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Effect on productivity for introducing cotton seed meal to feed mixtures for broilers, and economic indicators

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ABSTRACT

The research was carried out on (600) broiler chick hybrids (Hibrd), in the Technical Institute of Agricultural in Damascus, between 7/1/2010 and 24/2/2010. The birds were divided into 4 experimental groups, each group containing 150 birds, each of which included 3 replicates. Birds were fed in the 1st phase on fodder without cotton seeds, while in second and third phase: Birds in the 1st group (control) were fed on plant feed without cottonseeds, with the second group birds being fed on plant feed with 5% cottonseed meal in the second phase, and 10% in the third phase. Birds in the third group were fed on plant feed with 15% cottonseed meal in the second phase, and 20% in the third phase. Results obtained showed: The addition of cottonseed meal to a plant mixture used in feeding birds in second and third phase, up to 20% of the total mixture, would not affect the cumulative mortality rate. The best profitability was in the second group, which was fed on feed with 5 and 10% cottonseed meal, with about 0.1% compare to control group.

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Introduction

The main purpose of raising poultry is to provide food production of a quality and quantity which matches the increasing demand for it. Since most animal production problems arise in the developing countries, it is very important for these countries to find solutions as soon as possible, and to be more concerned with developing their national agricultural wealth. The department of animal production's researches at Damascus University indicated the capability of feeding the chicken with plant's meal (Al-Istwani, Yassin, & al-Saadi, 1996); the results were good enough, but after checking the fodder substances of the chicken and their ratios, the study found a possibility of including the local cottonseed meal up to certain percentages, in order to save on use of the soybeans seed meal. Previous research shows the possibilities of including cottonseed meal in the chicken's fodder in specific ratios without any side effect; Golian found in his research, in 1994, that including 5-10% of the cottonseed meals to chicken fodder from the first day until the seventh week does not have any negative effect on the chicken's final weight. Additional research shows that adding 15% and 20%, respectively, of the local cottonseed meal to the chicken's meal does not affect the productivity indicators for the chickens (Issa, 1990 and Fernamadez et al, 1995). And also (Hassan *et al*, 1996 and Botsoglmo, 1993) showed in their research that the Gossypol does not negatively affect the chicken's characteristics.

The aim of this research is to find the effects of introducing the cottonseed meal to the chicken fodder with consideration towards also adding it to the growing and final meals, not merely from the beginning, in certain ratios.

Research Methodology

This research was done in the Technical Institute of Agriculture in Damascus on 600 Hibrd chicks, between the 7th of January and the 24th of February, 2010; the chicks were divided into four experimental groups in three replicates, with the same conditions of hosting and caring during the growing period from the first day until the seventh week. The same meal system was applied for the four groups, in three categories, as follows:

First stage: from 1 day to 14 days old.

Second stage: from 15 days to 35 days old.

Third stage: from 36 days to 49 days old.

All birds were fed in groups during the first stage, with fodder free of the cottonseed meal, while the other two stages differed as follows:

The First Group (the witness): the fodder of the second and third stages was free of the cottonseed meal.

The Second Group: The fodder included 5% cottonseed meal during the first stage, and 10% during the final stage.

The Third Group: The fodder of all birds contained 10% and 15% cottonseed meal during the second and third stages, respectively.

The Fourth Group: in the last group, the ratios of the cottonseed meal were 15% and 20% in the second and third stages, in that order.

Table 1 shows the components ratio of the chicken's fodder mixtures, while, on the other hand, the content of feed mixtures, as used in bird's food for metabolic energy and crude protein, as well as some other food ingredients, are explained in Table 2, as based on chemical analysis of the forage materials available in the scientific literature (Normzywienidrobin, 1991) (Rabat & Hassan, 1986)

Research variable:

1- Mortality rate: The dead chickens were recorded daily, with the cause of death, and with the mortality rate calculated cumulatively.

2- The Average Weight of Live Birds: The average was calculated by choosing at least 10% of the chickens, at random, at age one day, and then every week following.

3- The Average Consumption of Bird's Fodder: This was calculated every week of the growing period by measuring the chicken's fodder weight, for each group, weekly, and then measuring the left over. After that, the average consumption was calculated for each bird, with consideration for the dead chickens, using the following equation:

$$\text{Average of bird's fodder consumption} = \frac{\text{Amount of fodder consumed in each stage (gram)}}{\text{Average number of chickens during this stage} \left(\frac{\text{gram}}{\text{bird}} \right)}$$

$$\text{Average of chickens during the stage} = \frac{\text{Number of chickens for each day of the stage}}{\text{Total number of days in the stage}}$$

4- Fodder-Chicken's Weight Ratio: This was calculated each week, for each group, by dividing the average of bird's fodder consumption by the average of bird's weight increase.

