RESPONSE OF BROILER CHICKEN TO DIFFERENT FEED FORMS: GROWTH PERFORMANCE, CARCASS YIELD AND COST BENEFITS

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ABSTRACT

A total of One Hundred and Twenty (120) Day Old Broiler Chicks were purchased from a reputable hatchery and raised under standard brooding conditions for seven days. The birds were divided into two main treatment groups of (60) birds each on (crumble feed/pellet and mash/mash feed forms), each consisting of four replicates. Each replicate housed fifteen (15) birds on weight equalization basis. Feed (Starter:CP 24.12% and M.Energy 3.03 and Finisher: 20.83% and M.Energy 3.04Kcal.kg) and water were supplied adlibitum for a period of 8weeks while the experiment lasted. At the end of the 8th weeks, 2 birds per replicate were selected and slaughtered for carcass analysis, plucked, eviscerated, cut-up parts and organs were used for carcass analysis. All data collected were statistically analysed with a general linear model of SAS (2013) and the Duncan multiple range tests were used to detect significant differences among means. The results on growth performance showed that Mash feed form had significantly (p<0.05) higher final weight (1225.00g/b), weight gain (897.25g/b), and feed efficiency (0.64) than crumble feed form at the starter phase. However, crumble feed form had significantly (p<0.05) higher feed conversion ratio (1.77) and average daily feed intake (52.14g/b) than mash feed form. Mash feed form had significantly (p<0.05) higher total feed intake (2653.00g/b), average weekly feed intake (663.00g/b) and average daily feed intake (94.71g/b) than pellet feed form at finished stage. While pellet feed form had significantly (p<0.05) higher feed efficiency (0.59) than mash feed form. The results on carcass analysis shows that pellet feed form had a higher significant (p<0.05) difference in the thigh weight (227.75g) and the heart weight (12.75) than mash feed form. Pellet feed form had significantly (p<0.05) higher cost of feed (N700), feed consumed at starter (1,460.00g/b), cost of feed at finisher (N740), total weight (2.05kg/bird) and benefits (N1,618.30) than mash feed form. However, mash feed form had significantly (p<0.05) higher total feed intake (4.05kg/bird), feed consumed at finisher stage (2,653.00kg/b), cost of feed consumed (N2,860.00/bird) and production cost (N4,206.00/bird) than pellet feed form. It can be concluded that physical form of feed can be considered as a factor of a significant impact on broiler growth performance, carcass yield and cost benefits from this study.

Keywords: Broilers, Liveweight, Mash feed, Pellets, Benefits

INTRODUCTION

In broiler production, feed costs account for approximately 70-75% of the total production costs (Ravindran, 2013). As a result, optimizing feed efficiency should be a top priority for poultry producers. However, despite the significant role that feed plays in broiler growth, there remains a lack of clarity regarding the most effective feed forms for maximizing its growth performance. In 2020, global chicken meat production reached approximately 100 million metric tons, making it the most consumed meat in the world (FAO, 2021). The broiler finisher phase, which typically represents the last 21 to 35 days of a broiler's life, is critical as it is during this period that chickens reach their final market weight. Feed form plays a vital role in determining growth performance during this phase. Several studies have explored the impact of different feed forms: mash, pellets, and crumble on broiler chickens, showing that feed form can influence feed intake, nutrient digestibility, growth rate, and feed conversion ratio (FCR) (Amerah *et al*., 2007). Mash feed which consists of grind ingredients mixed together without further processing, has traditionally been used due to its ease of preparation and low cost. However, mash feed is often associated with lower feed intake and poorer feed conversion ratios compared to pellet and crumble forms (Nir *et al*., 1995). On the other hand, pelleted feed, produced by compressing the feed ingredients into small, dense pellets, has been shown to improve feed efficiency by reducing feed wastage and enhancing nutrient availability (Abdollahi *et al*., 2013).

MATERIALS AND METHODS

The research was carried out at the Poultry Unit of the Teaching and Research Farm, Department of Agricultural Technology, Osun State College of Technology, Esa Oke, Osun State. One Hundred and Twenty (120) Day Old broiler chicks were obtained from a reputable hatchery in South West Nigeria and were raised under standard brooding conditions for seven (7) days. It was divided into two main treatment groups of (60) birds each on (crumble feed/pellet and mash/mash feed forms), each treatment consisting of four replicates. Each replicate housed fifteen (15) birds each on weight equalization. Feed and water were supplied *adlibitum* throughout the experimental period between July and September, 2024. At the end of 8th week, two birds per replicate were slaughtered, plucked and eviscerated for carcass analysis. All cost of inputs and price of live weight of the birds

were subjected to the prevailing market price at the time of the experiment. All data collected were statistically analysed with a general linear model of SAS (2013) and the Duncan multiple range tests were used to detect significant differences among treatment means.

