

تأثير تحديد كمية الغذاء المأكول على النمو واختبارات الذبح في الأرناب

احمد كمال أبو ريه ^(١) - محمد علي رافت ^(١) - احمد عبد الله ابو السعود ^(٢) -
فهمى الحسينى عبد السلام ^(٢) - محمد حسن رضوان ^(٢)

الملخص

لقد تم بحث تأثير معاملات تغذية لمستويات محدودة (فى كل منها مجموعتان) على نمو وصفات الذبح للأرناب ، وتشمل الدراسة ٨٧ حيوانا عمرها ست أسابيع أخذت من خليط جيانث فلاندر مع الأرناب من كل معاملة قسمت لست مجاميع فى تجربتين ، وأثناء النمو اختبرت ثلاث أرناب من كل معاملة فى التجربة الثانية لتذبح عند عمر ٦ ، ١٢ ، ١٦ أسبوعا .

وأظهرت النتائج أن معدل الغذاء المتوسط الذى يبلغ نحو ٩٠٪ من مستوى الغذاء القياسى (تجربة الحيوان) تؤثر قليلا فى مقدار زيادة النمو (الوزن المكتسب) وفى الكفاءة التحويلية لطاقة الغذاء على صورة معادل نشا . أما مستوى الغذاء المنخفض (٧٧ - ٨٠٪ من المستوى القياسى) فسبب فروق كبيرة عن نتيجة التغذية القياسية ، وكان زيادة النفوق فى التغذية المحددة تدعو لتغذية الأرناب بحريتها تفاديا لارتفاع الوفيات ، ويحتاج الأمر للتحقق من ذلك تحت ظروف بيئية متعددة ، كما وجد أن خواص الذبيحة وتركيبها كان أفضل فى حالة التغذية بحرية الحيوان عنه فى حالتى تحديد الغذاء عند عمر ١٢ أسبوعا و ١٦ أسبوعا ، ووجد أنه كلما تقدم الحيوان فى العمر زادت نسبة التصافى ونسبة التشافى (اللحم بدون عظم) ، كما كانت نسبة الرماد فى المادة الجافة للحم متساوية من الناحية العملية فى جميع المعاملات ولكن وجدت فروق فى نسبة البروتين والدهن فى اللحم ، وكلما زادت نسبة الدهن فى اللحم انخفضت نسبة البروتين .

(١) قسم الانتاج الحيوانى « فرع تغذية الحيوان » بكلية الزراعة - جامعة القاهرة -

ج ٢٠٤٠

(٢) قسم تغذية الدواجن - الادارة العامة للانتاج الحيوانى بوزارة الزراعة - الدقى -

ج ٢٠٤٠

**THE PERFORMANCE OF LAYING HENS AS
AFFECTED BY FEED RESTRICTION AND
METHIONINE SUPPLEMENTATION**

By

A.A. ABOUL-SEOUD*, F.E. ABDEL-SALAM*
AND A.D. SELIM*

One hundred Fayoumi and eighty Rhode Island Red (R.I.R.) birds of about 11 months old were used in the present study. Four groups for each breed were fed:

(a) Full-feed, (b) 85 percent of full-feed, (c) 70 percent of full-feed, and (d) 0.03 percent supplemental DL. methionine. The experiment lasted for five months from march to July.

It was concluded that restriction and full feeding did not show significant difference for body weight and percentage egg production between groups.

Results of food conversion for egg production were superior for restricted feeding than for full-fed groups.

Percentages of fertility and Hatchability were slightly improved for restricted feeding groups than for full-fed Fayoumi birds. While inconsistent values were recorded for R.I.R. birds.

Although slight improvement in egg production and feed conversion data for both breeds was noticed for methionine supplemented diet than the unsupplemented one, differences were not statistically significant.

The effect of methionine supplementation on fertility and hatchability was noted for fayoumi birds while inconsistent results were shown for R.I.R. birds.

Feeding cost, in general, represents about 65 percent of the total cost of raising the laying stock and is usually considered the most expensive item. Various attempts therefore, were made to cut down feeding expenses to the minimum economical level. One of these, is to minimize waste in feed as much as possible by using automatic feeders, reasonable levels of feed and increasing the efficiency of the diet.

