

USING SOME SUGGESTED FEEDING REGIMENS ON BROILERS AFTER THE FINISHING PERIOD

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Abstract

The present study was conducted to study the response of using some suggested feeding regimens on broilers after the finishing period. Two-hundred and fifty day-old Arbor Acres chicks were fed on commercial starter/grower and finisher diets to 7 weeks of age. On the start of 8th week of age, chicks were randomly divided into 18 groups (10 chicks/group). Chicks were fed according to six feeding regimens (treatments): T1, finisher diet (18% CP). T2, T3 and T4 were 10, 20 or 30% restriction of feeding 18% diet (T1), respectively. T5 was Skip-a-day feeding every two days *ad lib*, whereas, T6 was 14% protein diet. Growth performance and carcass characteristics were measured at the end of the experiment.

Results obtained were as follows:

Insignificant differences were found between chick groups fed on the finisher diet (T1) and low protein diet (T6) for body weight gain (BWG) and feed efficiency (FE).

Chick groups fed on the restriction regimens (T2, T3 and T4) resulted in gradient reduction in BWG, 12.56, 20.63 and 34.92% relative to T1, respectively.

A skip-a-day group (T5) decreased in the final body weight (FBW), BWG and FE 6.74, 39.62 and 15.44%, respectively as compared to T1.

There were a significant decrease in abdominal fat weight (AFW) 27.8, 44.9, 47.1, 54.2 and 55.5% for T2, T3, T4, T5 and T6, respectively, as compared to (T1).

The economical evaluation showed 22.08% reduction in feed cost/kg. gain for the low protein diet (T6) relative to the finisher diet (T1). However, the other feeding regimens caused an increase in feed cost/Kg. gain 2.86, 0.91, 7.48 and 18.01% for T2, T3, T4 and T5, respectively as compared to (T1).

INTRODUCTION

Higher egg production reported by Strain *et al.* (1965) and Fuller, (1976) was found to be due to feed restriction during the growing period.

In the last few years, feed restriction has been investigated in broilers mainly to improve feed efficiency and reduce body fat deposition (Beane *et al.* 1979, Moll-

son *et al.*, 1984, Plavnik and Hurwitz, 1985, Plavnik *et al.*, 1986). Until recently, improvement was thought to be in feed efficiency at the expense of the final body weight (Fisher, 1984).

Compensatory growth after a period of feed restriction has been studied in a number of animals as a means of enhancing weight gain or improving the utilization of ingested food (Moran, 1979, Szepesi, 1980, Prince *et al.*, 1983, Mersmann *et al.*, 1987, Oju *et al.*, 1988, Plavnik and Hurwitz, 1988 and Washburn and Bondari, 1978).

The effect of feed qualitative and quantitative feed restriction on live body weight and feed conversion had been reported by many investigators (Attia *et al.*, 1991, Fontana *et al.*, 1992, Leeson *et al.*, 1992 and Skinner *et al.*, 1992).

One method of quantitative feed restriction is the use of low protein diets (Moran, 1979). When dietary protein is marginally deficient, broilers respond by increasing feed intake (Fisher, 1984 and Plavnik and Hurwitz, 1990).

Mitchell (1962) reported that energy restriction has been shown to result in reduction in metabolic energy loss leading to reduced requirement for maintenance. Plavnik and Hurwitz (1990 and 1991) suggested that energy restriction during the early life of the broiler will result in meaningful reduction in abdominal fat and subsequent compensatory growth during refeeding which will result in optimum market weight.

Little research has been conducted to investigate the effect of nutrient restriction with older broilers. Arafa *et al.*, (1983) reported that energy restriction during the last 10 days of the finishing period, resulted in reduced fat pad weight, but had little or no influence on dressing percentage or cooked carcass weight.