RESULT AND DISCUSSION

The results on the growth performance parameters of broiler chicken at starter phase Table 1, is in collaboration with the findings of Yagoub and Salih (2008) who reported that birds that ate more have better weight gain.

Effects of feed forms on the growth performance characteristics of broiler chicken at starter phase (1 – 4 Weeks of age).

Table 1: Starter Phase Week 1-4 (Mean ± SEM)

Parameter (g/b)	Crumbles	Mash	Probability
Initial weight	308.25 ± 4.97	317.75 ± 3.20	0.02
Final Weight	1133.25 ± 2.66^{b}	1225.00 ± 16.02^{a}	0.001
Weight gain	825.00 ± 4.24^{b}	897.25 ± 13.39^{a}	0.002
Total feed intake	1460.00 ± 0.00^{a}	1397.00 ± 0.00^{b}	0.0001
Average weekly feed intake	365.00 ± 0.00^{a}	349.00 ± 0.00^{b}	0.0001
Average daily feed intake	52.14 ± 0.00^{a}	49.86 ± 0.00^{b}	0.0001
Feed conversion ratio	1.77 ± 0.01^{a}	1.53 ± 0.04^{b}	0.002
Feed efficiency	0.57± 0.003^{b}	0.64 ± 0.01^{a}	0.0003
Mortality rate	0.00	0.00	-

$^{a, b,}$: Mean within each row with different superscript are significantly different ($p<0.05$)

SEM (±) - Standard error mean.

Table 2. Effects of different feed forms on growth performance of broiler chicken at finisher stage (5- 8 Weeks of age).

Parameter	Pellets	Mash	Probability
Initial weight	1133.25 ± 2.66^{b}	1225.00 ± 16.02^{a}	0.001
Final Weight	2075.00 ± 17.68	1918.80 ± 125.57	0.26
Weight gain	941.80 ± 15.37	693.80 ± 132.66	0.11
Total feed intake	1623.00 ± 0.00^{b}	2653.00 ± 0.00^{a}	0.0001
Average weekly feed intake	406.00 ± 0.00^{b}	663.00 ± 0.00^{a}	0.0001
Average daily feed intake	58.00 ± 0.00^{b}	94.71 ± 0.00^{a}	0.0001
Feed conversion ratio	1.73 ± 0.03^{b}	4.23 ± 0.71^{a}	0.01
Feed efficiency	0.59± 0.01^{a}	0.26 ± 0.05^{b}	0.001
Mortality rate	0.00 ± 0.00	3.00 ± 1.73	0.13

$^{a, b,}$: Mean within each row with different superscript are significantly different ($p<0.05$)

SEM (±) - Standard error mean

Mash feed form had significantly ($p<0.05$) higher final weight (1225.00kg/bird), weight gain (897.25g/bird), and feed efficiency (0.64) than crumble feed form. The forms and characteristics of feed ingredients are related to feed intake, weight gain and efficiency of feed use. The higher the level of feed intake, indicating the higher the level of feed palatability. Feed Conversion Ratio (FCR) is the ratio of feed intake to be formed into live weight and a benchmark for the productivity of feed costs given as reported by Abd Aziz *et al*., (2021). At finisher phase (Table 2), the mash feed form had significantly ($p<0.05$) higher total feed intake (2653.00kg/bird), average weekly feed intake (663.00g/bird) and average daily feed intake (94.71g/bird) pellet feed form; while the pellet feed form had significantly ($p<0.05$) higher feed efficiency than the mash feed form. This finding is in line with that of Moran (1990) and Reece *et al*. (1986), who reported that pelleted feed had a better efficiency of feed utilization/conversion than the mash feed. However, Lieder and Rose (1992) concluded that the pelleted feed increased the extent of conversion with 5.9%. Table 3 shows that the pellet feed form had a higher significant ($p<0.05$) difference in the thigh weight (227.75g) and the heart than the mash feed form. However, there was no significant ($p>0.05$) difference in all other parameters across the two treatments group. The non-significant effects in the live weight and cut up parts as shown in the carcass analysis supported the reports of Fanatico *et al*. (2005) that showed no significant differences in the final weight of indoor raised birds. The live weight obtain for broilers on pellet feed form at finisher stage is in line with the findings of (Smith, 1990; Tallentire *et al*., 2016) who reported that the growth rate of commercial broiler chickens is fast and they are able to reach market weight of two kilogram and above at about seven weeks of age or less.