5- Feasibility study: the feasibility study was made based on the fodder's price and the price of 1 kg of chicken alive during the experiment (Al-Saadi & Hasna, 2000)

The next equations were used to get these prices:

1:

$$\text{The fodder cost of 1 kg live chicken} = \frac{\text{Fodder - Chicken's Weight Ratio} \times \text{price of 1kg fodder} \times 100}{\text{Live birds}}$$

2:

$$\text{The cost of 1 kg live chick} = \frac{\text{Broiler price} \times 100}{\text{weight (kg)} \times \text{Live birds}}$$

3: *The cost of 1kg live chicken = the cost of 1kg live broiler + the fodder cost of 1kg live chicken × 75%*

After considering that the cost of fodder and broiler is 75% of the total cost

4: Profit Index (%): the profit index was calculated twice in the growing duration, for both genders, based on the following formula:

$$\text{The profit index (\%)} = \text{income} / \text{cost} \times 100$$

All outcomes obtained were subjected to a statistical test whereby the researcher utilized a T-test to determine the differences.

Table 1: Fodder components of the plant mixtures for the experimental groups feeding.

The Fodder Component	First Group (the witness)			Second Group			Third Group			Fourth Group		
	1	2	3	1	2	3	1	2	3	1	2	3
Cotton Seeds Meal	—	—	—	—	5	10	—	10	15	—	15	20
Soybean Seeds Meal 40%	35.8	27	23.8	35.8	22	14	35.8	17.2	9.2	35.8	12.3	4.3
Yellow Corn	60.2	69	72.2	60.2	68.9	71.9	60.2	68.7	71.65	60.2	68.55	71.5
Bi-calcium Phosphate	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Limestone Powder	1	1	1	1	1	1	1	1	1	1	1	1
A mixture of vitamins and minerals	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Choline Chloride	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lysine	—	—	—	—	0.1	0.1	—	0.1	0.15	—	0.15	0.2
Salt	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total	100	100	100	100	100	100	100	100	100	100	100	100
Price of 1 kg Ready-mix	21.58	21.05	20.86	21.58	20.95	20.47	21.58	20.67	20.29	21.58	20.47	20.1

Table 2: Content of fodder mixtures used in bird feed for metabolic energy and crude protein, and some other food ingredients.

The Fodder Component	First Group (the witness)			Second Group			Third Group			Fourth Group		
	1	2	3	1	2	3	1	2	3	1	2	3
Cotton Seeds Meal	2867	2972	3010	2867	2951	2970	2867	2932	2949	2867	2912	2929
Soybean Seeds Meal 40%	21.17	18.9	16.97	21.17	17.93	16.73	21.17	17.85	16.65	21.17	17.73	16.53
Yellow Corn	135	164	177	135	164	177	135	164	177	135	164	177
Bi-calcium Phosphate	4.1	3.8	3.7	4.1	4.1	4.31	4.1	4.4	4.6	4.1	4.8	4.9
Limestone Powder	3	3.2	3.3	3	3.25	3.3	3	3.3	3.3	3	3.3	3.3
A mixture of vitamins and minerals	0.97	0.95	0.94	0.97	0.94	0.92	0.97	0.93	0.92	0.97	0.92	0.90
Choline Chloride	0.62	0.65	0.66	0.62	0.71	0.78	0.62	0.77	0.84	0.62	0.83	0.9
Methionine	0.44	0.4	0.39	0.44	0.4	0.39	0.44	0.4	0.39	0.44	0.4	0.4
Lysine	1.1	0.9	0.82	1.1	0.95	0.82	1.1	0.9	0.82	1.1	0.9	0.82

Results Analysis

1- The Cumulative Mortality Rate: Table 3 shows the cumulative mortality ratio for the all chickens' groups, based on the different stages. The findings show that there is no difference between the experimental, at the end of each stage of the chicken's growth, which indicates that including the cottonseed meal in the fodder mixture in the second and third stages, with percentages as mentioned earlier, does not have any negative effects on the mortality ratio, which concurs with the research (Hassan, Hashim, & al-Saadi, 2003).

Table 3: Mortality ratio during the growing stages

Age (weeks)	Broiler Groups			
	1 (witness)	2	3	4
2	2 a	2 a	2.3 a	2.6 a
5	a 3.3	4 a	4.7 a	5.3 a
7	a 6.7	7.3 a	7.3 a	8 a

Note: The similar letters mean there were no differences ($P < 0.05$)

2- The Average of Live Weight:

Table 4 shows the average of live weight for the chickens, for each of the experimental groups, from 1 day old until the end of each stage of growth. The results show that there are no differences until the end of the second week, because of the same fodder for all groups, while in the second, third and the fourth stage, some differences started to become apparent, such as the decreased weight of the birds as compared to the witness group (group 1) and the second group (Golian, 1994). Adding the 5 - 10% cottonseed meal to the fodder mixture, from the first day until seven weeks old, does not have any negative effect on the final chicken's weight; Issa shows in his research in 2003 that adding up to 15% local cottonseed meal does not negatively affect the productivity indicators for chickens.