In Egypt, broilers after the finishing period (at 7 weeks of age) are usually marketed under the stress of the additive cost of feeding or the unexpected reduced body weight or mortality. To find out a feeding regimen that could maintain broilers in the farm until marketing without these stresses are found to be beneficial. Therefore, the present study aimed to investigate the effect of using some suggested feeding regimens on broilers after the finishing period.

MATERIALS AND METHODS

The present study was carried out at El-Kanater Poultry Farm, Animal Pro-

duction Research Institute, Agricultural Research Centre, Egypt. The study involved one experiment to investigate the effect of using six regimens of feeding broilers after the finishing period in the 8th week (marketing period).

Two-hundred and fifty day-old Arbor Acres broiler chicks were used in the experiment. They were housed in broiler battery brooders with wire screen floors placed in an electrically heated room. Chicks were offered commercial starter/grower diet (22% CP, 3000 kcal ME/Kg diet) from one day to four weeks of age. From 5-7 weeks, they were offered finisher diet (18% CP, 3000 kcal ME/kg diet). During the 7th week of age, feed and water were provided for 24 hours photoperiod, feed intake was ascertained on a daily basis in order to establish a daily intake pattern per treatment. On the start of the 8th week, chicks were randomly divided into 18 groups in battery brooder compartments (10 chicks/compartment) according to the average group body weight. They were fed according to 6 feeding regimens in triplicate. The six feeding regimens (treatments) were: Treatment 1 (T1) the finisher diet, whereas, treatments T2, T3 and T4 were those in which feed intake was reduced by 10, 20 or 30% of (T1) *ad lib* intake, respectively. Restriction rates were calculated on the basis of *ad lib* feed intake in average recorded in the 7th week. Treatment 5 (T5) was skip-a-day feeding every two days *ad lib* feeding. For T6, chicks were fed *ad lib* on a low protein diet (14% CP) without animal protein sources (Table 1). Chicks were fed the experimental diets for seven days. Daily feed intake was recorded, and at the end of experimental period, body weight, body weight gain (BWG) and feed intake (F1) were measured, and accordingly, feed efficiency values (FE) ($FE = BWG/FI$) were calculated.

At the end of the experimental period, three birds from each dietary treatment were randomly taken, weighed, slaughtered and defeathered. Carcasses were eviscerated manually and weighed. Front part, hind part, liver, gizzard, heart and abdominal fat were weighed and expressed as a percentage of live weight.

Data obtained for the growth parameters and carcass characteristics were examined statistically using computerized analysis of variance and Duncan's multiple range test procedures within the statistical analysis system (SAS, 1990).

The beneficial effect of using these suggested feeding regimens was evaluated economically in term of feed cost/kg gain.

Table 1. Dietary composition and chemical analysis of starter/grower, finisher and lowprotein diets.

Ingredient	Starter/grower diet %	Finish diet %	Low protein diet %
Ground yellow corn	66.52	72.02	73.91
Soybean meal (48%)	23.50	--	--
Soybean meal (44%)	--	20.0	14.00
Wheat bran	--	--	9.00
Meat and bone meal (50%)	5.50	3.60	--
Corn gluten meal (60%)	2.90	2.50	--
Steamed bone meal	0.50	1.20	2.30
Limestone	0.40	0.10	0.30
Salt	0.20	0.20	0.20
Vitamin and mineral mixture*	0.25	0.25	0.15
D. L methionine	0.10	0.05	0.06
L. lysine	0.13	0.08	0.08
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Total	100.00	100.00	100.00
Calculated nutrient content**			
Crude protein %	21.56	18.37	14.13
Metabolizable energy kcal/kg	3033	30.44	2921
Calcium %	0.94	0.84	0.87
Av. Phosphorus %	0.45	0.45	0.42
Lysine %	1.10	0.91	0.70
Methionine	0.46	0.36	0.30
Methionine + cystine %	0.82	0.67	0.54

* Vitamin and mineral mixture, Pfizer Egypt.

