

Effect of Feed Restriction on the Laying House Performance of the Fayoumi Chicks

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This work was carried out to study the effect of feed restriction of Fayoumi pullets on their laying house performance.

The results arrived at are given in the following:

1. *Egg production*: Restricting feed intake during the growing period caused a delay in sexual maturity which was related to the level of feed restriction.

Feed restriction increased the average number of eggs laid per hen and increased the number of large eggs at the expense of the small eggs.

2. *Body gains*: Body weight was reduced by feed restriction and body gains were highly related to the level of feed restriction. When the restricted fed birds were put on full feed they started to gain weight rapidly but could not attain the body weight of the full fed birds.

3. *Feed consumption* was considerably less for the restricted groups than the full-fed birds from the time of restriction to the end of the experimental period.

4. *Mortality*: The highly restricted fed birds (50 percent) showed the highest rearing mortality. The full fed and the 70 percent restricted groups showed no mortality during the rearing period. Laying house mortality was higher for the full-fed birds than for the restricted birds.

5. *Returns and costs*: The income per bird (income overfeed costs) was in favour of the restricted groups. The higher income for restricted birds may be due to both higher income from eggs and lower total feed costs.

In recent years there has been considerable interest in various methods of controlling feed intake of egg type birds in order to improve the performance during the laying period.

Mac Intyre and Gardiner (1964), Hollands and Gowe (1965) and Gowe *et al.* (1965) reported that feed restriction can be accomplished by limiting the amount of feed intake.

Fuller (1960), Hollands and Gowe (1961), Strain *et al.* (1965) and Lillie and Denton (1966) reported that restricted feeding during the growing period reduced body size and delayed onset of egg production depending upon the severity and duration of restriction.

Reports differ with regard to the effect of feed restriction on laying house performance. The work of Anderson *et al.* (1963) and Deaton and Quisenberry (1963) showed that restriction of feed during the growing period had no effect on subsequent egg production. Fuller (1960) and Hollands and Gowe (1961, 1965) reported that feed restriction reduced feed consumption, increased egg production and improved efficiency for egg production. The restricted birds had an increased economic return of 44 cents per bird in the first production year compared with the full fed-birds.

Lawrence and Bearse (1961) and Fuller (1962) reported that restriction of feed intake during the developing period did not increase feed consumption during the laying period.

Lillie and Denton (1966) reported that no significant differences were observed for egg weight between the restricted and full fed birds.

The present investigation was undertaken to determine the effects of reducing the total nutrient intake of Fayoumi chicks during the growing period (6-20 weeks) on subsequent feed consumption, body weight changes, age at sexual maturity, egg production, mortality rate at the rearing and laying periods and costs and returns.

Materials and Methods

Two hundred and forty Fayoumi chicks were randomly distributed into six groups, each of forty birds, representing three replicates of dietary treatments. All groups were fed ad-libitum from hatching to 6 weeks of age. Two restricted intake levels based on the amount of feed consumed during the week before by full fed groups were used.

The first groups were fed 50 percent of the amount consumed by the full fed groups, or control. Restriction was 70 percent for the second two groups. The birds in the restricted groups were maintained on the restricted feeding system from 6 to 20 weeks of age. During this period the calculated amount of feed was divided into two parts, half was given in the morning while the other was fed in the late afternoon.

Commercial grower and laying rations were obtained from the General Poultry Organization (Table I).

Records maintained: Records of feed consumption, mortality, biweekly body weights, sexual maturity, and egg production were kept throughout the experimental period. Sexual maturity was measured by age of each hen at the time the first egg was laid. Also egg income and feed cost records were kept.

The data were statistically analysed using the analysis of variance after Snedecor (1956).

TABLE 1.—COMPOSITION OF DIETS

Ingredient	Grower	Laying
Ground yellow corn	41	53
Corn gluten meal (30% Protein)	15	10
Decorticated cotton seedmeal (40% protein)	6	6
Soya bean meal (50% protein)	3	3
Wheat bran	12	11
Rice bran	8	4
Fish meal (70% protein)	3	3
Meat Scrap (48% protein)	3	2
Blood meal (85% protein)	2	2
Bone meal	5	1
Sodium chloride	0.15	0.15
Ground lime stone	1	4
Vitamin premix	0.725 ^{1-a}	0.550 ^{1-b}
Trace mineral supplement	0.200 ^{2-a}	0.200 ^{2-b}
Coccidiostat supplement	0.50	—
Antibiotics Aureomycin	0.017	0.011

(1a) For growers : supplied per kg of diet 17500 IU Vitamin A, 1750 IU Vitamin D₃, 6.5 mg riboflavin, 14 mcg Vitamin B₁₂, 28 mg niacin, 280 mg. choline chloride, 7 mg Vitamin E, 11.2 mg calcium pantothenate, 2.8 mg Vitamin K.