In recent years, several workers (Sckneider *et al.* (1955), and Milby and Sherwood (1956), and Abdel-Salam *et al.* (1969) had considerable interest for controlling feed intake of chickens. So, it has been a common practice for commercial poultry keepers to restrict mechanically, the amount of feed for growing and Laying birds. Physically limiting feed intake for different laying stocks was studied by several workers (Singsen *et al.*, 1958, Sherwood and Milby, 1961 and Sherwood *et al.*, 1964).

* Poultry Nutr Sec., Anim. Prod. Dept., Minis. of Agric., Dokky, Cairo, U.A.R.

Singsen *et al.* (1958), found that limiting high energy diet controlled body weight gains and maintained egg production, while limiting low energy diet obtained unsatisfactory results.

Sherwood (1959), reported with leghorn strain cross, that there was little effect on egg production, but with meat type birds in some cases, feed efficiency was improved as a result of mechanically restricting feed intake. He also found that hatchability and percentage of large eggs were at least as good as a controlled basis. Combs (1960) also, reported similar egg production on full-fed and limited-fed birds. However, smaller egg size was obtained from the limited-fed birds. Singsen (1962), reported a system of a skip-day feeding out of five or out of seven days. He stated that rate of egg production, efficiency of feed utilization, fertility and hatchability were improved. With holding feed one day out of five or one day out of seven, Sherwood *et al.* (1964), did not result in any consistent improvement in hatchability or in any other economic factor. Restricting feed consumption to 80 or 90 percent of fullfed birds resulted in inconsistent responses.

A study on feed restriction for Fayoumi and Alexandria breeds by Abderrahim (1966), showed no significant difference in egg number and hatchability. The Fayoumi birds failed to show such differences in egg-weight, while Alexandria breed showed significant difference between 85 percent of full-feed and those of 70 percent and full-feed levels.

Methionine requirement of laying pullets has been studied by Leong and McGinnis (1952), Ingram and Little (1958) and Combs (1964). Bray (1965), reported that egg yield (g./bird/day) was the highest at 11.52 percent crude portein when methionine composed 2.8 percent of that portein level.

The purpose of the present study was to investigate the effect of feeding level and the supplementation of methionine for the practical diet on egg production and feed conversion for Fayoumi and Rhode Island Red layers.

Materials and Methods

The experimental work was carried out at Dokky Poultry Farm, Ministry of Agriculture. One hundred Fayoumi and eight Rhode Island Red (R.I.R.) pullets of eleven months old were used. They were divided into four groups with equal numbers and nearly similar mean body-weight for each breed designated as group 1, 2, 3 and 4. They were pen mated and housed in a sun porched houses for each group during the experimental period from March to the end of July; one sire was allowed for every 10 to 12 birds.

The treatments were as follows :

(a) Full feed level for group 1, (b) 85% of full feed for group 2, (c) 70% of full feed for group 3 (d) full feed diet supplemented with 0.03% DL-methionine for group 4. DL-methionine (98%) was provided by Pfizer Co., Cairo. The composition of the experimental diet is shown in Table (1). Feed restriction level during March uptil May was based in full

feed consumption data obtained two weeks earlier. While the feed levels for the following experimental period from the first of June to the end of July was based on the full feed consumption data obtained from the last two weeks of May.

TABLE 1.—PERCENTAGE COMPOSITION AND PROXIMATE ANALYSIS OF THE EXPERIMENTAL DIET

Ingredient	Percent	Ingredient	Percent
Maize.	40	Meatmeal	3
Rice bran	25	Bonemeal	2
Wheat bran	10	Lime stone (Pulverized)	2
Dec. Cotton seed meal	10	Sodium chloride *	0.5
Sesame-meal	5	Mineral mixture*	0.5
Fish meal	2	Vitamins	**

proximate analysis (calculated)

Moisture	10.10
Crude protein	17.77
Crude fat	5.58
Crude fibre	6.62
Carbohydrate	49.48
Ash	10.45
Met. Energy	—
Kcal/g. diet	2.58

* Commercial mixture prepared.

** Each kg. diet was supplemented with commercial vit. mix to provide: vit. A 5000 i.u., vit. D₃ 1000 i.u., vit. B₁ 0.5 mg., vit. B₂ 1.5 mg., vit. B₃ 0.25 mg., vit. B₁₂ 0.002 mg., vit. E 1.25 i.u., vit. K₃ 1.0 mg., nicotinic acid 4.0 mg., Pantothenic acid 2.5 mg., Choline 12.5 mg. Proc. Penicillin 4.0 mg.

