46.24 thousand tons per year with increase rate of 7.11% of annual average, which amounted to about 0.65 million tons during the period 1990-2008. The local consumption of white meat also increased by about 31.10 thousand tons, with increase in rate of 4.47% of average annual domestic consumption, which amounted to about 0.7 million tons. While the value of poultry meat has increased by 506.3 million pounds with annual

increase percentage of 4.88% of the average value of poultry meat, which amounted to about 10.37 billion pounds per annum because of the increase in average price of poultry by about 0.38 pounds, with an annual increase percentage of about 6.32% of average price during the study period.

Results also indicate that the amount of the annual increase in average per capita of white meat was about 0.31 kg, with annual increase percentage of 2.88% of average per capita during the period mentioned above, which amounted to about 10.76 kg per year. While the rate of self-sufficiency of white meat ranged from 120.50 to 46.84% in 1990-2002, respectively, the average of annual increase was about 3.67% of the average rate of self-sufficiency during the period 1990-2008.

Table (1). Equations of general time trend of the evolution of both total production and consumption, average price, the value of white meat, the average per capita, the gap and the rate of self-sufficiency of the white meat in Egypt during the period 1990-2008.

Particulars	Unit	α		β		R ²	F	Average	Annual rate of change (%)
		Value	T	Value	T				
Local production	thousand ton	187.54	2.77**	46.24	7.78**	0.78	60.47**	0.65	7.11
Local consumption	thousand ton	384.28	8.19**	31.10	7.56**	0.77	57.14**	0.70	4.47
Farm average price	Pound/kg	2.22	4.00**	0.38	7.77**	0.78	60.45**	6.01	6.32
Poultry meat value	million pound	732.50	2.12*	506.30	16.50**	0.94	272.22**	10.37	4.88
Per capita	kg/year	7.62	10.84**	0.31	5.10**	0.60	25.98**	10.76	2.88
Self-sufficiency rate	%	60.11	5.98**	3.07	3.48**	0.42	22.12**	83.57	3.67

Source: collected and calculated from data in table (1) in annex.

2. The Current Situation of Poultry Production in North Sinai Governorate

Data in table (2) show increasing local poultry production in North Sinai Governorate by about 0.09 thousand tons per year with increase rate of about 5.52% of the annual average, which amounted to 1.63 thousand tons in the period 1991-2009. Increasing in the value of poultry meat was shown to be about 1.09 million pounds by annual increase of about 10.70% of the average value of poultry meat, which amounted to about 10.19 million pounds per year. This may be attributed to the increase in the average price of poultry by about 0.24 pounds with annual increase rate of about 4.43% of the average price during the study period.

Table (2). The equations of general time trend of the evolution of total production, value of the white meat, and the average price of white meat in the governorate of North Sinai, during the period 1991-2009.

Particulars	Unit	α		β		R2	F	Average	Annual rate of change (%)
		Value	T	Value	T				
Poultry production	Thousand ton	0.73	2.29*	0.09	3.24**	0.38	10.51**	1.63	5.52
Average price	Pound/kg	3.05	3.77**	0.24	3.31**	0.39	10.96**	5.41	4.43
Poultry meat value	Million pound	0.75	0.19	1.09	3.19**	0.37	10.19**	10.19	10.70
General farm	Farm	10.72	0.51	11.59	6.31**	0.70	39.79**	1.50	11.04
full farm	Farm	68.75	3.58*	12.66	5.41**	0.63	29.31**	195	6.49

Source: collected and calculated from data in table (3) in annex.

Data in table (3 in annexes) show fluctuation in the number of working farms, as they ranged between 30 and 265, in 1997 and 2009, which represent about 30.00 and 77.94%, respectively. While the relative importance of working farms and total farms ranged between 18.45 and 95.77%, during the period 1991 and 1998, respectively. When estimating the directional relationship between working farms and the total farms, as shown in table (2), it is an increasing as a general trend, reached to about 12.13 farms annually, at changing rate of about 11.04 and 6.49%, respectively.

Table (3). Production of poultry in some centers in the governorate of North Sinai, during the months of 2009.

