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EFFECTS OF SKIP-A-DAY FEEDING PROGRAMME ON THE PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS IN A HUMID TROPICAL ENVIRONMENT

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ABSTRACT

The effect of Skip-a-day feeding programme for broilers chicken, as a form of feed restriction, was investigated. Two experiments were conducted from 3-6 weeks of age (Experiment 1) and 6-9 weeks of age (Experiment 2). There were 5 treatments with 2 replicates in each of the two experiments. In each experiment, treatment 1 was fed *ad libitum* and served as the control. Treatment 2 was fed every other day while in treatment 3 feed was skipped after every two days. In treatments 4 and 5 feed was skipped after every 3 and 4 days respectively.
Results showed that in both experiments, although efficiency of feed utilization were not significantly affected, live weight, weight gain and feed consumption were significantly affected ($p<0.05$). Dressing percentage, carcass parts and organ weights were not significantly affected ($P>0.05$) by the treatments.

Key words: Skip-a-day feeding, body weights, carcass parts, organ weights.

INTRODUCTION:

One of the most important considerations in raising broiler chickens is how to feed the birds economically to ensure maximum returns without jeopardizing performance. Feed accounts for over 60% of the cost in broiler production. Maximization of profit margin, therefore, can be achieved through the application of a well planned feeding programme that eliminates undue feed wastage and makes available to the birds only the quantity of feed required for maximum growth.

Over the years, producers have devised different feeding methods aimed at saving feed. These include meal feeding as against *ad libitum* feeding programme. There is also the quantitative feed restriction programme which involves feeding to the birds only a fraction of the quantity of a balanced feed the birds are capable of consuming under *ad libitum* management condition. Another is the qualitative feed restriction programme which involves lowering the protein content of the feed in order to reduce cost, since protein is the most expensive constituent in the compounded feed. There are other methods and modifications, all of which have the common aim of lowering cost in other to maximise the profit margin in the operation.

While the application of these restrictions or saving methods have been reported as favourable by some workers, others have reported on their adverse effects. These restriction methods have therefore engaged the attention of scientists and producers alike. Washburn (1990) reported that restricted broiler groups had their body weight reduced to 41% of the weight of their full fed counterparts at 4 weeks and 45% at 7 weeks of age respectively. Feed restricted birds have been reported to exhibit increase pecking behaviours (Hocking et al., 1993). Inspite of these obvious disadvantages, feed restriction still has its advocates. Robinson, et al., (1992) argued that feed restriction if applied for a short time, is a management tool for reducing the incidence of skeletal and metabolic disorders in broilers and roaster chickens. Plavnik and Bainave (1992) reported that they found no difference in 47 days body weight between *ad libitum* fed and restricted groups of broiler chickens.

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Further observations in favour of feed restriction are those of Pinchasov et al., (1985) and Fontana et al., (1992), who reported that after an initial adaptation period of two weeks, restricted groups of broiler chickens exhibited higher rates of gain than their unrestricted counterparts.

As broiler chickens grow, the amount of feed they consume increases proportionally, hence any possible manipulation to reduce the feed consumed, but maintain the expected growth rate, will increase the profit margin. Broiler chickens are usually fed *ad libitum* on a daily basis throughout the growing period. However, some producers have devised the feeding of the birds on alternate days as a means of saving feed. This is the so-called skip-a-day feeding programme. The present experiment involved the application of different modalities of skip-a-day feeding programme and was undertaken to explore the effects of such modalities of feeding on the performance and carcass characteristics of broiler chickens and to assesss the economic advantage, if any, of such a feeding programme.

METERIALS AND METHOD:

Two experiments were conducted in this study:

Experiment 1:

Three hundred (300) broiler chickens, already 3-weeks old were used in the experiment. The birds were weighed and randomly allotted to five treatments using sixty (60) birds per treatment, with each treatment having 2 replicates i.e. thirty birds (30) per replicate, in a Completely Randomised Experimental Design. The average initial weights of the birds in the groups were 329.20g, 337.35g, 325.24, 331.6g and 327.65g for treatments 1,2,3,4 and 5 respectively. Treatment 1 served as the control, and the birds were fed *ad libitum* daily for the period of the experiment. The birds in treatment 2 were fed every other day. In treatment 3, feed was skipped after every 2 days of feeding, while in treatments 4 and 5, feed was skipped after every 3 and 4 days of feeding respectively. The birds were weighed on weekly basis throughout the period of the experiment, which lasted for 3 weeks in order to determine live weight, weight gain, feed consumption and efficiency of feed utilization for the different treatment groups. A commercially formulated broiler starter mash was used. Records of mortality in the different groups were accurately kept. New2 Castle and Gumboro vaccines were applied appropriately to protect the birds against these diseases.

