EFFECTS OF QUANTITATIVE FEED RESTRICTION ON BROILER GROWTH AND ECONOMICS OF PRODUCTION

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ABSTRACT

The effects of quantitative feed restriction on broiler growth and monetary returns were investigated using two hundred and forty Cobb broiler chicks. Three levels of restriction namely, 5 10 and 15% of *ad libitum* intake, were randomly imposed on different groups. Birds that were restricted in the starter phase of growth were full-fed in the finisher phase, and vice versa. Body weight was depressed by all levels of feed restriction considered. Feed conversion ratio (FCR) was however not significantly affected. Although quantitative feed restriction significantly reduced feed cost, the highest revenue was realized from control birds. All economic parameters considered did not show feed restriction as having advantage over full-feeding.

Key words: Feed restriction, broiler growth, economics of production.

INTRODUCTION

Commercial broilers have conventionally been fed and watered *ad libitum*, in order to enhance their fast growth and early maturity.

Nevertheless, due to recent phenomenal increases in feed cost and occasional feed scarcity in Nigeria, many poultry farmers have been forced to engage in indiscriminate restriction of the amount of feed offered to commercial broilers. This practice, no doubt, will affect the market quality of chickens. This unwholesome development in our poultry industry has made research into feed restriction for commercial broilers imperative.

A good number of workers in the temperate areas, including McDaniel *et al* (1975), Gous and Stielau (1976), McCartney and Brown (1977), and Proudfoot and Hulan (1982) have reported reduced body weight for restricted-fed broilers. However, reports on the effects of feed restriction on other production parameters such as rate of weight gain, efficiency of feed conversion and mortality are not consistent. Twining,*et al.* (1974) and Gehle *et al.* (1979) have reported that broilers restricted-fed in their early phase of growth but later full-fed in their finishing phase showed near-equivalent final performance as their full-fed counterparts as a result of compensatory growth. A similar observation has also been made by Proudman and Opel (1981) on young poults restricted by 50% of *ad libitum* intake. The effect of feed restriction on monetary returns of broiler chickens have been shown by McDaniel *et al* (1975) and Proudfoot and Hulan (1982) to be significant.

This study was undertaken to determine the effect of quantitative feed restriction on growth performance of commercial broilers and on the economics of production.

MATERIALS AND METHODS

Stock and Management

Two hundred and forty day-old commercial Cobb broiler chicks were started in a deep litter pen, with an average brooder temperature of 32 C. Feed was given *ad libitum* to all the birds in the first weeks, which constituted the adjustment period.

At the end of this period, the chicks were randomly assigned to seven treatment groups with three replicates of eleven birds per replicate. The groups were as follows: Control (full-fed both in the starter and finisher phases); RS5FF, RS10FF and FS15FF (restricted by 5%, 10% and 15% in the starter phase, respectively, but full-fed in the finisher phase); FSRF5, FSRF10 and FSRF15 (full-fed in the starter but restricted by 5%, 10% and 15%, respectively in the finisher phase). Each replicate was housed in a pen measuring 2.70m x 1.55m, providing 0.38sq.m floor space per bird. The feeding and management of these birds have been described by Ibe and Nwachukwu (1988).

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TABLE 1. EFFECT OF QUANTITATIVE FEED RESTRICTION ON FEEDCONSUMPTION, FEED CONVERSION RATIO AND MORTALITY OF BROILER CHICKENS

Parameters	Starter Restricted Groups (2 - 6 wks)				Finisher Restricted Groups (7 - 9 wks)			
	Control	RS5FF	RS10FF	RS15FF	Control	FSRF5	FSRF10	FSRF15
Average feed consumption (g/bird)	470.40a	447.61ab	411.37bc	399.85	1232.14a	1170.48b	1108.92c	1044.94d
Feed conversion ratio (feed/gain)	2.26	2.34	2.34	2.24	3.71	3.99	3.61	3.73
Mortality (%)	0	0	0	0	0	0	0	0

[1] Values in the row within each group bearing different superscripts are significantly different ($P < .05$)

Parameters And Analytical Procedure

Body weight measurements were taken weekly on all surviving birds. Feed consumption and feed conversion ratios were recorded on a group basis. All data collected were tested statistically by the analysis of variance and significant treatment means were examined and separated using the Student-Newman Keul's method (Zar, 1974).

RESULTS

Table 1 gives the effects of feed restriction on feed intake, feed conversion and mortality of the birds. There was a general reduction in feed consumption in both the starter and finisher phases due to treatment. Feed conversion ratio (FCR), on the other hand was not significantly affected ($P > .05$) by feed restriction. There was no mortality in all the groups.

Mean body weights sof birds in each treatment group are given in Table 2. Feed restriction did not significantly affect ($P > .05$) body weights of the birds at the end of the first week of restriction (week 2). However, from week 3 until the end of the experiment in week 9, the control group had significantly higher ($P < .05$) body weights than all the restricted groups. Also at the end of the experiment, the average body weights of the birds restricted by 10% in the starter and those restricted by 5% in the finisher period were not significantly different ($P < .05$). All the other restricted groups had comparable body weights in the end.