** According to NRC, (1994) feed composition tables

RESULTS AND DISCUSSION

1 Growth performance

The effect of the suggested feeding regimens after the finishing period on broilers final body weight (FBW), body weight gain (BWG) and feed efficiency (FE) is shown in Table 2 and illustrated in Figures 1 and 2.

The average initial body weight (IBW) of the chick groups used for the six feeding regimens was 1655.92.

Chick groups fed on the finisher diet (T1) gave 1964.65, 304.15 and 0.395 in FBW, BWG and FE, respectively.

Insignificant differences were found between chick groups used finisher diet T1 and the group used low protein diet (T6) for FBW, BWG and FE. A significant gradient reduction in BWG, 12.56, 20.63 and 34.92% relative to that of T1 was obtained with T2, T3 and T4, respectively. In this respect, Leeson *et al.* (1992) reported that there are a linear relationship between feed intake and 49- day body weight of broilers. Washburn (1990) indicated that 50% feed restriction resulted in approximately 50% reduction in weight gain whereas, Teeter and Smith (1985) showed 30% reduction in weight gain with 25% feed restriction, which is nearly in agreement with the result obtained in the present study for BWG of (T4).

Differences between T1, T2 and T3 in FBW were insignificant whereas, T4 caused a significant decrease in FBW (6.02%) as compared to T1. However, there were no significant differences between T1, T2, T3 and T4 in FE.

Differences were found significant between T1 and T5 in all parameters. The fifth treatment caused a significant decrease between T1 and T5 in all parameters. The fifth treatment caused a significant decrease in FBW, BWG and FE by 6.74, 39.62 and 15.44% respectively, as compared to T1.

Table 2. The effect of suggested feeding regimens on growth performance of broiler chicks.

Item	T1	T2	T3	T4	T5	T6
IBW (g)	1660.50a	1651.50a	1665.00a	1648.50a	1648.50a	1661.50a
FBW (g)	1964.65a	1917.45a	1906.40ab	1846.45bc	1832.15c	1956.85a
BWG (g)	304.15a	265.95a	241.40c	197.95d	183.65d	295.35a
FI (g)	770a	693b	616c	539e	550d	770a
FE (g)	0.395a	0.384a	0.392a	0.367ab	0.334b	0.384a

Means in the same row followed by the same superscripts are not significantly different ($P > 0.05$).

2. Carcass characteristics

The effect of the suggested feeding regimens carcass characteristics of the broiler chicks at the end of the experimental period is shown in Table 3 and illustrated in Figure 3.

Table 3. The effect of suggested feeding regimens on carcass characteristics of broiler chicks.

Item	T1	T2	T3	T4	T5	T6
CW %	72.91a	69.77b	69.60b	69.33b	68.97b	69.61b
FPW %	37.61a	37.50a	36.22a	36.89a	35.96a	36.54a
HPW %	35.31a	32.27b	33.38ab	33.11ab	33.01ab	33.07ab
LW %	1.95 b	2.29a	1.99ab	1.90b	2.09ab	2.08ab
GW %	1.42 a	1.50a	1.51a	1.61a	1.61a	1.51a
HW %	0.41ab	0.41ab	0.37b	0.36b	0.42ab	0.48a
AFW %	2.27a	1.64b	1.25c	1.20c	1.04c	1.01c

Means in the same row followed by the same superscripts are not significantly different ($P>0.05$).

The results obtained for chick groups fed on the finisher diet (T1) were 72.91, 37.61, 35.31, 1.95, 1.42, 0.41 and 2.27% of live body weight in carcass weight % (CW), front part weight % (FPW), hind part weight% (HPW), liver weight % (LW), gizzard weight % (GW), heart weight % (HW) and abdominal fat weight % (AFW), respectively.