Egg production was recorded daily. Feed consumption was estimated by the difference between offered and monthly residual feed. The total egg produced was weighed daily for each group.

Body-weight for all birds was initially recorded individually and at the beginning of each calendar month up to the end of the experiment. During 7 weeks (from 25th March until 10th May 1964), 2614 Fayoumi eggs and 2263 R.I.R. eggs were recorded for the whole groups corresponding to about 600 eggs for each group. Eggs were tested for infertility, dead embryos on the 7th and 18th day of incubation. Percentage hatchability was related to fertile eggs.

Statistical analysis was made following Snedecor (1956). For testing the differences in percentage of egg production between treatments, percentage values were transformed to their corresponding arcsins, then the analysis of variance was carried out.

Results and Discussion

1. Body weight :

The average final body-weight of Fayoumi birds (Table 2) were 1227g. for group 1 followed by 1172 g. for group 2 and 1182g. for group 3. Differences between average body-weights during the experimental period were insignificant ($P = 0.05$).

The average final body weight of R.I.R. birds was 1836, 1852 and 1821g. for the three groups respectively. Statistical analysis also, showed no significant difference ($P = 0.05$) between the average body-weights during the whole experimental period. Similarly, Abderrahim (1966), reported that no significant difference in body weight at different stage of age e.g. sexual maturity and 500 days of age, between feeding levels. Sherwood and Milby 1961) and Sherwood *et al.* (1964), obtained satisfactory results for body-weight with controlling feed intake. However, the results obtained were in disagreement with those obtained by Combs *et al.* (1961) and Papper *et al.* (1966), who found that limiting feed intake significantly reduced body weight.

The results in Table 2 shown that the average final body-weight were lower than the average initial body-weights in all groups. This may be due to seasonal variations. In this respect, Selim (1964), obtained higher body-weights for Fayoumi birds during winter than summer.

2. Egg production :

It could be seen from Table 2 that higher egg number or percentage of egg production for Fayoumi of group 2 showed a higher increase than the

TABLE 2.—EGG PRODUCTION AND FOOD CONVERSION DATA (PER BIRD PER MONTH) FOR FAYOUMI AND R.I.R. BIRDS DURING THE EXPERIMENTAL PER (MARCH-JULY).

Measurements	Group No. for feeding levels							
	Full-feed Group 1		85% full-feed Group 2		70% full-feed Group 3		Methionine supp- lementation Group 4	
	R.I.R.		R.I.R.		R.I.R.		R.I.R.	
	Fayoumi	R.I.R.	Fayoumi	R.I.R.	Fayoumi	R.I.R.	Fayoumi	R.I.R.
<i>Birds numbers:</i>								
Initial	25	19	24	20	24	18	24	19
Final	18	16	21	17	12	16	19	18
<i>Live-weight g.:</i>								
Initial	1308	2041	1310	1980	1310	2021	1255	2074
Final	1227	1836	1172	1852	1182	1821	1190	1871
<i>Avg. Egg produced:</i>								
Number	12.5	14.2	13.4	13.0	10.9	14.5	14.0	14.3
Production %	39.9	46.4	43.1	42.1	34.1	45.9	45.2	46.5
<i>Avg. egg-weight g.:</i>								
Bird/month	535.0	786.7	577.5	733.2	461.1	822.2	606.2	803.7
egg	42.8	55.4	43.1	56.4	42.3	56.7	43.3	56.2
<i>Food conversion:</i>								
Feed intake kg.	3.454	4.012	2.859	3.398	2.445	2.928	3.289	3.932
F./one egg (g.)	275.6	282.1	214.1	262.3	225.2	208.4	235.7	275.8
F./kg. eggs (kg)	6.434	5.235	4.963	4.697	5.331	3.736	5.440	5.010

other two groups. Group 3 (70% restricted of full feed) gave less egg production per month-per bird for the entire period of the experiment. Analysis of variance showed no significant difference ($P = 0.05$) between groups.

The average egg number and percentage of egg production for R.I.R. of group 1 and group 3 were equal. However, group 2 gave slightly less value than for the other groups. Statistical analysis proved insignificant difference ($P = 0.05$) between feeding levels.

