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Effect of an Early Feed Restriction of Broiler's on Productive Performance and Carcass Quality

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Abstract: An experiment was carried out with straight run broiler chicks (lohman) in which diets from 7 to 14 days of age were substituted 0 , 5 , 10 and 15 % sand respectively . Each diet was tested with 4 replicate floor pens each containing 50 chicks. The results indicated that dietary substituted with sand resulted in a significant ($p<0.05$) reduction in body weight at the age of 14 days . After the return to adlib feeding the birds were able to fully recover body weight depression, the body weight of birds from all restricted group was significantly ($p<0.05$) higher than that of the control group at the age of 49 days of age. However , there was a numerical but not significant improvement in feed conversion ratio as a result of early feed restriction. Feed restriction had variable effect on carcass composition at 14 and 49 days of age. Similar trend was observed with respect to carcass cuts at 49 days of age. Earlier feed restriction significantly ($p<0.05$) reduced abdominal fat pad weight compared to that of the control group.

Key words: Feed restriction, compensatory growth, Broilers, carcass cut and carcass composition

Introduction

The increase in growth rate of modern broiler hybrids has been associated with increased fat deposition (plavnik *et al.,* 1986, Yu and Robinson, 1992) and high incidence of skeletal and metabolic disorders (Lesson and summers, 1988). These situation most commonly occur with broilers that consume feed ad lib (Pasternak and Shalev, 1983). Studies have shown tha potential for early -life feed restriction followed by full-feeding to reduce the above mentioned problems.

During the period of feed restriction, growth rate is slower than that of birds given free access to food , but when access to food is again unrestricted , the birds exhibit an accelerated rate of weight gain typical of compensatory growth (plavnik and Hurwitz, 1985, Calvert *et al.,* 1989, Jones and Farrell, 1992 a). The birds apparently utilise food more efficiently following the period of restricted feeding because their overall feed intake and feed conversion ratio are lower than that of full-fed birds.

The present experiment was conducted to study the effect of early life- feed restriction imposed by diet substituted followed by full-feeding until marketing age on productive performance and carcass parts of broiler chicks.

Materials and Methods

The present study was conducted using unsexed broiler chick (Lohman). 800 day-old chicks were allocated at random to 4 dietary treatments with 4 replicates per treatement . Each replicat consisted of 50 chicks each . The chicks were raised on deep litter with continous lighting through-out the experimental period.

At the age of 7 day all chicks were individually weighed and re-distributed to the 4 experimental treatments in order to equalize the mean body weight between treatments.

Feed restriction was imposed from the age of 7- 14 days by means of substituted the starter diet (Table 1) with sand to produce the following treatments:

T_1 - Control - Full feeding from day-old-49 days of age.
T_2 - Diet substituted with 5 % wt/wt sand.
T_3 - Diet substituted with 10 % wt/wt sand.
T_4 - Diet substituted with 15 % wt/wt sand.

Table1: Composition of starter and finisher diets used in the present study.

Ingredients	Starter %	Finisher%
Corn	63	72
Soybean meal 44%	27	20
Meat meal	5	4.5
Fish meal	4.5	3
Salt	0.3	0.3
Vitamin and minerals premix *	0.2	0.2
Total	100	100
Calculated chemical composition:		
A. Starter:		B. Finisher:
Metabolizable Energy:3050 Kcal /Kg.		3140 Kcal/Kg.
Crude Protein%: 22.6%		20%
Ether Extract%: 2.638%		2.658%
Crude fiber%: 2.6%		3.1%
Meth. + Cyst. (%)		0.9 , 0.65
Ca%: 1.15		0.95
Available P%: 0.45		0.40

*Every 1 gram of premix contained: vitamin A= 1500 IU; Vit. D_3= 150 IU; Vit. E= 200 ug; Vit. B_1 = 200 ug; vit. B_2 = 200 ug; vit. B_6 = 300 ug; vit. B_{12} = 0.5 ug; vit. K_3 = 200 ug; Folic acid= 30 ug; Panth. Acid = 550 ug and Nicotinamide = 1 mg. Minerals: Fe_2 SO_4 = 550 ug: Mn_2SO_4 = 450 ug; Zn_2SO_4 = 230 ug; Cu_2 SO_4 = 56 ug Co_2CO_3 14ug.

At the end of the feed restriction period, the chicks were returned to full feeding till marketing at the age of 49 days.

At the age of 14 and 49 days of age 2 and 4 birds were taken to randomly from each replicate from all dietary treatments. After slaughtering the birds. Samples of meat from the breast and thigh were taken for protein and fat analyses (A.O.A.C. 1984) Further more . Gizzard , heart and liver were removed to determine their weight . At the age of 49 days, dressing percentage and the weight of major cuts were measured.

The experiment was arranged as completely randomized design with pen as the experimental unit.Data for response variables in terms of growth parameters and carcass characteristics were examined (SAS, 1988), treatments means were assessed for significance using the Duncan multiple F-test (Duncan, 1955).

Results and Discussion

Dietary substituted with sand (T_1, T_2 and T_4) resulted in a significant ($p<0.05$) reduction in body weight at 14 days when compared with that of the control group. Although the maximum growth depression reached about 9.3% (T_4), body weight at 49 days of age for birds from feed restricted groups (T_2, T_3 and T_4) was significantly ($p<0.05$) higher than that of birds from the control group (Table 2) These results are in agreement with those obtained by susbilla *et al.*, 1994, Zubair and Lesson, 1994, Lesson *et al .*, 1996 and Saleh *et al.*, 1996 , their results indicated that birds subjected to a period of feed restriction were able to compensate for the reduction in body weight when returned to full feeding . feed conversion ratio (FCR) at the age of 49 days did not differ significantly among all the experimental groups (Table 2). But FCR for the feed restricted groups (T_2, T_3 and T_4) was numerically better than of birds from the control group, the difference ranged between 6.6 - 7.1 %. This apparent improvement in FCR may be of importance to the poultry producer, it means that restricted birds required less feed to produced one unit of weight gain.