Centers	Months												Total	%
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
Arish	1000	0.00	4800	0.00	0.00	16000	3000	0.00	0.00	0.00	6650	0.00	31450	1.74
Sheikh Zuwaid	74445	3870	3660	11620	15500	0.00	0.00	5800	0.00	0.00	19000	5500	72395	4.01
Bir al-Abed	97000	101000	102000	97000	145500	140500	213000	210500	191000	146000	157800	99000	1700300	94.19
Rafah	1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1000	0.06
Total number of chickens	106445	106445	110460	108620	161000	156500	216000	216300	191000	146000	183450	104500	1805145	100.00
%	5.90	5.81	6.12	6.02	8.92	8.67	11.97	10.58	8.09	10.16	10.79	5.79	100.00	

Source: collected and calculated from the data of North Sinai Governorate, the Department of Agriculture in El-Arish, unpublished data, February 2010.

Data in table (3) show the relative importance of poultry production in North Sinai Governorate, according to the centers during the months of the year 2009. It was found that Bir Al-Abed center is in the first rank for the total number of chickens by 1.7 million chickens representing about 94.19% of the total number of chickens in the governorate, which was estimated as 1.81 million chickens in 2009, followed by Sheikh Zuwaid center, El Arish

and Rafah by 4.01, 1.74 and 0.06%, respectively, of total number of chickens in governorate during the same year, while it was found that May, June, July, August, September, October and November months are the most prolific months in production rate by 70.37% of the total number of chickens in months during the year 2009. This refers to the importance of providing veterinary care during those months.

3. The General Features of the Poultry Industry in North Sinai Governorate

Data in table (4 in annex) show that the total number of farms in North Sinai Governorate is 246 farms and the production capacity of fattening poultry farms was 9696 chickens with rates of 0.95 and 0.60%, respectively, relative to the total records of the country in 2010, while there is no massacres at this province. That refers to the need to establish massacres in governorate fitted with and the number of fattening chickens.

4. The Economic Effects of the Bird Flu in Sample Farms

To find out the effects of bird flu crisis on poultry production in North Sinai Governorate, the impact of this crisis on many technical and economic variables was measured and compared, during the crisis in 2006 and before 2005. Then the change rate was calculated for each, after overcoming this crisis in 2009 and comparing it with the crisis situation in 2006, to define the current and future status of poultry production in North Sinai Governorate. Table (4) reveals decrease in all the economic variables under study in North Sinai Governorate during 2006 than it was in 2005, except feed price. The price of chickens has achieved greater rates of decline between variables under study by 66.67% than it was before the crisis. The average number of sold chickens, the number of permanent employment, average sale price, the number of dead chickens, the number of chickens, the average worker's wage, the amount of feed used where all decreased by 62.83, 50, 46.67, 42.86, 21.43, 14.29 and 13.04%, respectively, comparing to 2005, while average sale was affected by the crisis and decreased by 6.25%. More than half of the chickens were disposed before completion of the growth cycle in order to reduce the costs of feeding and care. So, the staying of chicken in farm makes the product more expensive than the expected revenue from the sale at session completion, because of the low average of selling price by 53% of what it was in 2005, which made producers dispose 51% from chicken farm, although the rate of dead chickens was limited by 5% of the total school and there is no death case due to bird flu. This indicates that the governorate of North Sinai was not directly affected by bird flu, but it was affected by the manner of crisis management in 2006.

Table (4). The economic effects of bird flu on poultry industry in farms under study before, during and after the crisis in North Sinai Governorate.