These results may indicate that restricting the feed for both Fayoumi and R.I.R. birds showed inconsistent improvement in percentage of egg production. Similarly, Sherwood *et al.* (1964), by removing feed one day out of five or seven days reported the same trend. Combs (1960) also, proved similar results with full-feed and restricted birds.

It is interesting to note that Abderrahim (1966), in a study of feed restriction on local breeds (Fayoumi and Alexandria) reported no significant difference in egg production between treatments. On the other hand, Combs *et al.* (1961), reported that the total amount of egg production was slightly less for birds of restricted feed. Papper *et al.* (1966), also found a decrease in egg production when feed was withheld for 24 or 39 consecutive hours per week.

3. Egg Weight :

Table (2) illustrates that egg weight produced per month per Fayoumi bird was markedly heavier for group 2 (85 % full-fed birds) than the other groups. The average egg-weight was 42.8, 43.1, and 42.3 g. for group 1, 2, and 3 respectively.

The total egg-weight produced per month per Fayoumi bird could also be seen in table (2). It was observed that egg-weight produced by groups gave higher values of 511.5 g., compared with 535.0 g. for group 1 and 461.1 g. for group 3.

The average egg-weight produced by R.I.R. per month was slightly heavier for group 3 than for the other groups. The average egg weight was 55.4, 56.4 and 56.7 g. for group 1, 2 and 3 respectively.

Comparing the total egg-weight per month per bird, it could be noticed that group 3 gave higher values of 822.2 g. compared with 786.7 g. for group 1 and 133.2 g. for group 2.

It is worth-noting that the present results for egg-weight were similar to those of Sherwood *et al.* (1964) who stated that limiting feed intake seemed to have no consistent effect on egg weight. Abderrahim (1966) obtained similar results and did not find significant differences in egg weight between the full-fed and the restricted feeding group. However, Combs (1960), with

limited feeding obtained smaller egg size than full-fed groups. This trend was also, reported by Combs *et al.* (1961) and pepper *et al.* (1966) with laying birds.

4. Feed conversion :

As a matter of fact, the theoretical levels of 85 and 70 percent of full feed were in practice 83 and 71% for Fayoumi while they were 84 and 72 percent for R.I.R. These differences may, partly be due to mortality that occurred during the experimental period and partly to food spilling from the food troughs. It could be seen from table 2 that egg production was not markedly increased between groups, therefore, the feed required per one egg or per one kg of eggs showed better results for restricted feeding than the full-fed. Similarly, Singsen *et al.* (1958), Sherwood (1959) and Singsen (1962), proved that feed efficiency was improved by controlled intake basis.

5. Fertility and Hatchability :

The average percentages fertility and hatchability of Fayoumi and R.I.R. birds are shown in table (3). The percentages of fertility and hatchability were, in general irrespective to feeding level higher for Fayoumi than for R.I.R. breed. It could be observed that percentage for fertility and hatchability for Fayoumi birds were higher for the restricted feed birds, group 2 and 3, than for group 1. Sherwood and Milby (1962), proved that hatchability increased by limiting feed intake. On the other hand, the percentage fertility and hatchability for R.I.R. showed no special trend with the feeding level. Similarly, Sherwood (1959), Sherwood *et al.* (1964) and pepper *et al.* (1966), found that hatchability was not influenced by restricting feed. Abderrahim (1966), showed that hatchability of the restricted-fed groups was slightly higher than that of the full-fed control, but the difference was insignificant.

The present data may suggest that restricted feeding in general, did not decrease the egg production and showed better results for feed conversion than full feed. These results may indicate that the experimented breeds were of a low egg production, therefore satisfactory results were obtained with limited amount of feeds.

It is therefore, suggested that further investigations are needed for either selection for high egg producers or studies for practical low feed allowances.

Effect of methionine supplementation :

It was one of the purposes of the present study to investigate the methionine supplementation at the full-feeding level. It is, generally, agreed that the sulfur containing amino acids are the most deficit and essential in poultry diets.

