

Restricted Feeding of Broiler Type Replacement Stock

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Several groups of Nichols chicks were restricted in feed intake during the growing period (9-20 weeks of age). Feed was restricted to 70 and 50 percent of full fed groups.

The results arrived at in this work showed that feed restriction during the growing period reduced body weight, retarded sexual maturity and reduced laying house mortality. The reduction in body gains increased as the level of restriction increased. At 600 days of age body weight differences were still not heavy as the full fed birds.

The rate of egg production after the initial delay of sexual maturity was higher for the restricted birds than the full fed birds.

From the economic point of view egg income from the restricted groups was higher than that of the full fed groups due to 3 factors: (1) increased egg production; (2) a higher percentage of large and medium size eggs; and (3) increased livability in laying house.

The higher net returns for restricted birds were due to both higher income from eggs and lower total feed costs.

Reports are consistent in showing problems of obesity, relatively low egg production and poor utilization of feed for egg production in broiler strain hens.

It is generally agreed that restricted feeding during the growing period reduces body size and delays onset of egg production depending upon severity and duration of restriction (Fuller, 1960; Hollands and Gowe, 1961; Anderson *et al.*, 1963; Nichols and Balloum, 1963; Mac Intyre and Gardiner, 1964; and strain *et al.*, 1965).

Milby and Sherwood (1956) reported that restricting of feed did not result in any saving in feed cost to time of first egg, primarily because of the longer feeding period required to reach sexual maturity. Lawrence and Bearse (1961) and Fuller (1962) showed that restriction during the growing period did not increase feed consumption during the laying period. Gowe *et al.* (1965) found that restriction of feed increased monetary returns over a full-fed group for both the first and second production year.

Lawrence *et al.* (1963) and Strain *et al.* (1965) found that mortality in the restricted groups was higher during the period of feed restriction but it was lower through the laying period. Mitchell *et al.* (1962) and Mac Intyre and Gardiner (1964) found that restriction of feed intake has no effect on total mortality.

Schneider *et al.* (1954) Mac Intyre and Aitken (1959), Gardiner and Mac Intyre (1962) and Strain *et al.* (1965) postulated that feed restriction during the growing period changed the pattern of egg production in that the restricted birds came into production later but subsequently laid at higher rate than the full fed counterparts. Lillie and Denton (1966) reported that no significant differences were noticed for egg weight between the restricted and full fed birds.

In this study we have attempted to determine the effect of different levels of feed restriction on the laying house performance of the Nichols Chicks as a broiler type replacement stock under A.R.E. conditions.

Materials and Methods

Two hundred and forty chicks of Nichols broiler strain were randomly distributed to six groups each of 40 birds representing three replicates of dietary treatments. Two restricted intake levels of nutrition based on the amount of feed consumed during the week before by full fed groups were used.

The first group with its replicate was fed 50 percent of the amount consumed by the full-fed groups. Restriction was 70 percent for the second group. The third group served as a control. Birds in the restricted groups were maintained under restricted feeding system from 9 to 20 weeks of age. During this period the calculated amount of feed was divided into two parts, one was given in the morning while the other was fed in the late afternoon.

Grower and Laying rations obtained from the General Poultry Organization were used (Table 1).

Performance in the laying pens was measured by recording feed consumption, egg production mortality, egg weight on a pen basis. An average egg weight was obtained by weighing to the nearest gram, all eggs laid till 500 days of age.

Sexual maturity was measured by age of each pen at the time of the first egg laid. Egg income and feed cost records were kept throughout the experimental period.

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

Results and Discussion

Body Weight and Mortality

Restricting nutrients intake resulted in reduced body weights (Table 2.) Body weight gains were highly related to the level of feed restriction. These results agreed with those obtained by Gardiner and Mac Intyre (1962), Nichols and Balloun (1963), Anderson *et al.* (1963) and strain *et al.* (1965). As the

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TABLE 1.—COMPOSITION OF DIETS

Ingredient	Grower	Laying
Ground yellow corn	41	53
Corn gluten meal 30% protein)	15	10
Decorticated cotton seed meal (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 serap (48% protein)	3	2
Blood meal (85% protein)	2	2
Bone meal	5	1
Sodium chloride	0.15	0.15
Ground lime stone	1	1
Vitamine premix 1a,b	0.725 ^{1a}	0.550 ^{1b}
Trace mineral supplement 2a,b	0.200 ^{2a}	0.200 ^{2b}
Coccidiosta supplement	0.050	—
Antibiotics Auremoycin	0.017	0.011

(1a) For growers : Supplied per Kg. of diet 17500 IU. vitamin A, 1750 IU vitamin A, 1750 IU vitamin D₃, 6.5 mg. riboflavin, 14 vit. B₁₂, 28 mg macin, 280 mg choline chloride, 7 IU 11.2 calcium Vit. E, pantothenate, and 2.8 mg Vit. K.