Particulars	Unit	Before disease in 2005	During disease in 2006		After disease in 2009		Comparing situation after disease
		Average	Average	% ⁽¹⁾	Average	% ⁽²⁾	% ⁽³⁾
The number of chickens	Chicken	7000	5500	-21.43	7000	27.27	0
Purchase price of the chicken	Pound	0.9	0.3	-66.67	5	1566.67	455.56
The amount of feed used	Ton	23	20	-13.04	24	20.00	4.35
Price per ton of feed	Pound	750	950	26.67	2020	112.63	169.33
The number of permanent employment	Worker	2	1	-50.00	2	100.00	0.00
Average wage of the worker	Pound	700	600	-14.29	750	25.00	7.14
The number of temporary employment	Worker	1	1	0.00	1	0.00	0.00
Average wage of the worker	Pound	200	200	0.00	300	50.00	50.00
The number of dead chickens	Chicken	490	280	-42.86	380	-48.65	-22.45
The number of disposed chicken	Chicken	0	2800	0	0	-	-
The number of sold chickens	Chicken	6510	2420	-62.83	6620	237.76	1.69
Average sale weight	kg	1.6	1.5	-6.25	1.8	20.00	12.50
Average sale price	Pound / kg	7.5	4	-46.67	11	175.00	46.67

The rate of increase or decrease = $\frac{\text{during disease} - \text{before disease}}{\text{before disease}} \times 100$

The rate of increase or decrease = $\frac{\text{after disease} - \text{during disease}}{\text{during disease}} \times 100$

The rate of increase or decrease = $\frac{\text{after disease} - \text{before disease}}{\text{before disease}} \times 100$

Source: calculated from the date of questionnaire form 2010

The previous table show significant improvement of all variables under study in 2009 than it was in 2006, where number of chickens , price of chicken, amount of used feed, price of feed per ton, number of permanent employment, average wage of worker, number of sold chicken, average weight of a chicken, average sale weight, and average selling price have increased by 27.27, 1566.67, 20, 112.63, 100, 25, 50, 237.76, 20 and 175%, respectively. And when comparing the situation for these variables in 2009 with that before the crisis 2005, the study shows significant improvement for all economic variables under study.

5. The Economic Effects of Bird Flu on the Economics of Chickens Fattening

The results in table (5) refer to the economics of chickens fattening in North Sinai Governorate including all costs of feeding, total return, economic efficiency indicators and productivity of fattening.

Table (5). The rate of return costs in farms under study before, during and after the crisis in North Sinai Governorate.

Particulars	Before disease in 2005	During disease in 2006		After disease in 2009		Comparison after disease
	Average	Average	% (1)	Average	% (2)	% (3)
Purchasing chickens cost	6300	1650	-73.81	35000	2021.21	455.56
Purchase costs of feed	17250	19000	10.14	48480	155.16	181.04
Labor cost	1600	800	-50.00	1800	125.00	12.50
Drug cost	1050	1500	42.86	1050	-30.00	0.00
Bedding cost	1600	1450	-9.38	1600	10.34	0.00
Energy cost	1000	900	-10.00	1000	11.11	0.00
Equipment cost	150	200	33.33	170	-15.00	13.33
Total variable cost	28950	25500	-11.92	89100	249.41	207.77
Fixed cost (rent)	1500	1500	0.00	1500	0.00	0.00
Total cost	30450	27000	-11.33	90600	235.56	197.54
Return of main product	78120	14520	-81.41	131067	802.73	67.79
Return of secondary product	1250	650	-48.00	1400	115.38	12.00
Total Revenue	79390	15170	-80.89	132476	773.28	66.91
Net return	48290	11830	75.82-	41876	253.98	-14.40
Gross margin	50420	10330	-79.51	43376	319.90	-13.97
Return of the cost	2.61	0.56	-78.44	1.46	160.71	-43.90

The rate of increase or decrease = $\frac{\text{during disease} - \text{before disease}}{\text{before disease}} \times 100$

The rate of increase or decrease = $\frac{\text{after disease} - \text{during disease}}{\text{during disease}} \times 100$

The rate of increase or decrease = $\frac{\text{after disease} - \text{before disease}}{\text{before disease}} \times 100$

Source: Calculated from data of questionnaire form 2010.

