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The Effcet of Food Volume on Feed Consumption, Feed Conversion and Growth Performance of Fayoumi Chicks

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THIS WORK was conducted to study the effect of feed volume on feed onsumption, feed conversion, growth performance and the economical efficiency of feed utilization of Fayoumi chicks as local breed.

166 Fayoumi chicks of two weeks old were divided randomly into three groups A, B and C of 55, 55, 56 chicks / each, respectively.

Rations were formulated from the available ingredients prevailing in Egypt. All the experimental rations were nearly isocaloric (2768-2807 Kscal/M.E./kg) and isonitrogenous (18. 17-18. 86 crude protein), but the difference was in volume and density as follows:

Groups	A	B	C
Volume CC/mg	1.48	1.72	1.90
Density g/CC	0.68	0.58	0.53

Birds were weighed individually and feed consumption was recorded per each group at weekly interval up to 18 weeks. Results obtained can be summarized as follows:

— Birds fed on larger volume of rations consumed more feed than that fed smaller volume of ration. The increase in food consumption by Fayoumi Chicks which fed on ration B (1. 72 CC/g) and C (1. 90 CC/g) represented 12. 3 % and 21. 0 % relatively to that consumed by chicks fed on ration A (1. 48 CC/g).

— Feed converstion of the birds which fed on compact ration were better than that fed on coarser and bulkey rations. Feeding bulky feed required consequently more energy and more protein for one gain weight unit while the compact food required less in this respect.

— The birds which fed on ration A gave more gain in weight than that fed on rations B and C.

— The relative growth rate values for groups during the experimental priod (2-18 weeks)were 177. 3, 176. 4 and 175. 1 % for groups A, B and C, respectively.

— From the economical point of view, one unit gain in weight for birds fed on ration A saves 18. 0 and 36. 4 % than that fed on ration B and C, respectively.

Generally speaking, it, could be concluded that feeding Fayoumi chicks on compact rations may be, not only more favourable for bird's growth, but also more economical use than feeding bulky food.

The chemical analysis of poultry feed-stuffs do not give an accurate picture about the biological value of these feeds. Other measurements should be taken into consideration, hence the physical properties of the feeding ingredients or ration could also be of great value.

In Egypt there are many feed-stuffs which differ greatly in their physical properties (volume CC/g and density g/CC). Studying the effect of physical properties on some productive traits may be of great benefit in poultry rations.

In this work, the effect of food volume on feed consumption, feed conversion and growth performance of Fayoumi chicks were studied.

Material and Methods

This work was carried out in the Poultry Farm, Faculty of Agriculture, Zagazig University, during 1974. 166 Fayoumi chicks of two weeks old nearly similar in their live weight were used in this study. The birds were divided into three groups, A,B and C of 55,55 and 56 in each, respectively. All the birds were wingbanded to obtain individual records. All birds were reared and treated under the same managerial and environmental conditions, in total confinement house keeping system of floor breeding rooms. Waterers, feeding troughs, electric heaters, deep wheat straw litter and good ventilation were provided.

The experimental rations were formulated from the available ingredients prevailing in Egypt as shown in Table 1.

The volume of experimental rations expressed as CC/g and density as g/CC were estimated from random samples and the average of 5 estimates was recorded. The volume CC/g was measured by lightly pouring 100 of rations into a graduated cylinder. The ration volume was increased by coarse wheat bran and protein.

The chemical analysis of experimental rations for groups followed the ordinary conventional methods of A.O.A.C. 1965 are shown in Table 2.

All rations were nearly equal in the estimated crude protein, metabolizable energy, other extract and energy protein ratio, but these rations were differed in their volume CC/g and density g/CC as shown in Table 2.

The birds were weighed, individually, at weekly intervals up to 18 weeks, by Mettlar balance to the nearest g at 8 a.m. absolute and relative gain were also calculated according to Brody (1949).

$$\text{Relative growth rate} = \frac{1/2\ (W1 + W2)}{W\ 2 - W1} \times 100$$

The food intake was recorded from the difference between the offered and the rest food after 24 hr to the nearest g. Food conversion was calculated for each experimental groups as number of kg ration required to one kg growth T.D/N was calculated in the usual manner, and metaboliable energy were thereafter, calculated according to Rabsts and Morimoto (1965), M. E. /k. cal. /100 g = 3.23 $\times$ T D N) + 27.1. Energy /protein ratio was also calculated according to Eomies equation, (1962) :

$$C/P = \frac{\text{k cal. M. E./Eg food}}{\%\ \text{crude protein}}$$

The statistical analysis was performed after Snedecor (1967).