Chemical analyses (Table 3) at the end of the feed restriction period (14 days of age) indicated that fat percentage of dry matter in breast meat was significantly higher ($p<0.05$) in birds from T4 (15 % sand substituted) when compared with that of birds from all other treatments (T1 , T 2 and T 3) , While fat percentage in thigh meat was significantly ($p<0.05$) lower for birds from T2 and T3 when compared with that Of birds from T1 and T4.however, fat percentage in the liver of birds from T3 and T4 was significantly higher ($p<0.05$) than that of birds from T1 and T2 .As with respect to protein level, the results indicated that breast meat contained significantly ($p<0.05$) higher protein in birds from T3 and T4 compared with that of birds from T1 and T2, while · there was a significant decrease ($p<0.05$) in protein level in the thigh meat of birds from T4 compared to other

Table 2: The effect of varying levels of feed restriction 7-14 days of age followed by full feeding on the productive performance of broilers at 49 days of age

	Mean body weight g				Feed Conversion ratio g feed: g gain	Feed day 7-14
Treatments	Day old	7 days old	14 days old	49 days old		
T1 -control	41.1	178.2	443.8 [a*]	2325 [a]	2.26	
T2 -5% sand	41.2	178.5	422.5 [b]	2475 [b]	2.12	
T3-10% sand	41.0	178.3	415.5 [b]	2500 [c]	2.1	
T4 -15% sand	41.3	178.0	402.5 [c]	2500 [c]	2.1	
Level of significance	N.S.**	N.S.	$p<0.05$	$p<0.05$	N.S.	

* In each column , mean not bearing similar superscripts differ significantly ($p<0.05$).
** Not significant.

Table 3: The effect of varying levels of feed restriction from 7- 14 days of age followed by full feeding on the chemical composition of various carcass parts.

	Chemical composition (% of dry matter)											
	Breast				Thigh				Liver			
Treatments	Protein 14 days	Protein 49 days	Fat 14 days	Fat 49 days	Protein 14 days	Protein 49 days	Fat 14 days	Fat 49 days	Protein 14 days	Protein 49 days	Fat 14 days	Fat 49 days
T1 Control	86.0 ^{b}	86.9 ^{b}	7.25^{b}	15.3	73.8 ^{b}	73.7 ^{b}	23.5^{a}	13.78	64.4^{b}	66.8^{b}	31.7^{b}	22.3
T2 5% sand	86.6 ^{b}	86.9 ^{b}	7.4 ^{b}	16.6	74.9 ^{b}	73.7 ^{b}	21.1^{b}	14.0	64.5^{b}	66.8^{b}	32.4^{b}	22.8
T3 10% sand	88.5 ^{a}	88.0 ^{a}	7.7 ^{b}	15.9	76.4 ^{a}	76.0 ^{a}	21.0^{b}	13.9	67.3^{a}	66.8^{b}	34.5^{a}	22.5
T4 15% sand	86.9 ^{a}	88.1 ^{a}	8.1 ^{a}	15.9	71.4 ^{c}	75.0 ^{ab}	23.0^{a}	13.9	64.7^{b}	68.1^{a}	34.3^{a}	22.5
Level of significant	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	N.S	(p<0.05)	(p<0.05)	(p<0.05)	N.S

*In each column, means not bearing similar subscripts differ significantly (p<0.05).

Table 4: The effect of varying levels of feed restrictions from 7_14 days of age followed by full feeding on the yield of carcass cuts at marketing age.

	Cuts weight (gram)					
Treatments	Whole leg (Thigh+drum stick)	Breast	Back	Wings	Neck	Abdominal fad pad
T1- control	541.33^{b*}	539.67^{c}	366.17^{a}	191.0^{b}	118.83^{a}	60.83^{a}
T2-5% sand	553.00^{a}	588.83^{b}	358.0^{b}	193.33^{a}	116.5^{b}	49.0^{b}
T3- 10% sand	539.67^{c}	618.67^{a}	332.5^{c}	186.83^{c}	112.33^{c}	46.5^{c}
T4-15% sand	550.67^{a}	612.33^{a}	333.33^{c}	184.5^{c}	116.0^{b}	43.17^{c}
Level of significance	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)	(p<0.05)

*In each column, means not bearing similar superscripts differ significantly (p <0 .05).

experimental groups. However, the liver of birds from T3 contained significantly (p<0.05) more protein when compared with that of birds from T1, T2 and T4.When the same parameters were determined at the age of 49 days ,the results showed that breast meat of birds from T3 and T4 and thigh meat of birds from T3 and liver of birds from T4 contained significantly (p<0.05) more protein compared with that of birds from other treatments. However, no significant difference was observed in fat percentage among all dietary treatments. These results confirm the finding of zubair and lesson, (1994) who showed that different level of feed restriction had varying effects on chemical analysis of carcass components.

When examining the results concerning carcass yield and carcass cuts across treatments at the age of 49 days, it was indicated that feed restriction programs employed in the present study had varying effects on these parameters (Table 4). However, it is interesting to note that feed restriction programs significantly (p<0.05) reduced the size of abdominal fat pad when compared with that of the control group. These findings are of importance to the broiler producers because fat deposition is considered the most expensive way of using dietary energy. The above mentioned results are supported by the findings of susbilla *et al.*, 1994.

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