TABLE 3.—AVERAGE PERCENTAGE FERTILITY AND HATCHABILITY FOR FAYOUMI AND R.I.R. BIRDS
DURING THE EXPERIMENTAL PERIOD (25TH MARCH — 10TH MAY)

Measurements	Group No. for feeding levels							
	Full-fed Group 1		85% full feed Group 2		70% full feed Group 3		Methionine supplementation Group 4	
	Fayoumi	R.I.R.	Fayoumi	R.I.R.	Fayoumi	R.I.R.	Fayoumi	R.I.R.
<i>Number of :</i>								
Egg set	627	531	687	560	591	553	718	619
Fertility %	74.6	69.3	89.2	67.3	85.3	63.8	86.6	69.0
Hatchability %	77.4	82.6	84.6	82.5	86.7	86.7	87.0	82.0

The National Research Council (1960), gave a methionine requirement of 0.53 percent of the diet or 0.28 percent of the diet in presence of 0.25 percent cystine. This requirement is specified for diets that contain 2.86 K cal. per g. (metabolizable energy). However, Bray (1965), proved that microbiologically available methionine was 0.216 percent of the diet in a 12 percent protein diet.

The calculated methionine content (using analytical data of Titus, 1961) of the experimental diet Table (1) was found to be 0.3 percent of the diet. The amount of 0.03 percent DL-methionine was added to sum up the methionine content of 0.33 percent of the diet; corresponding to about 1.84 percent of an 18 percent protein diet.

The results, in table (2), indicate that the methionine supplemented diet, group 4 gave, in general, for both breeds, a slight improvement in egg number and egg-weight produced (per bird per month) together with the average egg-weight than the comparative birds of group. 1

Methionine supplementation also slightly improved feed conversion data than for group 1. The feed intake per one egg produced was 235.7 and 275.8 g. for Fayoumi and R.I.R. respectively while for group 1, the values were 275.6 and 282.1g. correspondingly. The values for feed intake were 8.44 and 5.01 kg. per kg. egg produced correspondingly for group 4, while the values were 6.434 and 5.235 for group 1 in their respective order.

Results in Table 3 indicate that the effect of methionine supplementation was noted, for Fayoumi birds, on fertility and hatchability. The percentage fertility values were 74.6 and 86.6 for group 1 and 4 respectively, while the percentage hatchability values were 77.4 and 87.0 correspondingly. Inconsistent results for fertility and hatchability were recorded for R.I.R. birds.

These results may conclude that 0.03 percent methionine supplementation in the experimental diet showed a slight improvement, in general, for the test characters than the unsupplemented diet.

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تأثير تحديد الغذاء والميثايونين المضاف للعليقة على دجاج البيض

أحمد عبد الله أبو السمود فهدي الحسيني عبد السلام عبد الفتاح درويش سليم

الملخص

أخذ لهذه الدراسة مائة دجاج فيومي وثمانون دجاجة رودايلند أحمر عند عمر ١١ شهر تقريبا . قسمت الأفراد الى أربع مجموعات وغذيت كما يلي :

- (أ) التغذية للشبع .
- (ب) ٨٥٪ من الشبع .
- (ج) ٧٠٪ من الشبع .
- (د) عليقة أضيف إليها ٣.٠ ر. / ميثايونين .

واستمرت التجربة لمدة خمسة شهور من مارس الى يوليو .

وقد أوضحت النتائج أن التغذية المحدودة والتغذية للشبع لم تعط فروقا معنوية بين المجموعات للوزن الحى والنسبة المئوية لانتاج البيض وكذلك كانت نتائج كفاءة تحويل الغذاء لانتاج البيض أحسن عند تحديد الغذاء عنه في حالة التغذية للشبع .

كما أن التغذية المحدودة بالنسبة للفيومي - أظهرت نتائج أحسن في نسبتي الإخصاب والفقس عنها في حالة التغذية للشبع - أما بالنسبة للروود ايلند الأحمر فان النتائج لم تكن ذات طابع مميز .

وعند إضافة ٣.٠ ر. / ميثايونين للعليقة أظهرت تحسنا طفيفا عن العليقة العادية في انتاج البيض والكفاءة التحويلية الغذائية لكلا السلالتين .

كما أن تأثير إضافة الميثايونين الى العليقة على الإخصاب والفقس كان ملحوظا بالنسبة للدجاج الفيومي ولم يكن واضحا في الروود ايلند الأحمر .

قسم بحوث تغذية الدواجن بالادارة العامة للإنتاج الحيوانى - وزارة الزراعة
بالدقى - القاهرة .