TABLE 1. The formula of the experimental rations.

Ingredients	Groups		
	A	B	C
	%	%	%
Ground yellow corn	50	50	55
Grashed rise	15	10	—
Coarse wheat bran	—	5	10
Protelau	10	10	10
Dec. cotton seed meal	15	15	15
Fish meal	7	7	7
Bone meal	2	2	2
Ground limestone	0.5	0.5	0.5
Sodium chloride	0.3	0.3	0.3
Mineral mixture	0.2	0.2	0.2
Total	100	100	100

Feed additives :

0.5% yeast
0.5% vit A+ d_3 (Each g contains 5000 IU vit A and 500 IU vit D_3)

TABLE 2. Chemical and physical analysis of the experimental rations.

	Rations		
	A	B	C
Moisture %	7.50	7.36	7.59
C.P. %	18.86	18.64	18.17
E.E %	9.81	8.45	9.35
C.F. %	4.37	4.68	5.43
Ash %	6.98	6.88	6.99
N.F.E %	52.48	53.99	52.47
T.D.N %	77.82	78.51	77.31
M.E.Kola./kg*	2785	2807	2768
C/P ratio	148.1	151.1	152.1
Volume CC/g	1.48	1.72	1.90
Density g/CC	0.68	0.58	0.52

* Estimated according to Kabota and Morimoto equation (1965).

Results and Discussion

Effect of food volume on feed consumption and conversion

The average values of feed consumption per bird for different ages of Fayoumi chicks during the experimental period from 2 to 18 weeks old are shown in Table 3.

TABLE 3. **The average values of feed consumption per bird for different ages of Fayoumi chicks.**

Group	A		B		C	
Age in weeks	F.C./g	Relative	F.C./g	Relative	F.C./g	Relative
2—8	833.7	100	999.6	119.6	1090.6	130.8
2—12	1190.7	100	1360.8	114.3	1476.3	124.0
12—18	2899.5	100	3124.8	109.3	3343.2	116.0
2—18	4883.9	100	5485.2	112.3	5910.1	121.0

F.C. = Feed consumed

It is evident that birds in groups B and C which were fed rations of larger volume, consumed more feed than that of group A which were fed smaller volume ration. The increase in feed consumed of groups B and C, represented 12.3 % and 21.0 % more than that relatively to group A. Generally speaking we can say that the increase in feed volume caused a considerable increase in feed consumption. These results were in agreement with those obtained by Gleaves *et al.* (1963 and 1968), Gleaves and Satyavan (1971) and Deader (1972).

However, there was an assumption that the rapid passage of large volume food could not enable the digestive tract to get use of the protien or energy needs of the birds. The digestion of the small particles of larger surface may be more easier than that of larger size and smaller surface. So, more food should be taken by the bird because of the faster rate of passage of big volume and the incomplete digestion of its larger particles, in order to meet its needs.

Effect of feed volume on feed conversion

Results concerning feed conversion of different groups of Fayoumi chicks during the experimental period are shown in Table 4.

TABLE 4. **Feed conversion of different groups of Fayoumi chicks during the experimental period.**

Group	A	B	C
Age in weeks			
2—8	3.006	4.513	5.256
8—12	4.299	5.417	5.801
12—18	7.579	7.659	8.873
2—18	5.242	6.228	7.045

The most noticeable trend from these results is the superiority of group A (which fed compact ration) than the other two groups (which fed bulky rations), in feed conversion throughout the whole period of the study.

Furthermore, the feed conversion by group B which fed relatively more compact ration, was better than that of group C which fed coarser and more bulky ration.

It was noteworthy that the feed conversion was indirectly affected by gain weight and growth rate. It could be concluded that feeding bulky food, required consequently more energy and more protein for one gain weight units, while compact food required less in this respect. The finding obtained in the study were in agreement with those reported by Heuser and Roblee (1962), and Daader (1972).