The results indicate that the overall costs of chickens fattening including variable costs are associated with the size of production such as purchase of chickens, nutrition, permanent and temporary employment, medicines, disinfectants, accessories of bedding and heating, and finally the costs of equipment, and other fixed costs like farm rent. The results in table (5) indicate that the total variable costs decreased by 11.92% during the crisis in 2006, compared to the situation before the crisis in 2005, and this decrease has reached maximum for the cost of purchasing chickens, where the amount of decrease was about 73.81% and less for bedding, while the drug and equipment cost has increased by 42.86 and 33.33%, respectively. The same table shows that the total variable costs has increased by 249.41% after the crisis in 2009, comparing to the situation during the crisis in 2006. This increase has reached the maximum for the cost of purchasing chickens by about 2021.21%, and minimum for the cost of bedding by 10.34%, while the cost of drugs and equipment had decreased by 30 and 15%, respectively. Comparing the situation of these variables in 2009 and before the crisis in 2005 show that the total variable costs has increased by 207.77%, while the height has reached the maximum for the cost of buying chickens by 455.56%.

Studying the terms of the fixed costs, in farms under study in North Sinai Governorate, the previous table shows that the total fixed costs did not

change before, during and after the crisis, considering the fixed costs (rent) are burden upon farm owner whether produced or stop production.

Studying the terms of total revenue in farms under study in North Sinai Governorate (Table 5), it became clear that the total overall revenue has decreased by 80.89% during the crisis in 2006, comparing to the situation before the crisis in 2005. Also, it increased by 773.28% after the crisis in 2009 comparing to the situation during the crisis in 2006. When comparing the situation of this variable in 2009 and before the crisis in 2005, it was shown that it increased also by an amount of 66.91%

By extrapolating the results of table (5), which describe some indicators of the economic efficiency of chicken fattening in farms (net revenue, gross margin and rate of return of the cost), it was found that net average returns in farms of North Sinai Governorate decreased by 75.82% during the crisis in 2006 comparing to the situation before the crisis in 2005. It increased by 253.98% after the crisis in 2009, comparing to the situation during the crisis in 2006. Comparing the situation of this variable in 2009 with that before the crisis in 2005 show that it decreased by 14.40%, and this can be attributed to increase the cost of purchase chickens and feed than it was before the crisis.

Total average margin in farms of North Sinai Governorate decreased by 79.51% during the crisis in 2006, comparing the situation before the crisis of 2005. Total average margin increased by 319.90% after the crisis in 2009, comparing the situation during the crisis of 2006. Comparing the situation for this variable in 2009 and before the crisis in 2005, shows that it has decreased by 13.97%, and this was due to increase variable costs by 207.77% from that in 2005.

Regarding to the proportion of return and costs of farms in North Sinai Governorate, it is clear that it decreased by 78.44% during the crisis in 2006, comparing to the situation before the crisis in 2005. Also, it increased by 160.71% after the crisis in 2009, comparing to the situation during the crisis in 2006. When comparing the situation for this variable in 2009 and before the crisis in 2005, it shows that it decreased by 43.90%, and this is due to increase in total cost of about 197.54% from that before the crisis in 2005.

6. The Indicators of Marketing Efficiency

Table (6) refers to marketing efficiency indicators, which include marketing differences and marketing efficiency. To know the impact of disease spreading on those indicators, period before disease and after spread the disease have been compared.

Table (6). Indicators of efficiency marketing of poultry farms of field study in North Sinai Governorate before, during and after bird flu.

Particulars	Unit	North Sinai governorate				
		Before	During	% ⁽¹⁾	After	% ⁽²⁾
Average cost of fattening*	L.E/ kG	3	7	133.3	7.5	150
Average farm price	L.E/ kG	7.5	4	-46.7	11	46.7
Average retail price	L.E/ kG	8	4	-50	12	50
Average differences marketing ⁽³⁾	L.E/ kG	0.5	-	-100	1	100
Marketing Efficiency ⁽⁴⁾	%	14.3	-	-100	11.8	-17.5

⁽¹⁾The effect disease spread(%) = $\frac{\text{during disease} - \text{before disease}}{\text{before disease}} \times 100$

⁽²⁾The effect disease spread = $\frac{\text{after disease} - \text{before disease}}{\text{before disease}} \times 100$

⁽³⁾marketing differences = retail price - the price of farm

⁽⁴⁾marketing efficiency = $\frac{\text{Marketing differences}}{\text{Marketing differences} + \text{fitting cost}} \times 100$