A significant decrease in CW (4.53%) and AFW (55.5%) was obtained with T6 as compared to T1 whereas, there were no significant differences between T1 and T6 in FPW, HPW, LW, GW and HW. There was a significant decrease in AFW. In respect to feed restriction, results indicated that AFW decrease by 27.8, 44.9 and 47.1% for T2, T3, and T4, respectively, as compared to T1. Also, carcass weight % (CW) decreased by 4.31, 4.54 and 4.91% for T2, T3 and T4, respectively. Significant differences were found between T1 and T2 in HPW and LW.

Insignificant differences were found between T1, T2, T3 and T4 in FPW, GW and HW. Concerning FPW, results were in general agreement with those of Leeson *et al.* (1992). However, there were no significant differences between T1, T3 and T4 for HPW and LW.

Little are reported about the effect of feed restriction on carcass characteristics. Teeter and Smith (1985) reported that abdominal fat decreased by 50% with 25% feed restriction, which is nearly in agreement with the results obtained in the present study considering that the mean of restriction rates of feed for T3 (20%) and T4 (30%) is 25%.

Significant differences were found between T1 and T5 for CW and AFW, whereas, T5 showed 5.4% and 54.2% decrease in these parameters, respectively. Washburn (1990) found that abdominal fat reduced from 2.5 to 0.5% body weight with feed restriction. This could be in agreement with the results obtained in the present study where, AFW reduced from 2.27% to 1.01%. No significant differences were found between T1 and T5 in FPW, HPW, LW, GW and HW.

3. Economical efficiency

Table 4 shows the effect of the suggested feeding regimens after the finishing period on the economical efficiency in term of the feed cost/kg gain (EE). According to feed restriction rates, the cost of feeding chicks was affected markedly in a linear trend throughout T2, T3 and T4, whereas, T5 showed nearly the same as T4 in feed cost. On the other hand, feed cost of the low protein diet (T6) was lower markedly than that of the finisher diet (T1). However, it reduced feed cost/kg gain by 22.08% relative to the finisher diet (T1). Regarding T2, T3, T4 and T5, there were an increase in feed cost/kg gain by 2.86, 0.91, 7.48 and 18.01% relative to T1, respectively. The low protein diet gave the least feed cost/kg gain in the present study.

Table 4. The effect of the suggested feeding regimens on Feed cost/kg gain.

Item	T1	T2	T3	T4	T5	T6
Feed Price/kg. (PT)	82	82	82	82	82	62
Total feed intake/chick (kg)	0.770	0.693	0.616	0.539	0.550	0.770
Total feed cost/chick (PT)	63.14	56.83	50.51	44.20	45.10	47.47
BWG/chick (Kg)	0.304	0.266	0.241	0.198	0.184	0.295
Feed cost/kg gain (PT)	207.70	213.65	209.59	223.23	245.11	161.83
Feed cost relative to T1 %	100.00	102.86	100.91	107.48	118.01	77.92

From the results of the present study, the 14% protein diet gave similar final body weight as the 18% protein diets. Such diet showed 22.08% reduction in the feed cost/kg weight gain. Restricting feed 10% followed this regimen in such parameter which represented 2.86% increase in the economical efficiency value. Skipping-a-day in feeding broilers which was nearly equivalent to 30% feed restriction are not recommended as compared to 14% protein diet due to the relatively low body weight and feed efficiency, despite the 18% increase in the economical efficiency. The recommended 14% protein diet reduced abdominal fat 55.5% relative to that of 18% which may be due to that of the former regimen satisfied broilers requirement in the 8th week of age from protein and amino acids. The difference between 14% and 18% crude protein seemed to be a surplus that had been converted to deposited fat in the abdomen.