(1b) For layers : supplied per kg of diet 1500 IU Vitamin A, 1500 IU of Vitamin D₃, 2 mg. thiamine, 6 mg riboflavin, 2 mg. Pyridoxine, 10 mcg Vitamin B₁₂, 40 mg niacin, 250 mg choline chloride, 12 mg calcium pantothenate, 15 mg Vitamin E and 2 mg Vitamin K₂.

(2a) Supplied per kilo of diet 120 mg manganese, 75 mg zinc, 37 mg Iron, 2.5 mg Copper, 0.15 Cobalt and 1 mg Iodine.

(2b) Supplied : 80 mg manganese, 50 mg zinc, 25 mg Iron, 2 mg Copper, 0.1 mg cobalt and 0.77 mg Iodine.

Results and Discussions

Egg production: Restricting feed consumption during the growing period caused a delay in sexual maturity as measured by days to first egg as shown in Table 2. It seems that the delay in sexual maturity can be maximized by increasing the level of feed restriction. These results are in agreement with the results obtained by Fuller (1960), Hollands and Gowe (1961), Strain *et al.* (1965) and Lillie and Denton (1966). In contrast, Anderson *et al.* (1963) and Deaton and Quisenberry (1963) reported that restriction of feed during the growing period had no effect on subsequent egg production.

The birds which were restricted to 70 or 50 percent of full feed laid a six and fifteen more eggs on the average than the full fed birds. However, there were no significant differences in egg production due to this treatment (P, 0.05 & p.10.) This increase may be due to the fact that the full fed birds being in high production during the first period of the laying season, while the restricted groups came in production more slowly and were taken off the experiment while they were still laying at an average of 58 and 62 percent for the 70 and the 50 percent restriction of full fed birds respectively. These results were in agreement with those of Fuller (1960) and Hollands and Gowe (1961, 1965) who showed that restricted fed birds laid more eggs than the full fed birds in the first production year.

The pattern of egg production is shown graphically in Fig. 1. In general, following the initial delay in sexual maturity, egg production in the restricted fed groups increased rapidly. It reached the highest peak and maintained the highest rate of egg production. During the drops in the production curve, the full fed birds decreased to a great extent than the groups receiving 70 percent of the full feed and the latter more than the groups maintained on 50 percent of full feed (Fig. 1).

It is interesting to note that the more the ration is restricted the later is the sexual maturity. The least maturing birds (50 percent group) was the highest in level of egg production all through the experimental period followed by the 70 percent and lowest was the fully fed group of birds. These results agreed with the results obtained by Mac Intrye and Gardiner (1964).

Egg weight: The restricted birds laid heavier eggs than those which were full fed, but the differences were insignificant (P, 0.05) (Table 2). The level of restriction had no effect on egg weight. These results confirm the previous results reported by Lillie and Denton (1966).

Body weight and Mortality: Restricting feed intake resulted in significantly reducing body weight (P, 0.1) (Table 3) Body weights were also influenced by changing the level of feed intake. The final average body weights were 1633, 1614 and 1554 grams for the control, the 70 and 50 percent restricted groups respectively. This indicates that when the restricted fed birds were put on full feed they started to gain weight rapidly, but could not attain the same body weight.

TABLE 2.—LAYING HOUSE PERFORMANCE OF FAYOUMI CHICKS FOR THE DIFFERENT TREATMENTS

Treatment	Initial No. of birds	Ave. body wt. at 20 weeks of age (gms)	Ave. body wt. at 72 weeks of age (gms)	No. of eggs laid/hen from H. to 500 days	Total egg wt./hen (Kilo)	Feed/ dozen of eggs (Kilo)	Days to 1st. egg.	Days to peak Prod.	Bear. Mortality	Laying Mortality
<i>Full Feeding:</i>										
Replicate A	33	3286	1728	165.7	7.11	2.66	131	161	—	5
Replicate B	29	1342	1559	157.7	6.53	2.89	127	161	—	12.5
Mean	31	1364	1633	161.7	6.82	2.77	129	161	—	8.75
<i>Seventy percent Restriction:</i>										
Replicate A	31	1202	1657	164.3	7.73	2.59	142	182	—	10.0
Replicate B	32	1167	1571	172.2	7.08	2.58	140	189	—	5.0
Mean	31.5	1185	1614	168.2	7.40	2.59	141	186	—	7.5
<i>Fifty percent Restriction:</i>										
Replicate A	32	934	1560	166.6	7.73	2.64	141	196	2.6	2.7
Replicate B	32	949	1584	157.7	8.13	2.21	159	182	2.5	2.6
Mean	32	941	1554	177.2	7.72	2.41	150	189	2.55	2.6