Source: Calculated from data of questionnaire form 2010

It was shown that the implications of bird flu crisis in Egypt in general and the North Sinai Governorate in particular have led to a deterioration and a decrease in marketing differences of and marketing efficient by 100% for each of them. That is due to lack of difference between the average of price farm and the average of retail price and this along with high average cost of kilogram fattening compared to farm prices and retail prices, but during the post-crisis period. There has been improvement in marketing differences about 100%, which may be attributed to higher retail prices than farm prices. While the deterioration of marketing efficiency standard but lesser than level during the crisis as decrease rate was 17.5%. From obtained data, it was clear that the amount of imbalance in marketing indicators of fattening poultry, whether during the period of disease spread or later, increased at farm and consumer level to compensate the losses caused by the spread of disease.

CONCLUSION

Studying the economic effects of bird flu and its implications on the poultry industry in North Sinai Governorate, showed a decrease of all the economic variables under study and so in 2006 than it was in 2005, except the price of feed. Also, a significant improvement in all variables under study was shown in 2009 than it was in 2006. There was an increase in the number of chickens, the price of chicken, the amount of feed used, the price per ton of feed, the number of permanent labor, the average permanent and temporary worker's wages, the number of chicken sold, the average weight of a chicken, and the average selling price. When comparing the situation to

those variables in 2009 than it was before the crisis in 2005, the study showed a significant improvement in all the economic variables under study.

Studying the indicators of economic efficiency of fattening chicken in farms under study showed reduction in both average net earnings, average gross margin, and the rate of return for the costs of farms in North Sinai Governorate during the crisis in 2006, compared to the situation before the crisis in 2005. When it became clear, there was an improvement in these indicators after the crisis in 2009, compared to the situation during the crisis in 2006.

RECOMMENDATIONS

In the light of the foregoing data, the study recommends the following:

1. Using the scientific method and be calm and cautious during the crises, especially by the officials and the media, where the wrong decisions and advertising have a significant role in increasing the size of the losses.
2. The need for a comprehensive inventory of all poultry farms in the governorate of North Sinai and licensing it to be controlled in the case of the disease if it appears.
3. Determining an appropriate financial compensation by the government and that should be given to the owners of farms in the event of infection, to cover production costs, at least so do not give the opportunity to hide infection cases, fearing of the state might execute all birds.
4. Using geographic information systems in calculating poultry farms all over the country to illustrate the productive activities of industry in integrated database.

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ANNEXES

Table (1). Evolution of bird flu cases worldwide during the period 2003-2009.

Items	(2003-2005)				(2006-2008)				(2009)				Total			
	Cases		Death		Cases		Death		Cases		Death		Cases		Death	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Azerbaijan	0	0.0	0	0.0	8	3.2	5	2.9	0	0.0	0	0.0	8	1.9	5	1.9
Bangladesh	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0
Cambodia	4	2.7	4	5.1	4	1.6	3	1.8	0	0.0	0	0.0	8	1.9	7	2.7
China	9	6.1	6	7.6	22	8.9	15	8.8	7	18.4	4	33.3	38	8.8	25	9.5
Djibouti	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0
Egypt	0	0.0	0	0.0	51	20.7	23	13.5	27	71.1	4	33.3	78	18.0	27	10.3
Indonesia	20	13.5	13	16.5	121	49.0	102	59.7	0	0.0	0	0.0	141	32.6	115	43.9
Iraq	0	0.0	0	0.0	3	1.2	2	1.2	0	0.0	0	0.0	3	0.7	2	0.8
Lao																
People's Democratic Republic	0	0.0	0	0.0	2	0.8	2	1.2	0	0.0	0	0.0	2	0.5	2	0.8
Myanmar	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0
Nigeria	0	0.0	0	0.0	1	0.4	1	0.6	0	0.0	0	0.0	1	0.2	1	0.4
Pakistan	0	0.0	0	0.0	3	1.2	1	0.6	0	0.0	0	0.0	3	0.7	1	0.4
Thailand	22	14.9	14	17.7	3	1.2	3	1.8	0	0.0	0	0.0	25	5.8	17	6.5
Turkey	0	0.0	0	0.0	12	4.9	4	2.3	0	0.0	0	0.0	12	2.8	4	1.5
Viet Nam	93	62.8	42	53.2	14	5.7	10	5.9	4	10.5	4	33.3	111	25.6	56	21.4
Total	148	100.0	79	100.0	247	100.0	171	100.0	38	100.0	12	100.0	433	100.0	262	100.0

http://www.who.int/csr/disease/avian_influenza.