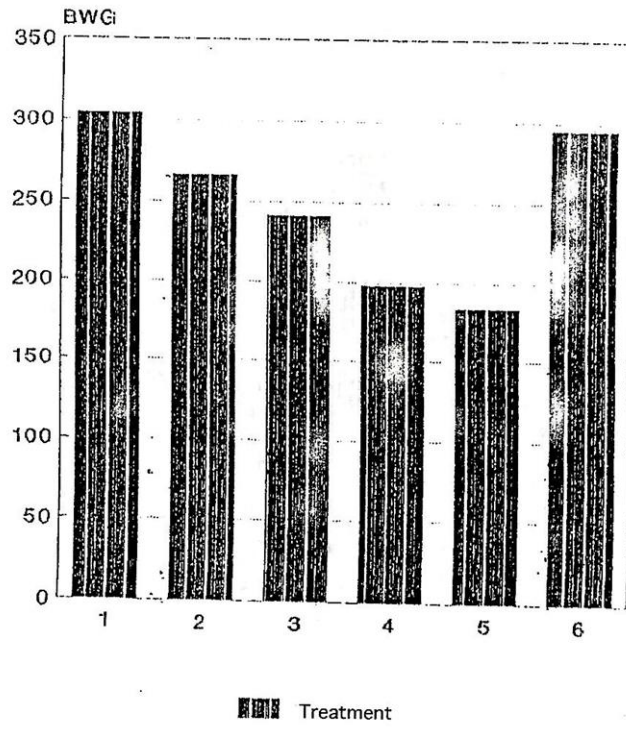


Fig. 1. Effect of feeding regimen on BWG.

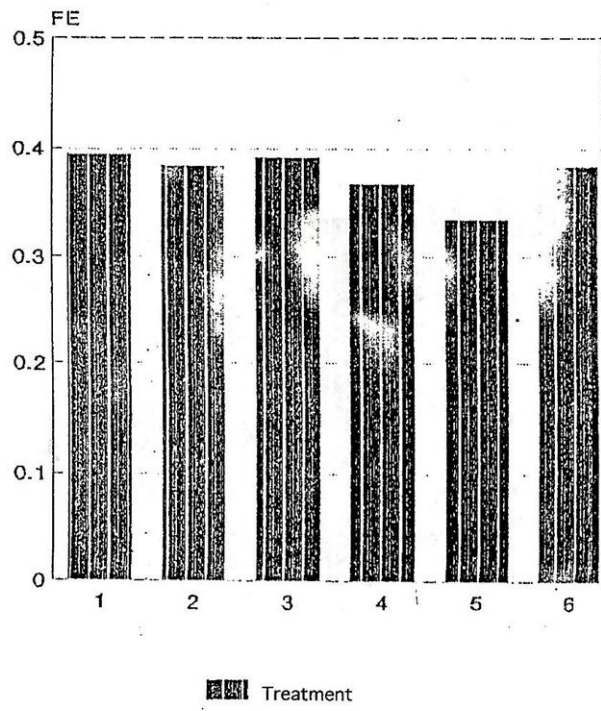


Fig. 2. Effect of feeding regimen on FE.

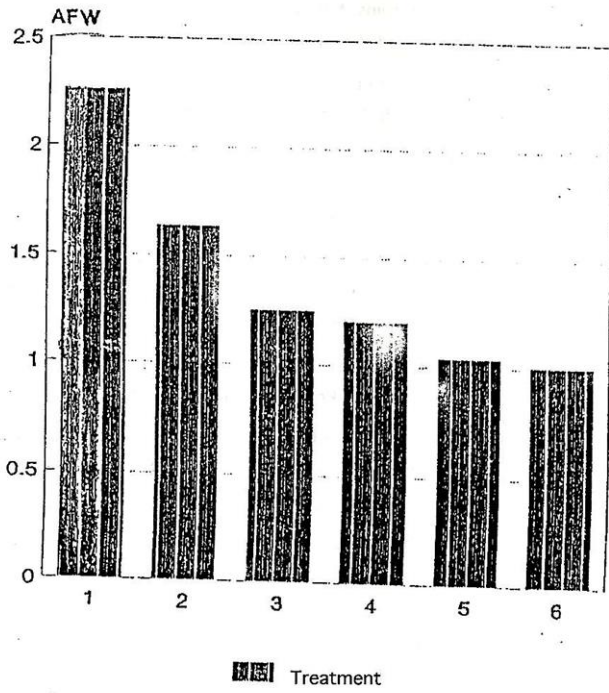


Fig. 3. Effect of feeding regimen on AFW.

