

Performance of Broiler Chickens to Time Limited Feeding of Mash or Pellet Feed

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Abstract

The effect of feed form (FF) and time limited feeding on performance of broiler chickens was studied. 160 marshal strain of broiler were allocated in a 2 × 4 factorial experimental arrangement with two FF (mash and pellet) at four Time limited feeding (TLF) (24, 6, 4, and 2 hours). Data collected were analysed using a completely randomized design. Significant differences were obtained on feed intake (FI), weight gained (WG), final weight (FW), feed conversion ratio (FCR) and mortality (M). FI reduced ($P < 0.05$) as TLF reduced. FI was influenced by FF, birds fed pellet diet having higher ($P < 0.05$) FI compared to mash at each corresponding level of TLF. WG was lower ($P < 0.05$) at all levels of TLF in broilers fed mash compared to ad libitum group. However, birds fed for 4 and 6 hours on pellet diet during feed limitation had similar ($P > 0.05$) WG compared to their control group. FW at 8 weeks of age was lower in birds fed mash compared to pellet. FCR was influenced by FF and TLF with birds placed on pellet having a better FCR compared to those fed mash. Pellet fed birds recorded higher M compared to the mash fed birds particularly during the first week of life because the pellet size of 2mm was too big for their mouth size hence inability to feed properly, thereafter improvements were observed from week two. The study revealed a better performance and better benefit of feed limitation when birds are fed pellet diet compared to mash.

Keywords: Broiler Chickens, Feed Forms, Growth Performance, Time Limited Feeding.

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1. Introduction

Generally, broiler production is known to be capital demanding due to high cost of conventional feed ingredients especially the energy and protein sources. This is because it is one of the most efficient converters of feed to animal protein and it is generally assumed that when birds eat more, they attain higher body weight at market age. The high cost of feed in poultry production is threatening the sustainability of the enterprise. There is therefore, a need to identify methods of reducing costs (Khetani et al., 2009). Various feed form including mash, pellet or crumble are supplied to broilers. Ration forms are the most important factor which directly influences the cost of mixed feed and production performance of broiler (Ghazi et al., 2012). The physical form of feed (mash and pellet) is a crucial factor in meat yield of broiler. With the present widening protein deficiency gap due to high population and high cost of livestock production, there is the need to reduce production cost through feed cost savings, this will allow the product go round the population at affordable prices. (Azarnik et al., 2010). The benefits of feed savings, feed conversion rates, lean meat and a more uniform growth are worth serious consideration. These benefits can be realized by finding cheap, adequate and readily available ways of reducing feed cost in broiler chicken production. One of such method is reducing the amount of daily feed offer for some time (Novele et al., 2009). Quantitative and qualitative feed restrictions have been introduced; this is done by reducing the birds feed access time or by reducing the nutrient content of the feed. Restricted feeding can be done in early life of chickens (Lee and Leeson, 2001). Limiting feed access in boiler production has reduced excess fat deposition and therefore improving the carcass quality of broiler as well as reducing metabolic diseases and mortality rate. (Lee and Lesson, 2001). Several studies on feed limitation in boilers has shown decrease in mortality, stimulation of compensatory growth, improved carcass quality by reducing excess fat deposition, reduce production cost and improved feed efficiency. However, in these studies birds were placed on the same form of diet. However, there is little information on feed restriction programme where there is comparison between different forms of feed fed to broiler chickens.

2. Materials and Methods

Animal and housing

A total of one hundred and sixty marshal strain of broiler chicks raised on deep litter were used for the study.

Experimental procedure

The experimental birds were raised altogether for the first 7 days of age (1 week) and were fed ad libitum on

mash diet during this period. At 1 week of age birds were balanced for weight and allocated into a 2 × 4 factorial experimental arrangement in a completely randomized design with two feed forms (mash and pellet) and four levels of feed access time (24, 6, 4, and 2 hours). There were 8 treatments which were replicated four times with five birds. Birds on all the feed limited groups were provided with same quantity of feed each day using the guide given by Aduku (2004). Leftover feed was withdrawn from feed limited groups at the stated time. The time limited feeding was carried out for a period of 3 weeks from 7 - 28 days of age. After the 21 days of feed restriction all birds were fed ad libitum till eight weeks of age. A straight diet was used for the experiment. The Gross Percentage Composition of the Mash and Pellet are similar (Maize, 45.00; Soybean meal 15.00; Fish meal(72%CP) 1.00; Groundnut Cake 12.50; Wheat Offal 21.50; Oyster Shell 1.50; Bone meal 2.50; Lysine 0.25; Methionine 0.25; Salt 0.25; Vit./Mineral Premix 0.25). Necessary Vaccinations and medications were administered. Data collected were subjected to the following equations to obtain weight gain, feed intake, feed conversion ratio and Mortality (%).