Table 3 shows the effects of feed restriction on the economic parameters considered. The data reveal that feed cost was significantly higher ($PÇ < .05$) in the control and declined in the restricted groups according to the level of restriction. The cost of production of birds also followed a similar trend. Revenue, a factor determined by final body weight and ruling market price of broilers, was highest ($P < .05$) in the control group. The revenue from the birds restricted by 10% in the starter and those restricted by 5% in the finisher period was not different ($PÇ > .05$). All the other restricted groups had comparable revenues as was observed for final body weights. Benefit and cost-benefit ratio were better in the control while savings in feed cost were greater for the restricted groups than for the control. Indeed savings increased with increasing level of restriction.

DISCUSSION

Results of this study show that feed restriction at the levels examined caused significant decreases in both feed consumption and body weight of the birds, thus supporting reports of earlier workers like Gous and Stielau (1976) and Balnave (1976). It is evident that full-feeding is a more commercially viable option for broiler production. This stems from the finding that full-fed (control) birds had the highest body weight, the highest revenue, the greatest profit and indeed the lowest cost-benefit ratio. Although feed cost and total cost of production

TABLE 2: MEAN[1] BODY WEIGHTS (KG) OF BROILER CHICKENS SUBJECTED TO FEED RESTRICTION DURING THE STARTER PHASE (2 - 6 WKS) AND FINISHER PHASE (7 - 9 WKS

Age[3] (Wk)	Treatment Group[2] Control	RS5FF	RS10FF	RS15FF	FSRF5	FSRF10	FSRF15
2	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	(.002)	(.008)	(.008)	(.006)	(.002)	(.002)	(.002)
3	0.23a	0.21b	(.21b	0.20b	0.23a	0.22ab	0.23a
	(.005)	(.006)	(.006)	(.006)	(.005)	(.005)	(.005)
4	0.44a	0.40b	0.39b	0.38b	0.37b	0.39b	0.36b
	(.010)	(.010)	(.010)	(.009)	(.008)	(.007)	(.007)
5	0.69a	0.58b	0.59b	0.58b	0.61b	0.60b	0.59b
	(.010)	(.013)	(.019)	(.012)	(.011)	(.009)	(.009)
6	1.04a	0.87c	0.89c	0.88c	0.97b	o.93bc	0.92bc
	(.022)	(.016)	(.022)	(.018)	(.015)	(.012)	(.012)
7	1.35a	1.14c	1.17bc	1.10c	1.25b	1.18bc	1.22b
	(.022)	(.020)	(.029)	(.024)	(.024)	(.015)	(.017)
8	1.69a	1.39c	1.52b	1.50b	1.60b	1.52b	1.51b
	(.032)	(.022)	(.033)	(.034)	(.029)	(.017)	(.030)
9	2.03a	1.72c	1.88b	1.74c	1.92b	1.78c	1.79c
	(.038	(.026)	(.037)	(.032)	(.050)	(.024)	(.031)

[1]Means in a row bearing different superscripts are significantly different ($P < .05$). Values in parenthesis are ± S.E. of mean.

[2]See text for treatment codes

[3]Week 1 was the adjustment period (average body weight = .04 kg).

were significantly higher in the control, these costs were clearly offset by the birds' good growth performance and their superior market weights.

The observed non-significant difference in feed conversion ratios for birds in different treatment groups agrees with earlier observations by Proudfoot and Hulan (1982) and Pinchasov and Jensen (1988) nut is inconsistent with those of McCartney and Brown (1977), Yule and Fuelling (1979) and Yule *et al*(1979). Conflicting results of this kind have often been attributed to differences in feed restriction methods, severity of restriction and strains of broilers used in the experiments (Lee *et al.*, 1971).

Although feed restriction in commercial broilers has been reported to have significant effects on monetary returns (McDaniel *et alD;* 1975; Proudfoot and Hulan, 1982), the economic parameters considered in this study do not justify feed restriction as a commercially viable option for broiler production in the tropics.

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TABLE 3. EFFECT OF QUANTITATIVE FEED RESTRICTION ON ECONOMIC PARAMETERS OF BROILER CHICKENS

	Treatment groups*						
Economic Parameters:	Control	RS5FF	RS10FF	RS15FF	FSRF5	FSRF10	FSRF15
Feed cost (N/bird)	8.09a	7.94b	7.77c	7.61d	7.85b	7.61d	7.37e
Cost of day-old chick (N/chick)	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Cost of Productuon[2] (N/bird)	10.69a	10.54b	10.37c	10.21d	10.45b	10.21d	9.97e
Revenue[3] (N/bird)	16.24a	13.76c	15.04b	13.92c	15.36b	14.24c	14.32c
Benefit[4] (N/bird)	5.55a	3.22d	4.64b	3.71c	4.91b	4.03c	4.35bc
Cost-Benefit ratio[5]	1.93	3.27	2.22	2.75	2.13	2.53	3.29
Savings[6] (N/bird)	0.00	0.15	0.32	0.48	0.24	0.48	0.72

*Values in a row bearing different superscripts are significantly different ($P < .05$)

[1]Feed cost = cost of feed consummed by a bird to maturity

[2]Cost of Production = Feedcost plus cost of purchasing the birds; labour cost not considered

[3]Revenue = Final weight of bird (kg) x N8.00/kg (ruling price of broiler the time of the experiment)

[4]Benefit = Revenue minus cost of production

[5]Cost benefit ratio = Cost of production divided by benefit.

[6]Saving = Cost of production for control birds minus cost of production for each restricted group.

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