(2a) 120 mg manganese, 75 mg zinc, 37 mg iron, 2.5 mg copper, 0.15 cobalt and 1.1 mg iodine.

(1b) For Layers : supplied per Kg of diet 15000 IU vitamin A, 1500 IU D₃, 2 mg. thiamine, 6 mg riboflavin, 2 mg Pyridoxine, 10 mcg B₁₂, 40 mg niacin, 250 mg choline chloride, 12 mg calcium d-pantothenate, 15 mg Vit. E and 2 mg Vit. K.

(2b) 80 mg manganese, 50 mg zinc, 25 mg iron, 2 mg Copper, 0.1 mg cobalt and 0.77 mg iodine.

restricted groups were put on fullfed, birds began to compensate the retarded growth during the restriction period. As a result of this growth compensation, the differences between the final body weights were not significant. The average final body weights were 3644, 3406, and 3389 grams for the control, the 70 and the 50 percent restricted birds respectively.

It was noticed that the 70 percent restricted birds showed the lowest total mortalities followed by both the fullfed and the 50 percent restricted birds which showed the same values. These results agreed in part with the results obtained by Mitchell *et al.* (1932) and Mac Intyre and Gardiner (1964) who reported that restriction of feed intake has no effect on total mortalities.

Treatment	Age in weeks									
	9	10	12	14	16	18	20	22	24	72
<i>Full feeding</i>										
Replicate A	925	1170	1537	1861	2186	2536	2798	2905	2821	3517
Replicate B	866	1103	1518	1815	2087	2439	2691	2858	2873	3683
Mean	895	1136	1538	1838	2137	2488	2744	2881	2847	3644
<i>Seventy Percent Restriction</i>										
Replicate A	937	1007	1273	1584	1821	2045	2205	2660	2685	3418
Replicate B	881	973	1234	1551	1769	1959	2176	2667	2673	3394
Mean	909	990	1254	1567	1792	2002	2190	2663	2674	3406
<i>Fifty Percent Restriction</i>										
Replicate A	887	906	1097	1285	1436	1590	1758	2375	2569	3358
Replicate B	908	1000	1128	1303	1447	1599	1776	2405	2470	3421
Mean	897	952	1112	1294	1442	1594	1767	2390	2520	3389

Feed Consumption

Total feed consumption of the restricted groups was less than that of the full fed groups. It decreased as the level of restriction increase (Table 3). The feed restriction treatments caused a saving of 1.5 kilograms per bird

when feed was restricted up to 70 percent of feed consumed by the full fed birds, and saving of 2.84 kilograms per bird, if feed restricted to 50 percent of the full feeding. These results are in agreement with results obtained by Lawrence and Barse (1961) and Fuller (1962) who reported that restriction of feed intake during the developing period did not increase feed consumption during the laying period.

Egg Production

a) *Sexual maturity*: As shown in Table 3 the feed restriction during the growing period caused a delay in sexual maturity ranging from 4 to 11 days for the 70 and 50 percent restricted groups respectively. This delay in sexual maturity may be due to the retardation of growth which was affected significantly by feed restriction. It appeared that this delay in sexual maturity was highly related to the level of feed restriction. These results are in agreement with results obtained by Fuller (1960), Holland and Gowe (1961), Mac Intyre and Gardiner (1964) and strain *et al.* (1965).

b) The number of eggs laid per hen to 500 days of age was 111, 127 and 116 for the full fed, the 70 and the 50 percent restricted fed groups, respectively. The differences in egg production per hen were not significant. The eggs were recorded from the start of lay to 500 days and thus the groups which showed a delay in sexual maturity may have shown better records of egg production if eggs were recorded for a longer period. Similar results have been reported by Schineider *et al.* (1954), Mac Intyre and Aitken (1959) and Gardiner and Mac Intyre (1962).

c) *Pattern of egg production*: Figure 1 shows that feed restriction during the rearing period retarded sexual maturity and this retardation depended upon severity of restriction. As the birds came into production the 70 percent restricted birds were superior to other groups and the 50 percent restricted groups were the second. The control groups had the lowest values. The 70 percent restricted groups have the highest peak of production followed by the 50 percent restricted groups and at last the control groups. This indicated that the level of 70 percent restriction was superior to both the full feeding and the 50 percent restricted birds. During the periods of drop in egg laying the restricted fed groups appeared to be superior to the full fed groups.