Weight Gain (g) = Final Body Weight – Initial Body Weight

Feed Intake Per Bird (g) = Feed Supplied – Left Over Feed / Number of chicks

Feed Conversion Ratio = Feed Intake (g)/ Total Weight Gain (g)

Mortality (%) = Number of Dead Bird/Total Number of Birds at the Start of the Experiment

Chemical and Statistical analysis

Proximate analysis of mash and pellets (Table 1.) were carried out using the methods of AOAC (2005).

Table 1: Analyzed Composition (%) of Mash and Pellet Feed

	DM	CP	CF	EE	Ash
Mash	88.35	21.05	3.97	3.74	5.65
Pellet	89.25	20.94	4.08	3.56	5.30

Data collected were subjected to analysis of variance, significant (P<0.05) differences among each treatment means were separated using Duncan's Multiple Range Test (SAS, 1987).

3. Results and Discussion

Main and interaction effects of FF and TLF are shown in Tables 2 and 3.

Table 2: Main Effects of Feed Form (FF) and Time Limited Feeding (TLF) on Performance Characteristics of Marshal Broiler Chickens

Parameter	Feed Form		SEM	Time Limited Feeding (Hours)				SEM
	Mash	Pellet		2	4	6	24	
Initial Wt(g)	146.25	146.75	1.76	143.00	149.50	146.50	145.00	2.35
Final Body Wt(g)	1799.38 ^b	1980.00 ^a	28.78	1786.25 ^c	1878.75 ^b	1875.00 ^b	2018.75 ^a	42.86
FI During Restriction/bird/day(g)	29.40 ^b	30.52 ^a	3.89	17.36 ^d	21.78 ^c	25.18 ^b	55.52 ^a	0.52
FI During Realimentation/bird/day (g)	115.72 ^b	118.62 ^a	0.74	116.88 ^{ab}	117.17 ^{ab}	115.34 ^b	119.29 ^a	1.04
FI (Entire period) / bird/day(g)	78.72 ^b	80.87 ^a	1.87	74.23 ^c	76.29 ^b	76.70 ^b	91.96 ^a	0.66
WG during Restriction/bird/day (g)	11.37 ^b	12.96 ^b	1.07	9.25 ^c	9.42 ^c	10.92 ^b	19.07 ^a	0.51
WG During Realimentation/bird/day(g)	50.70 ^b	55.96 ^a	0.72	51.68 ^b	54.96 ^a	54.00 ^{ab}	52.66 ^{ab}	1.35
WG (Entire period)/bird/day (g)	33.84 ^b	37.53 ^a	0.61	33.50 ^c	35.44 ^a	35.54 ^b	38.27 ^a	0.90
FCR During Restriction	2.56 ^a	2.23 ^b	0.125	1.91 ^c	2.40 ^b	2.37 ^b	2.92 ^b	0.13
FCR After Restriction	2.28 ^a	2.13 ^b	0.03	2.27 ^a	2.14 ^b	2.15 ^b	2.27 ^a	0.05
Total FCR	2.33 ^a	2.16 ^b	0.03	2.23 ^b	2.16 ^b	2.17 ^b	2.41 ^a	0.05
Mortality(%) During Restriction	1.25 ^b	12.5 ^a	2.42	17.50 ^a	7.50 ^b	2.50 ^b	0.00 ^b	3.04
Mortality (%) After Restriction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Mortality(%)	1.25 ^b	12.5 ^a	2.42	17.50 ^a	7.50 ^b	2.50 ^b	0.00 ^b	3.04

abc Means on the same row not sharing common superscript are significantly different (p<0.05)

Table 3: Effects of Interaction Between Feed Form (FF) and Time Limited Feeding (TLF) on Performance Characteristics of Marshal Broiler Chicken