Table 3: Effects of different feed forms on carcass yield of broiler chicken

Parameter	Pellets	Mash	Probability
Live weight (kg)	2.03 ± 0.03	1.85 ± 0.19	0.38
Slaughter weight (kg)	1.91 ± 0.01	1.73 ± 0.19	0.38
Eviscerated weight (kg)	1.73 ± 0.03	1.58 ± 0.18	0.44
Carcass weight (kg)	1.39 ± 0.04	1.21 ± 0.13	0.24
Cut-up parts			
Head (g)	45.50 ± 2.60	45.50 ± 3.93	1.00
Shank (g)	92.75± 5.68	75.00 ± 5.87	0.07
Breast (g)	437.50 ± 24.63	367.75 ± 36.53	0.17
Thigh (g)	227.75± 5.62[a]	181.75 ± 17.29[b]	0.04
Wings (g)	156.25 ± 14.15	138.75 ± 14.28	0.42
Drumstick (g)	197.00 ± 8.06	171.75 ± 18.50	0.26
Back (g)	267.50 ± 20.82	220.00 ± 22.10	0.17
Neck (g)	91.29 ± 2.69	73.00 ± 7.88	0.07
Organs			
Gizzard (g)	39.75 ± 1.97	39.50 ± 2.22	0.69
Heart (g)	12.75 ± 1.25[a]	8.00 ± 0.71 [b]	0.02
Liver (g)	38.00 ± 1.96	38.00 ± 4.69	1.00
Lungs (g)	7.25 ± 1.11	9.50 ± 0.50	0.11
Proventriculus (g)	12.00 ± 1.35	9.25 ± 1.03	0.16
Intestine (g)	95.50 ± 6.17	105.75 ± 14.89	0.55

[a, b,] : Mean within each row with different superscript are significantly different ($p<0.05$)

Table 4: Cost benefit analysis of broiler chicken reared on different feed forms.

Parameter	Pellets	Mash	Probability
Cost of Doc (₦)	600.00 ± 0.00	600.00 ± 0.00	-
Brooding cost (₦)	650.00 ± 0.00	650.00 ± 0.00	-
Total feed intake (kg)	3.83 ± 0.00[b]	4.05 ± 0.00[a]	0.0001
Cost of feed (₦) starter	700.00 ± 0.00[a]	680.00 ± 0.00[b]	0.0001
Feed consumed (starter)	1460.00 ± 0.00[a]	1397.00 ± 0.00[b]	0.0001
Cost of feed (₦) finisher	740.00 ± 0.00[a]	720.00 ± 0.00[b]	0.0001
Feed consumed (finisher)	1623.00 ± 0.00[b]	2653.00 ± 0.00[a]	0.0001
Medication cost (₦)	96.00± 0.00	96.00 ± 0.00	-
Cost of feed consumed	2223.00 ± 0.00[b]	2860.00 ± 0.00[a]	0.0001
Total weight (kg/b)	2.05 ± 0.00[a]	1.98 ± 0.00[b]	0.0001
Cost/kg live weight	2500.00 ± 0.00	2500.00 ± 0.00	-
Benefit	1618.30 ± 44.01[a]	590.00 ± 313.93[b]	0.02
Production cost (₦)	3569.00 ± 0.00[b]	4206.00 ± 0.00[a]	0.0001

[a, b,] : Mean within each row with different superscript are significantly different ($p<0.05$)

SEM (±) - Standard error mean.

CONCLUSION

From the results of the experiment, it could be concluded that feeding mash form at starter phase improved weight gain and final body weight of broiler chicken. The performance of broiler birds at finisher phase, showed no significant effects for weight gain and final body weight. Therefore, physical form of feed can be considered as a factor of a significant impact on broiler growth performance, production cost and better return was observed for pellet feed form.

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