At the end of the experiment, it was noticed that the egg curves for both restricted groups showed a trend to higher levels of production being 47.6, 21.9 for both the 70 and the 50 percent restricted groups respectively, while the controls laid at the level of 13.6 percent of its level of production as shown in Fig. 1. These results were in agreement with those reported by Strain *et al.* (1965).

d) *Egg sizes*: Feed restriction increased the percentage of the large size eggs at the expense of small and medium size eggs (Table 3). This may be due to the fact that the delay in sexual maturity helped the reproduction systems of the restricted birds to develop better and become more efficient in producing large size eggs. The analysis of variance for the effect of feed restriction on total egg weight laid per hen showed no significant differences between treatments (Table 2). Similar results were also reported by Lillie and Denton (1966).

TABLE 3. LAYING HOUSE PERFORMANCE OF NICHOLS CHICKS FOR THE DIFFERENT TREATMENTS

Treatments	Initial No. of Birds	Av. Body wt. at 20 wks of age (grams)	Av. Body wt. at 72 wks of age (grams)	No. of eggs laid/hen from H. to 500 days	Total egg wt/hen (Kilo)	Feed dozen of eggs (Kilo)	days to first egg	days to peak production	Mortalities		Total feed consumed/ birds 9-72 weeks	
									Rear- ing	Laying		
<i>Full Feeding</i>												
Replicate A . . .	37	2798	3517	113.5	5.95	5.79	130	210	—	5	62.20	
Replicate B . . .	35	2691	3683	107.5	5.69	6.25	126	217	—	15	58.20	
Mean	36	2747	3644	110.5	5.82	6.02	128	214	—	10	60.20	
<i>70% Restriction</i>												
Replicate A . . .	37	2205	3418	113.4	6.09	5.70	133	203	—	7.5	58.40	
Replicate B . . .	37	2176	3394	139.9	7.46	4.67	131	231	—	10	58.70	
Mean	37	2190	3406	126.7	6.77	5.13	132	217	—	8.8	58.50	
<i>50% Restriction</i>												
Replicate A . . .	36	1758	3358	130	7.04	5	139	217	—	10	57.30	
Replicate B . . .	38	1776	3421	102.5	5.46	6.13	139	175	7.7	2.5	57.40	
Mean	37	1767	3389	116.4	6.35	5.51	139	196	3.8	6.3	57.36	

TABLE 4. — FEED COSTS AND INCOME (PIASTERS) FOR THE FULL FED, THE 70 AND THE 50 PERCENT RESTRICTED FED GROUPS BASED ON LOCAL PRICES FOR EGGS AND MEAT IN THE NICHOLS PARENT STOCK STRAIN

Treatment	Feed costs/bird		Total feed costs/bird	Income from eggs	Income from meat	Total Income	Extra Project
	63-140 days	140-500 days					
<i>Full Feeding</i>							
Replicate A	35.2	283.4	318.6	223.9	136.3	360.2	41.6
Replicate B	35.3	287.5	323.3	220.2	130.1	350.3	27.0
Mean	35.5	285.5	320.9	223.7	133.2	355.2	34.3
<i>Seventy Percent Restriction</i>							
Replicate A	25.2	289.9	315.1	221.7	128.9	350.0	35.5
Replicate B	25.3	292.1	317.3	286.3	126.5	412.8	95.5
Mean	25.2	291.0	316.2	253.7	127.7	381.4	65.5
<i>Fifty Percent Restriction</i>							
Replicate A	18.5	292.6	311.1	265.2	126.6	391.8	80.7
Replicate B	18.0	293.8	311.8	208.7	124.2	332.9	21.2
Mean	18.3	293.2	311.5	236.9	125.4	362.4	50.8

Costs and Returns

In this experiment only the feed costs, egg income and value of carcasses were put into consideration to estimate costs and returns. No labour costs were included as they were the same for all groups.

Table 4 shows that the feed costs per bird during the restriction period was higher in the full fed birds than the restricted ones as it was expected. It was noticed that the feed costs decreased as the level of restriction increased. The egg income from the restricted groups was higher than that of the full fed groups due to three factors, increased egg production, higher percentage of large and medium size eggs at the expense of pewee eggs and increased livability in the laying house. Comparing the total feed costs with the total income per bird it was found that, the net returns per bird were 34.3, 65.5 and 50.8 piasters for the full fed birds, the 70 percent and the 50 percent restricted groups respectively. The higher net returns for the restricted birds are due to both higher income from eggs and lower total feed costs.