Feed Form (FF) Time Limited Feeding (TLF) (Hours)	Mash				Pellet				SEM
	2	4	6	24	2	4	6	24	
Initial Body Wt.(g)	143.00	148.00	146.00	144.00	143.00	151.00	147.00	146.00	3.52
Final Body Wt.(g)	1707.50 ^c	176.00 ^{cb}	1745.00 ^c	1985.00 ^a	1865.00 ^a	1997.50 ^a	2005.00 ^a	2052.50 ^a	33.99
FI During Restriction/bird/day (g)	17.73 ^c	21.81 ^d	24.49 ^c	53.56 ^b	16.99 ^c	21.74 ^d	25.88 ^c	57.49 ^a	0.57
FI During Realimentation/bird/ day (g)	115.05 ^{bc}	114.98 ^{bc}	112.90 ^c	119.95 ^a	118.72 ^{ab}	119.37 ^{ab}	117.79 ^{ab}	118.63 ^{ab}	1.13
FI (Entire period) /bird/day (g)	73.34 ^d	75.05 ^{cd}	75.00 ^{cd}	91.50 ^a	75.12 ^{cd}	77.53 ^{bc}	78.40 ^b	92.42 ^a	0.77
WG During Restriction/ bird/day (g)	8.43 ^{dc}	8.35 ^c	9.41 ^{cbe}	19.29 ^a	10.07 ^c	10.49 ^c	12.43 ^b	18.86 ^a	0.52
WG During Realimentation/bird/ day (g)	49.70 ^b	51.66 ^b	50.06 ^b	51.38 ^b	53.67 ^b	58.27 ^a	57.95 ^a	53.95 ^b	1.21
WG (Entire period)/bird/day (g)	32.01 ^c	33.10 ^{cb}	32.63 ^{cb}	37.63 ^a	34.99 ^b	37.79 ^a	38.44 ^a	38.91 ^a	0.75
FCR During Restriction	2.12 ^b	2.72 ^a	2.64 ^a	2.79 ^a	1.70 ^a	2.08 ^b	2.10 ^b	3.05 ^a	0.13
FCR after Restriction	2.32 ^a	2.22 ^a	2.23 ^a	2.34 ^a	2.21 ^b	2.05 ^{bc}	2.04 ^c	2.20 ^b	0.05
Tot.FCR	2.30 ^{abc}	2.27 ^{bc}	2.30 ^{abc}	2.44 ^a	2.15 ^{cd}	2.06 ^d	2.05 ^d	2.38 ^{ab}	0.05
Mortality During Restriction	5 ^{cb}	0 ^c	0 ^c	0 ^c	30 ^a	15 ^b	5 ^{bc}	0 ^c	2.60
Mortality after Restriction	0	0	0	0	0	0	0	0	0
Total Mortality(%)	5 ^{cb}	0 ^c	0 ^c	0 ^c	30 ^a	15 ^b	5 ^{cb}	0 ^c	2.60

abc Means on the same row not sharing common superscript are significantly different (p<0.05)

Average daily feed intake/bird for the entire period of experiment reduced significantly (P<0.05) with reduction in time of access to feed. Feed consumption for the entire period of experiment was higher in pellet fed birds compared to mash fed birds at all corresponding level of feed access time. The performance of pellet fed bird compared to mash fed birds (Table 2) indicates that broilers were able to utilize pellet diet better than mash diet. Average daily weight gain/bird for the entire period of experiment was higher in pellet diet compared to mash at all corresponding level of feed access time. Birds placed on pellet diet responded better to the feed restriction, birds fed for 4 and 6 hours during restriction on pellet diet were able to compensate for their initial body weight loss after realimentation. However, all groups of feed limited bird placed on mash diet failed to compensate fully for their initial weight loss after realimentation. Final body weight gain of birds on table indicated that birds limited to 4 and 6 daily feed access time and fed pelleted diet were able to compete favourably with birds fed ad libitum on mash diet. The general improved performance of pellet fed birds compared to mash can be explained to be due the fact that birds prefer feed in pellet form compared to mash (Behnke, 1998) which resulted in increased feed intake and subsequent higher body weight gain. Each pellet grain gives a balanced nutrient intake thereby eradicating ingredient segregation (Behnke, 1998). Also chicken spent less time feeding on pellets and expended less energy than on mash (Savory, 1974; Moran, 1989). Pellet fed birds had better feed conversion ratio for the entire period of experiment at each corresponding level of feed access time, this means that broilers were able to utilize pellet feed better than mash. Similar results were observed from earlier findings (Ghazi et al., 2012; Zakeri et al., 2013) who reported that pellet had a better feed efficiency of pellet over mash.

In this study no outbreak of disease was recorded, mortality was recorded only at the early period of feed limitation (1st week). Higher mortality recorded among the pellet fed birds may be a result of combination some factors (at the early period of restriction birds were not readily familiar with the pellet diet, the beak was not

developed enough to effectively pick up the 2mm pellet, and feed was restricted giving them less time to feed) which might have contributed to a very low energy intake which was not sufficient to fuel necessary body processes, though birds that survived were able to adapt favourably at the second week of feed limitation.

4. Conclusion

The study concluded that broiler chickens on pellet feed had better performance in terms of feed intake, weight gain, feed conversion ratio and final weight gain over those fed mash. Broilers subjected to 4 and 6 hours daily TLF competes favourably with groups of birds fed ad-libitum following realimentation.

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