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إستخدام بعض الأنظمة المقترحة لتغذية دجاج التسمين بعد فترة الناهي

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يهدف هذا البحث إلي دراسة تأثير إستخدام بعض الأنظمة المقترحة لتغذية دجاج التسمين بعد فترة الناهي.

تم إستخدام ٢٥٠ كتكوتا أربور أكرز عمر يوم وغذيت علي عليقة بادئ نامي وعليقة ناهي حتي عمر ٧ أسابيع. في بداية الإسبوع الثامن من العمر تم تقسيم الكتاكيت عشوائياً إلي ١٨ مجموعة، بكل مجموعة ١٠ كتاكيت. تم تغذية الكتاكيت تبعاً لستة أنظمة مقترحة للتغذية (٦ معاملات)، المعاملة الأولى : عليقة ناهي تسمين (١٨٪ بروتين خام). المعاملات الثانية والثالثة والرابعة تم فيها خصم ١٠ ، ٢٠ ، ٣٠ ٪ من كمية الغذاء المأكول بالنسبة للمعاملة الأولى علي التوالي. المعاملة الخامسة: تم فيها تصويم الكتاكيت يوماً كل يومين تغذية حرة من عليقة الناهي (١٨٪ بروتين خام). المعاملة السادسة : استخدم فيها تغذية حرة للكتاكيت علي عليقة منخفضة البروتين (١٤٪ بروتين خام). وفي نهاية فترة التجربة تم إخذ قياسات النمو والذبيحة.

أوضحت نتائج التجربة مايلي:-

- لا يوجد إختلافات معنوية بين مجاميع الكتاكيت التي غذيت علي عليقة الناهي (المعاملة الأولى) ومجاميع الكتاكيت التي غذيت علي عليقة منخفضة في البروتين (المعاملة السادسة)، وذلك بالنسبة لكل من الزيادة في النمو والكفاءة الغذائية.
- حدث إنخفاض تدريجي في معدل الزيادة في الوزن لكتاكيت المعاملة الثانية والثالثة والرابعة وذلك بمقدار ١٢،٥٦ ، ٦٣ ، ٢٠ ، ٩٢،٣٤٪ علي التوالي بالمقارنة مع المعاملة الأولى.
- أدي نظام التصويم يوماً كل يومين (المعاملة الخامسة) إلي إنخفاض الوزن النهائي ومعدل الزيادة في النمو والكفاءة الغذائية بمقدار ٦،٧٤ ، ٣٩،٦٢ ، ١٥،٤٤ ٪ علي التوالي بالمقارنة مع المعاملة الأولى.
- حدث إنخفاض معنوي في كمية دهن البطن للمعاملات الثانية والثالثة والرابعة والخامسة والسادسة بمقدار ٢٧،٨ ، ٤٧،١ ، ٥٤،٢ ، ٥٥،٥٪ علي التوالي بالمقارنة بالمعاملة الأولى.
- أوضح التقييم الاقتصادي للمعاملات أنه يوجد إنخفاض في تكلفة كيلو جرام النمو للكتاكيت التي غذيت علي عليقة منخفضة البروتين (المعاملة السادسة) مقداره (٢٢،٠٨٪) بالمقارنة بعليقة الناهي (المعاملة الأولى) بينما أدت باقي المعاملات إلي زيادة في تكلفة كيلو جرام النمو مقدارها ٢،٨٦ ، ١٨،٠١ ، ٧،٤٨ ، ٠،٩١ ٪ للمعاملات الثانية والثالثة والرابعة والخامسة علي التوالي بالمقارنة مع المعاملة الأولى.