Table (2). Evolution of total production and consumption, average price of white meat, average per capita, hole and self-sufficiency rate of white meat in Egypt during the period 1990-2008.

Particulars	Production (thousand ton)	Consumption (thousand ton)	Average price of poultry (LE/kg)	Chicken meat value (million pound)	Per capita (kg/year)	Hole (thousand ton)	Self-sufficiency (%)
1990	215	459	2.30	494.50	8.44	-244	46.84
1991	230	470	3.00	690.00	8.42	-240	48.94
1992	321	480	3.33	1068.93	8.51	-159	66.88
1993	328	549	4.77	1564.56	9.55	-221	59.74
1994	391	579	4.70	1837.70	9.83	-188	67.53
1995	480	606	5.42	2601.60	10.07	-126	79.21
1996	482	657	5.70	2747.40	10.70	-175	73.36
1997	506	685	5.93	3000.58	11.07	-179	73.87
1998	516	430	5.41	2791.56	6.91	86	120.00
1999	629	524	5.40	3396.60	8.30	105	120.04
2000	669	559	5.20	3478.80	8.64	110	119.68
2001	863	721	5.17	4461.71	10.96	142	119.69
2002	1164	966	5.38	6262.32	14.46	198	120.50
2003	1047	878	6.12	6407.64	13.05	169	119.25
2004	982	839	7.72	7581.04	12.18	143	117.04
2005	1018	888	7.61	7746.98	12.69	130	114.64
2006	895	936	9.03	7178.85	13.13	-141	84.94
2007	879	987	9.56	8403.24	13.77	-108	89.06
2008	834	987	12.44	10374.96	13.85	-164	83.57
Average	643.28	678.50	5.74	4320.47	10.76	-45.37	90.78

Source: collected and calculated from the data of the following:

- Food and Agriculture Organization (FAO), 2009.
- Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Central department of Agricultural Economics, records of Statistics Department, miscellaneous number.

Table (3). Evolution of total production quantity and value and average price of white meat in North Sinai Governorate during the period 1991- 2009.

Particulars	Production (thousand ton)	Average price of poultry (LE/kg)	Chicken meat value (million pound)	Farms number		
				Working		Total
				Number	%	
1991	1.16	3.40	3.94	39	25.83	151
1992	1.78	4.00	7.12	31	18.45	168
1993	1.13	4.40	4.97	45	26.79	168
1994	1.33	4.00	5.32	49	29.52	166
1995	1.06	4.25	4.51	45	44.12	166
1996	0.82	5.25	4.31	34	33.33	102
1997	0.54	4.82	2.60	30	30.00	102
1998	0.90	5.00	4.50	68	95.77	100
1999	1.41	4.00	5.64	83	61.03	71
2000	1.44	4.80	6.91	76	51.35	136
2001	1.55	5.50	8.53	106	58.56	148
2002	1.84	4.75	8.74	107	59.12	181
2003	1.89	5.60	10.58	108	59.02	181
2004	1.72	7.50	12.90	155	72.09	183
2005	4.14	^0.00	33.12	154	53.47	215
2006	2.31	4.00	9.24	250	80.65	288
2007	3.62	3.50	12.67	260	76.47	310
2008	0.83	8.00	6.64	93	25.69	340
2009	3.45	12.00	41.40	265	77.94	362
Average	1.63	5.41	10.19	105	53.85	195

Source: collected and calculated from the data of North Sinai Governorate, the Directorate of Veterinary in El-Arish, unpublished secondary data, February 2010.