Table 4: Average Weight during the growing stages

Age (weeks)	1 (witness)	2	3	4
One day a	a 40	a 40	a 40	a 40
2	a 379	a 370	a 365	a 375
5	ab 1690	ab 1600	ab 1590	b 1550
7	ab 2300	a 2280	ab 2200	b 2150

Note: The similar letters mean there were no differences ($P < 0.05$)

3- Fodder-Chicken's Weight Ratios:

Table 5 shows the averages of the bird's cumulative weights increasing for all experimental groups throughout the growth period. The table shows no differences, in terms of fodder consumption and weight increasing, especially at the end of the growing duration ($P < 0.05$); on the other hand, there are some differences in the fodder-chicken's weight ratios, as the results were better with adding 20% cottonseed meal to the mixture (Fernandez et al, 1995).

Table 5: Average of fodder consumption ratios (g), average of the bird's cumulative weight increase (g) and fodder-chicken weight ratios (kg) for the four groups

Chicken's Age (Weeks)	Variable	Broiler groups			
		1	2	3	4
First Stage (1-14 days)	Average of fodder consumption ratio	a 470	a 475	a 470	a 475
	average of the bird's cumulative weight increasing	a 339	a 330	a 325	a 335
	Fodder-Chicken's Weight Ratio	a 1.386	a 1.439	a 1.446	a 1.418
Second Stage (15-35 days)	Average of fodder consumption ratio	a 2800	b 2950	c 3090	c 3120
	average of the bird's cumulative weight increasing	a 1650	ab 1560	ab 1550	b 1510
	Fodder-Chicken's Weight Ratio	a 1.697	b 1.891	c 1.993	c 2.066
Third Stage (36-49 days)	Average of fodder consumption ratio	a 4950	a 4940	a 4950	a 4970
	average of the bird's cumulative weight increasing	a 2260	a 2240	ab 2160	b 2110
	Fodder-Chicken's Weight Ratio	a 2.190	b 2.205	c 2.292	c 2.335

4- Feasibility:

The feasibility and the profit index, for growth of the chickens over 49 days, is shown in Table 6. The results show the minimum cost of 1 kg live chicken in the second group, which is 27% less as compared with the first group (the witness), which makes the best profit index at about 0.1%, assuring the equivalent efficiency of the second group's fodder mixture with higher fodder-chicken's weight ratios, when compared with the witness group ($P < 0.05$).

Table 6: Feasibility and profit index

Item	Groups			
	1	2	3	4
Average price of broiler (S.P)	15			
Fodder cost for 1 kg live	47.3	48	49.8	51.6
cost of 1 kg live chicken	7	7.1	7.4	7.6
Total cost of 1 kg live	72.4	73.4	76.3	78.9
Price of 1 kg chicken meat (S.P)	90			
Profit index %	24.3	22.6	18	16

Conclusion:

This study concludes that adding 20% cottonseed meal to plant-fodder mixtures, which are used for growing chickens with a mortality ratio kept under the acceptable ranges, does not have any negative effect on the chicken's live weight.

For increasing the economic efficiency of chicken production, and using the locally available fodder, this study recommends using fodder without the cottonseed meal from the first until the fourteenth day, including 5-10% cottonseed meal to the mixture during the second stage, and, finally, using fodder containing 10-15% cottonseed meal during the last stage.

References:

- Al-Istwani, A. G., Yassin, H., & al-Saadi, M. A. (1996). Effect of reducing the level of animal proteins in chicken mixtures productivity indicators (. *Basil al-Assad Journal of Agricultural Engineering Sciences*, Vol (2). 45-63.
- Al-Saadi, M. A., & Hasna, G. (2000). *Practical and concise way to study the productivity and economic feasibility of the fattening competent poultry farms*. Lattakia: Teshreen University Press.
- Botsoglou, N. A., & Spais, A. B. (1933). Effect of the diet art (free) gossypol source on the deposition of gossypol residues in liver and muscle tissues of chickens. *Archive- FurGeflugelkund*, (57) 5, 237-240.
- Drobieu, N. Z. (1991). *Wartosc Pokarmowa Pasz-Praca Zbiorowa*. Warszawa: Omnitech Press.
- FERNANDEZ, S. R., ZHANG, Y., & PARSONS, C. M. (1995). Dietary formulation with cottonseeds meal on a total amino acid versus a digestible amino acid basis. *Poultry Sci*, (74), 1168-1179.
- GOLIAN, A. (1994). The utilization of Mashnal cottonseeds meal in the corn-soya or wheat-soya diet of broiler chickens.. *Agricultural Science and technology*, (8) 1,5, 67-78.
- Hassan, I., Abdallah, A. G., El-Wafa, S. A., & A.Z.SOLIMAN. (1996). Utilization of decorticated local seeds meal in broiler diets, Egypt. *Poult. Sci*, Vol.(16)1, 31-49.
- Hassan, I., Hashim, Y., & al-Saadi, M. A. (2003). The impact of using the local barley with enzymes and shelled cotton cake mixes local chicken plant productivity indicators. *Damascus University Journal of Agricultural Sciences*, Vol 19.
- Petterson, D., & Aman, P. (1990). Enzyme Supplementation of broiler chicken diets based on cereals with endosperm cell walls rich in arebinosylans of mix-Linked B-glucans. *Amin . Prod*, (51), 201-207.
- Rabat, M. F., & Hassan, I. (1986). *Scientific Nutrition for poultry, Practical part*. Damascus: Damascus University Press.