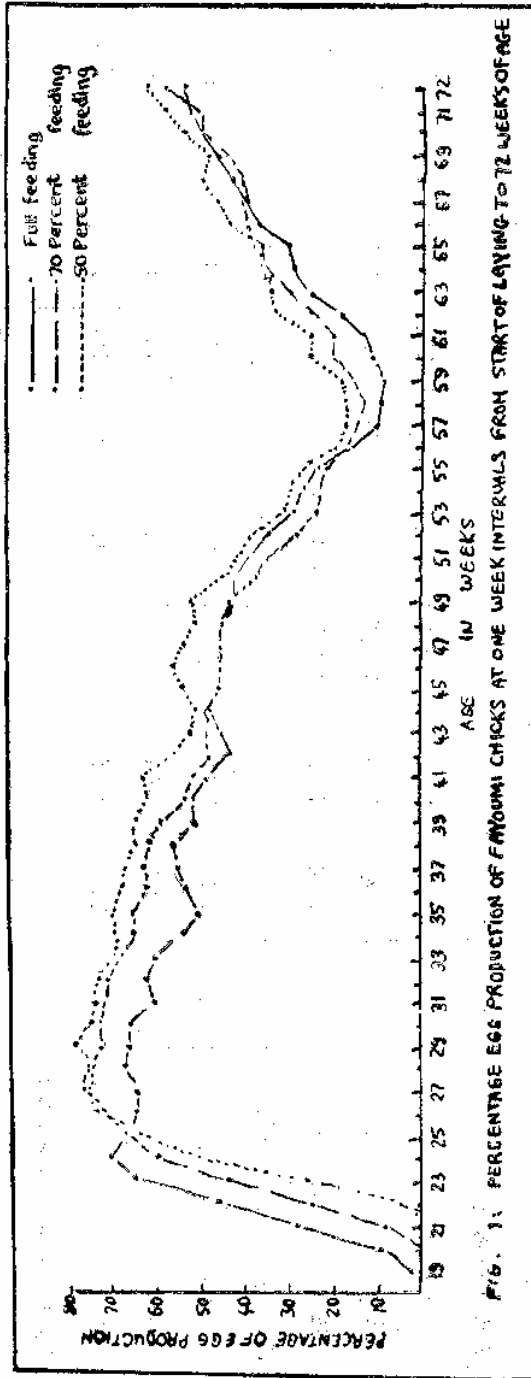


FIG. 1. PERCENTAGE EGG PRODUCTION OF FAWOUMI CHICKS AT ONE WEEK INTERVALS FROM START OF LAYING TO 72 WEEKS OF AGE

TABLE 3.—BODY WEIGHT AVERAGES OF FAYOUMI CHICKS FOR THE DIFFERENT TREATMENTS AT THE AGES FROM 6 TO 72 WEEKS

Treatment	Age in weeks										
	6	8	10	12	14	16	18	20	22	24	72
<i>Full Feeding</i>											
Replicate A . . .	287	445	643	846	1000	1156	1259	1386	1451	1497	1728
Replicate B . . .	272	437	624	806	954	1074	1182	1342	1410	1444	1559
Mean	280	441	633	826	978	1115	1221	1364	1431	1470	1633
<i>Seventy Percent Restriction</i>											
Replicate A . . .	264	376	564	757	894	1015	1102	1202	1389	1419	1657
Replicate B . . .	268	268	371	548	733	874	982	1073	1167	1366	1571
Mean	266	373	556	745	884	999	1087	1185	1378	1406	1614
<i>Fifty Percent Restriction</i>											
Replicate A . . .	282	318	458	597	702	807	885	934	1242	1294	1560
Replicate B . . .	283	320	460	601	701	785	866	949	1238	1267	1458
Mean	282	319	459	599	702	796	873	941	1240	1281	1554

It was noticed that feed restriction during the growing period resulted in lower house mortality (Table 2). This may be explained by the fact that there may be some type of selection among the highly restricted birds during the rearing period as a result of the stress exerted upon them from starvation. These results are in accordance with those stated by Hollands and Gowe (1966).

Feed consumption: Feed consumption per bird in kilograms for the restricted and full fed birds is given in Table 3. It was noticed that restriction during the rearing period did not cause a subsequent increase in feed consumption during the laying period. In general, the restricted birds consumed considerably less food than the full-fed ones from the time of restriction

till 72 weeks of age. These results are in agreement with results obtained by Lawrence and Bearnse (1961) and Fuller (1962) who reported that restriction of feed intake during the developing period did not increase feed consumption during the laying period.