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أثر تحديد كميات العليقة على إحدى سلالات الطيور الخاصة لإنتاج اللحم

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أجريت هذه التجربة بمزرعة الدواجن بكلية الزراعة جامعة الأزهر لدراسة تأثير تحديد كميات العليقة خلال فترة النمو على الزيادة في الوزن والكفاءة الغذائية وإنتاج البيض في النيكولز كاجدى سلالات اللحم .

1 - معدلات الزيادة في الوزن

لوحظ أن تحديد العليقة خلال فترة النمو أدى إلى تقليل الأوزان ، وأن متوسط الزيادة في الوزن كان يرتبط بمستوى التحديد في كمية العليقة وعند انتهاء المعاملة بدأت الطيور في تمويض النمو المتأخر بسرعة ولكن لم تصل أوزانها في النهاية إلى أوزان المجموعات التي كانت تتغذى تغذية كاملة وكان متوسط الأوزان النهائية في عمر ٥٠٠ يوم ٣٦٤٤ ، ٣٤٠٦ ، ٣٨٨٤ جرام لكل من المجاميع التي كانت تحت مستوى تغذية كاملة ثم التي كانت تتغذى فقط على ٧٠٪ من العليقة وأخيراً التي كانت تتغذى فقط على ٥٠٪ من العليقة .

٢ - الوفيات

لوحظ أن المجاميع التي كانت تتناول ٥٠٪ من التغذية الكاملة أظهرت أكبر نسبة من الوفيات خلال فترة الرعاية حيث كانت نسبة الوفيات ٣٨٪ بينما لم تظهر في مجاميع التغذية الكاملة أو التي كانت تتغذى على ٧٠٪ من العليقة أى وفيات خلال هذه الفترة - أما خلال فترة وضع البيض فقد لوحظ ارتفاع نسبة الوفيات في المجاميع التي كانت تحت مستوى التغذية الكاملة فكانت النسبة المئوية للوفيات ١٠ ، ٨ ، ٣٦٪ لكل من مجاميع التغذية الكاملة ومجاميع التغذية على ٧٠٪ ، ٥٠٪ من العليقة على التوالي .

٣ - الغذاء المستهلك

لوحظ أن استهلاك العليقة كان أقل في المجاميع المحددة التغذية من المجاميع التي تتناول تغذية كاملة وأنه بصفة عامة كان وفراً في كمية العليقة المستخدمة بالنسبة للمجاميع التي حدد غذاؤها .

٤ - إنتاج البيض

تحديد المليقة خلال فترة النمو الأولى أدى إلى تأخير النضج الجنسي ولوحظ أن التأخير في النضج الجنسي كان مرتبطاً بمستوى التحديد حيث زاد العمر عند أول بيضة بزيادة مستوى التحديد كذلك وجد أن تحديد المليقة أدى إلى زيادة عدد البيض للفرخة الواحدة حيث كان متوسط عدد البيض للفرخة ١١١ ، ١٢٧ ، ١١٦ بالنسبة لمجاميع التغذية الكاملة ومجاميع ٧٠٪ تغذية ، ٥٠٪ تغذية على التوالي كذلك أدى تحديد التغذية إلى زيادة عدد البيض الكبير الحجم على حساب النقص في عدد البيض الصغير الحجم .

٥ - الأرباح والتكاليف

لوحظ أن صافي الربح بالنسبة للطائر الواحد كان ٣٤ ، ٦٥٥ ، ٥٠٨ قرشا لكل من مجاميع التغذية الكاملة ومجاميع التغذية على ٧٠٪ ثم مجاميع ٥٠٪ على التوالي وتميزت الزيادة في الدخل في المجاميع المحدد غذاؤها إلى زيادة دخلها من البيض مع نقص تكاليف الغذاء .
وعموماً لوحظ أن المميزات الاقتصادية لتحديد المليقة ترجع إلى الوفرة في كمية المليقة خلال فترة التحديد .

ويجب الاهتمام بموضوع تحديد التغذية خلال فترة النمو حيث أن نجاح أى نظام للتغذية يرتبط بعوامل مختلفة كالنوع ونظام الرعاية ومصادر الغذاء وغير ذلك .