Effect of food volume on growth performance

Effect of food volume on live body weight

Average live body weight of different groups at different ages of Fayoumi chicks are shown in Table 5.

It is noticed that birds of ration A (compact) was in favour to be heavier in live body weight than birds of both rations B and C (bulky rations) either in males or in females during experimental period. At the end of the experimental period, it is noticed that the difference in live body weight between group A was higher than that of group B and C, while this difference was very narrow between group B and C, especially in females.

From the previous results it may be concluded that the live body weights, were affected by the volume of the diet.

TABLE 5. **Average live weights of different groups at different ages of Fayoumi chicks.**

Group age in weeks	A		B		C	
	male	Female	Male	Female	Male	Female
	g	g	g	g	g	g
2	61.1	57.2	60.2	56.5	56.9	56.0
8	337.5	335.8	296.6	263.0	274.6	252.8
12	621.9	605.4	561.0	501.0	540.4	496.5
18	1072.0	909.8	1042.9	835.1	976.6	813.9

Effect of food volume on live gain weight

Results of live gain weight of different groups at different ages of chicks are shown in Table 6.

TABLE 6. **Live gain weight of different groups at different ages of Fayoumi chicks.**

Groups age in weeks	A		B		C	
	Males	Females	Males	Females	Males	Females
	g	g	g	g	g	g
2—8	275.9	278.6	236.4	205.5	217.7	196.8
8—12	284.4	269.6	264.4	238.0	265.8	243.7
12—18	450.1	304.4	481.9	334.1	436.2	317.4
2—18	1010.4	852.6	982.7	778.6	919.7	757.9

From the previous table it may be reasonable that the compact ration A was more suitable to give gain when it may compared with either ration B or ration C (bulky).

Furthermore, it was noticed that group A gave a higher gain in both males and females than that of groups B and C.

The analysis of variance for live gain weight data throughout the experimental period at weekly intervals between groups and sex showed significant difference between groups at all ages except at 9, 11, and 13 weeks of age which were not significant. The data showed significant difference (P 0.05) between sex at 4 and 5 weeks and highly significant difference (P 0.01) at all weeks of age up to the end of the experiment.

Effect of food volume on relative growth rate

The results concerning relative growth rate of different groups at different ages are represented in Table 7.

TABLE 7. Relative growth rate of different groups at different ages.

Groups Age in weeks	A		B		C	
	Males	Females	Males	Females	Males	Females
	%	%	%	%	%	%
2—8	138.3	141.8	132.6	129.2	131.3	127.5
8—12	59.3	57.3	61.7	62.3	65.2	65.0
12—18	53.1	40.2	60.1	50.0	57.5	48.4
2—18	178.3	176.3	178.2	174.6	178.0	174.3

From these data it could be concluded that the relative growth rate of group A (which fed compact ration) was more than that of groups B and C (which fed bulky rations).

Generally speaking it could be concluded that the compact ration was in favour to better growth performance than that of rations B and C (bulky rations). It is noticed also that the relative increase in food volume resulted in a reversible effect on growth performance of Fayoumi chicks. However, these results are in line with these obtaind by Gleaves *et al.* (1968), Gleaves and Satyaban (1971) and Daader (1972).

Effect of feed volume on economical efficiency of food

Price/ton/L.E., feed efficiency (kg ration/1000 kg growth) and economical efficiency (1000 kg growth/L.E.) of Fayoumi chicks are shown in Table 8.

The values of relative economical efficiency may clarify more accurately the great margine in costs of unit gain of group A which may save 18.8 and 36.4 % of the costs required to this unit gain compared with ration B and C, respectively of Fayoumi chicks.

From the previous results, it could be concluded that feeding Fayoumi chicks on compact ration may be, not only more favourable for bird growth but also of more economical use than feeding bulky food.