Table (4). Data of farms number, productive capacity of farms and massacres in North Sinai Governorate, 2010.

Governorate	Farms number		Farms capacity		Massacres capacity	
	Number	%	Number	%	Number	%
Behara	1332	5.13	567986	34.94	16080	9.46
Qaliubiya	8000	30.83	480000	29.53	52200	30.69
Dakahlia	2378	9.16	154823	9.52	0	0.00
Gharbia	2965	11.42	133320	8.20	1650	0.97
sharckia	4211	16.23	70916	4.36	26927	15.83
Damietta	424	1.63	34827	2.14	600	0.35
Ismailia	521	2.01	34118	2.10	15360	9.03
Giza	1948	7.51	32053	1.97	8250	4.85
Kafir El-Sheikh	572	2.2	31880	1.96	0	0.00
Menoufia	643	2.48	18883	1.16	4800	2.82
Alexandria	195	0.75	16317	1.00	6401	3.76
Fayoum	433	1.67	11188	0.69	0	0.00
Minya	280	1.08	10200	0.63	600	0.35
North Sinai	246	0.95	9696	0.60	0	0.00
Qena	163	0.63	5900	0.36	1200	0.71
Assiut	822	3.17	5700	0.35	2100	1.23
Luxor	167	0.64	2024	0.12	600	0.35
Suez	67	0.26	1227	0.08	3900	2.29
Cairo	45	0.17	1150	0.07	13200	7.76
Beni Suef	86	0.33	1121	0.07	10800	6.35
Sohag	304	1.17	1015	0.06	1800	1.06
Red Sea	14	0.05	697	0.04	0	0.00
Matrouh	46	0.18	156	0.01	0	0.00
Aswan	42	0.16	122	0.01	0	0.00
Port Said	21	0.08	78	0.00	3600	2.12
el wady el gaded	18	0.07	65	0.00	0	0.00
South Sinai	9	0.03	43	0.00	0	0.00
Total	25952	100	1625507	100.00	170068	100.00
Damietta	1332	5.13	567986	34.94	16080	9.46

Source: Presidency of cabinet, Center for Information and Decision Support, the study of the economic impacts of an outbreak of bird flu in Egypt, 2010.

الآثار الاقتصادية لإنتشار مرض إنفلونزا الطيور في جمهورية مصر العربية

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بدراسة الآثار الاقتصادية لمرض أنفلونزا الطيور وتداعياته على صناعة الدواجن في محافظة شمال سيناء، تبين إنخفاض كافة المتغيرات الاقتصادية موضع الدراسة وذلك خلال عام ٢٠٠٦ عما كانت عليه عام ٢٠٠٥ عدا سعر العلف. كما تبين التحسن الملحوظ لكافة المتغيرات موضع الدراسة عام ٢٠٠٩ عما كانت عليه عام ٢٠٠٦، حيث إرتفع كل من عدد الكتاكيت، سعر الكنكوت، كمية العلف المستخدمة، سعر طن العلف، عدد العمالة الدائمة، متوسط أجر العمالة الدائمة والمؤقتة، عدد الدجاج المباع، متوسط وزن الدجاجة، ومتوسط سعر البيع. وبمقارنة الوضع لتلك المتغيرات عام ٢٠٠٩ عما كانت عليه قبل الأزمة عام ٢٠٠٥ فقد بينت الدراسة حدوث تحسن كبير لكافة المتغيرات الاقتصادية موضع الدراسة. وتبين من دراسة مؤشرات الكفاءة الاقتصادية لتسمين الدجاج في مزارع عينة الدراسة إنخفاض كل من متوسط صافي العائد، متوسط الهامش الكلي، ونسبة العائد للتكاليف بمزارع محافظة شمال سيناء أثناء الأزمة عام ٢٠٠٦ مقارنة بالوضع قبل الأزمة عام ٢٠٠٥. في حين إتضح تحسن تلك المؤشرات بعد الأزمة عام ٢٠٠٩ مقارنة بالوضع أثناء الأزمة عام ٢٠٠٦.