Costs and returns: To study economic aspects of feed restriction, feed costs were worked out from the time of restriction to the end of the experiment. Egg income was calculated and the value of the carcasses were estimated by the end of the experiment. No labour costs were included as they are the same for all groups. At the end of the test the built up litter was moved to the university farm and no returns were calculated for this item.

TABLE 4.—FEED CONSUMPTION IN KILOGRAMS PER BIRD DURING THE RESTRICTION PERIOD (6-20 WEEKS) FROM 20 TO 72 WEEKS AND FROM 6 TO 72 WEEKS IN THE FAYOUMI BREED

Treatment	Kilograms of feed consumed per bird		
	6-20 weeks of age	20-72 weeks of age	6-72 weeks of age
<i>Full feeding</i>			
Replicate A	4.97	32.38	37.35
Replicate B	5.03	32.82	37.85
Mean	5.00	32.58	37.59
<i>Seventy Percent Restriction</i>			
Replicate A	3.83	32.63	36.47
Replicate B	3.83	32.51	36.35
Mean	3.83	32.57	36.41
<i>Fifty Percent Restriction</i>			
Replicate A	2.81	33.32	36.13
Replicate B	2.83	32.42	35.26
Mean	2.82	32.86	35.68

Average feed cost per bird during the period from 140 to 500 days of age was almost the same for all birds. This indicated that the restricted fed birds when allowed to be fed liberally no over feed consumption was observed, thus resulting in a net saving in their feed costs.

Egg income per bird of the restricted groups was more than that of the full fed birds. This was due to the fact that restricted fed birds laid more eggs than the full fed ones.

The estimated returns for carcasses of the full fed birds at the end of the test were slightly higher than that of the restricted birds.

The income per bird (income over feed costs) was 72.5, 100.1 and 112.3 piasters for the full fed birds, the 70 and the 50 percent restricted birds respectively. The higher income for restricted birds may be due to both higher income from eggs and lower total feed costs. These results agree with those reported by Hollands and Gowe (1965).

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أثر تحديد العليقة خلال فترة النمو على الصفات الإنتاجية للدجاج الفيومي

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أجريت هذه التجربة بمزرعة الدواجن بكلية الزراعة جامعة الأزهر لدراسة اثر تحديد كمية العليقة خلال الفترة من ٦ - ٢٠ أسبوع على النمو والكفاءة الغذائية والنتاج البيض في الدجاج الفيومي وقد استخدمت ثلاث معاملات غذائية الأول تناول طيورها تغذية كاملة والثانية ٧٠٪ من الغذاء الكامل والثالثة ٥٠٪ فقط وبعد عمر ٢٠ أسبوع أعطيت غذاء كاملاً. والملائق المستخدمة سواء خلال فترة النمو أو وضع البيض ملائق تجارية تم الحصول عليها من المؤسسة العامة للدواجن .

وأهم النتائج التي تم الوصول اليها تتلخص فيما يلي :

١ - تحديد الملائق خلال فترة النمو أدى الى نقص في وزن الطيور وأن متوسط الزيادة في الوزن كان يرتبط بمستوى التجديد في العليقة وعند انتهاء الحاملة وبدء التغذية الكاملة بدأت الطيور في تمويض النمو المتأخر بسرعة ولكن لم تصل أوزانها في النهاية الى أوزان المجموعات التي كانت تتغذى تغذية كاملة .

٢ - لوحظ أن الطيور التي كانت تتغذى على ٥٠٪ من العليقة أظهرت أعلى نسبة وفيات خلال مدة النمو (٢٣٪) فيما لم تحدث وفيات خلال هذه الفترة في المجموع التي كانت تتغذى على عليقة كاملة أو ٧٠٪ أما خلال فترة وضع البيض فقد ارتفعت الوفيات قليلا في المجموع التي تتغذى تغذية كاملة عنها في المجموع المحدد تغذيتها .

٣ - الغذاء المستهلك : استهلاك الغذاء كان أقل في المجموع المحددة التغذية أي أنه كان هناك وفرا في كمية العليقة المستخدمة بالنسبة للمجموع التي حدد غذاؤها .

٤ - انتاج البيض : تحديد العليقة خلال فترة النمو مرتب عليه تأخير النضج الجنسي وان هذا التأخير كان مرتبطا بمستوى التجديد في الغذاء كذلك لوحظ أن تحديد العليقة أدى الى زيادة عدد البيض للفرخة الواحدة بالإضافة الى زيادة عدد البيض الكبير الحجم على حساب النقص في عدد البيض الصغير .

٥ - الأرباح والتكاليف : لوحظ أن صافي الربح بالنسبة للطائر الواحد كان ٧٧٢ر ، ١٠٠ ، ١١٢ قرش في الفيومي بكل من مجاميع التغذية الكاملة ومجموع ٧٠٪ تغذية ومجموع ٥٠٪ تغذية .