TAE 8. **Price / ton / L.E.feed efficiency (kg ration / 1000 kg growth and economical efficiency 1000 kg growth / L. E.) of Fayoumi chicks.**

Item	Groups		
	A	B	C
Price / ton / L.E.	45.8	45.8	46.5
Feed efficiency (kg ration / 1000 kg growth	5242	6228	7045
Costs of 1000 kg growth / L.E.	240.1	285.2	327.6
Relative costs	100.0	118.8	136.4
Relative economical efficiency % . . .	100.0	81.2	63.6

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تأثير حجم الغذاء على مظهر النمو ومعدل استهلاك الغـذاء والتحول الغذائى للكتاكيت الفيومى

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أجرى هذا البحث لدراسة تأثير حجم الغذاء على مظهر النمو ومعدل استهلاك الغذاء ومعدل التحويل الغذائى والكفاءة الاقتصادية للاستفادة من الغـذاء للكتاكيت الفيومى كنوع محلى ٠

وقد استخدم فى هذه الدراسة ١٦٦ كتكوت فيومى فى عمر أسبوعين قسمت عشوائيا الى ٣ مجاميع أ ، ب ، ج بكل منهـا ٥٥ ، ٥٥ ، ٥٦ كتكوت على التوالى ٠

وقـد غذيت طيور التجربة على علائق مكونة من خامات العلف السـائدة فى مصر وقد روعى فى تكوين العلائق المستخدمة فى التجارب أن تكون متساوية تقريبا فى كل من الطاقة الفسـيولوجية (٢٧٦٨ ـ ٢٨٠٧) سعرا كبرا/ مجهود فسيولوجى نافع \ كجم والبروتين الخام (١٨٫٠٤ ـ ١٨٫٨٦ ٪) مع اختلاف هذه العلائق فى الحجم والكثافة كالآ :

العليقـــة	أ	ب	ح
الحجم سم/٣ جم	١٫٤٨	١و٧٢	١٫٩٠
الكثافة جم / سم٣	٠٫٦٨	٠٫٥٨	٠٫٥٣

وقد روعى عند أخذ نتائج التجارب ان توزن طيور كل مجموعة فرديا ، كما سجلت مقدار الغذاء المستهلك وحساب الكفاءة الغذائية أسبوعيا حتى عمر ١٨ أسبوعا ٠

ويمكن تلخيص النتائج المتحصل عليها كالآتى :

ـ لوحظ أن الطيور التى غذيت على علائق ذات حجم كبير استهلكت كمية من الغذاء أكبر من تلك التى غذيت على عليقة ذات حجم صغير ٠ وكان استهلاك العليقة بواسطة الكتاكيت التى تتغذى على العليقة « ب » (١٫٧٢ سم/٢ جم) والعليقة ٠ (١٫٩٠ سم٢/جم) يزيد بمقدار ١٢٫٣ ، ٢١٫٠٪ عن تلك التى غذيت على العليقة أ (١٫٤٨ سم٣/جم) ٠

ـ كان معـدل التحول الغذائى للطيور التى غذيت على عليقـة مندمجة أفضل من تلك التى غذيت على العليقة ذات الحجم الكبير ، كما لوحظ أن الطيور التى غذيت على عليقة ذات حجم كبير تحتـاج الى طاقة وبروتين لكل وحدة وزنية أكثر من تلك التى غذيت على عليقة مندمجة ٠

ـ الطيور التى غذيت على العليقـة (أ) أعطت زيادة فى الوزن أكثر من تلك التى غذيت على العلائق ب ، ج ٠

ـ كان معدل النمو النسبى خلال فترة التجربة (٢ ـ ١٨ أسبوعا) هو ٣ر١٧٧ ، ٤ر١٧٦ ، ١ر١٧٥٪ للمجاميع أ ، ب ، جـ على التوالى .

ـ من الناحية الاقتصادية كانت الكتاكيت التى تتغذى على العليقة 1 تخفض بتكاليف الزيادة فى الوزن بمقدار وحدة وزنية واحدة بنسبة ٨ر١٨ ، ٤ر٣٦٪ عن تلك التى تتغذى على العلائق ب ، جـ على التوالى .

وبصفة عامة يمكن القول أن تغذية الدجاج الفيومى على غذاء أقل حجما وأعلى كثافة لا يكون له تأثير حسن على الطائر فقط ولكن يكون له أيضا أهمية اقتصادية فى استعماله عن الغذاء ذو الحجم الكبير والأقل كثافة .