Experiment 2:

A total of two hundred and seventy (270) broiler chickens, six weeks old were used in the experiment. The birds had been reared conventionally on a commercial starter ration for 5 weeks during which they were given Newcastle and Gumboro vaccines to protect them against these diseases. The birds were weighed into similar groups and allotted randomly to 5 treatments of 2 replicates each, such that each treatment had 54 birds with 27 birds per replicate. The Completely Randomized Experimental Design was used. The average initial weights of the birds at commencement of the experiment were 876.5g, 888.93g, 887.97g, 874.11g and 888.26g for treatments 1,2,3,4 and 5 respectively. The same modalities of skipping feed as described in experiment 1 were used in this experiment. The feed used consisted of a commercially formulated broiler finisher mash. Birds and quantity of feed offered were weighed on weekly basis, to determine weight gain, feed consumption and efficiency of feed utilization. At the end of the experiment two birds from each replicate were randomly removed and fasted for 18 hours before being slaughted for carcass evaluation. The birds were weighed prior to killing, which was done by cervical dislocation as described by (Bremner 1977). The birds were immersed in hot water to loosen the feathers. After plucking, the carcasses were weighed, dressed and cut up for weighing to determine the effect of the treatments on the body parts.

All data collected in both experiments were subjected to analysis of variance procedure of Snedecor (1976) while the differences between treatment means were examined using Duncan's Multiple Range Test (Steel and Torrie (1980) at 5% level of probability.

RESULTS AND DISCUSSION

Experiment 1

The growth performance of the birds in this experiment is shown in Table 1. It was observed that the birds in treatments 2 and 5 had live weights of 594.03g and 758.62g

TABLE 1: EFFECTS OF SKIP-A-DAY FEEDING ON PERFORMANCE OF BROILER CHICKENS AT 6 WEEKS OF AGE (Experiment 1)

PERFORMANCE CHARACTERISTICS	TREATMENTS 1	2	3	4	5
Initial Live weight (g)	329.20	337.35	325.24	331.65	327.65
Final Live weight (g)	1034.73 ± 111.61[a]	594.03 ± 17.36[b]	873.53 ± 97.73[ab]	824.05 ± 101.77[ac]	758.62 ± 110.42[bc]
Live weight gain (g)	705.53 ±14.34[a]	256.68 ± 17.79[c]	548.29 ±1.91[ab]	492.40 ± 12.96[b]	430.94 ± 13.52[bc]
Cumulative feed intake (g)	1235.23 ± 17.83[a]	609.91 ± 20.62[c]	1051.76 ± 16.15[ab]	1030.53 ± 0.01[ab]	1004.47 ± 9.49[b]
Feed conversion ratio	1.75	2.38	1.92	2.09	2.33

Means in the same row bearing different superscripts are significantly different (P<0.05)

TABLE 2: TOTAL NUMBER OF DAYS OF FEED WITHDRAWAL

TREATMENTS	TOTAL DAYS SKIPPED
1. (Fed everyday)	0
2. (Fed every other day)	10
3. (Skip-a-day after every 2 days)	7
4. (Skip-a-day after every 3 days)	5
5. (Skip-a-day after every 4 days)	4

TABLE 3: EFFECTS OF SKIP-A-DAY FEEDING ON PERFORMANCE OF BROILER CHICKENS AT 9 WEEKS OF AGE (Experiment 2).

PERFORMANCE CHARACTERISTICS	TREATMENTS 1	2	3	4	5
Initial weight (g)	876.50	888.93	887.97	874.11	888.26
Final weight (g)	1444.16 ± 352.80[a]	1194.26 ± 300.24[b]	1342.26+ 300.24[ab]	1134.54 ± 270.54[b]	1329.82 ± 204.39[ab]
Live weight gain (g)	567.69 ±7.46[a]	305.33 ± 23.44[c]	454.29 ±26.52[ab]	260.43 ± 3.73[c]	441.56 ± 5.72[ab]
Cumulative feed intake (g)	1790.89 ± 47.36[a]	1236.73 ± 28.04[c]	1619.18 ± 90.41[ab]	1235.25 ± 54.08[c]	1567.45 ± 56.80[b]
Feed conversion ratio	2.90	4.22	3.56	4.52	3.73

Means in the same row bearing different superscripts are significantly different (P<0.05)

respectively which were significantly poorer and different (P <0.05) from treatment 1 (control) with 1034.73g. Although birds in treatments 1 (control) weighed 1034.73g, they were not significantly different (P> 0.05) from Treatments 3 and 4 weighing 873.53g and 824.05g respectively. Treatments 3 and 4 did not differ statistically. The lowest weight was recorded in treatment 2 although this did not significantly differ (P> 0.05) from treatment 5, which weighed 758.62g.

The lowest cummulate feed intake of 609.91g was recorded in treatment 2, while the highest value(1235.23g) was recorded in treatment 1 The cumulative feed intake of 609.91g for treatment 2 was significantly different from those of treatment 1 (1235.23g), treatment 3 (1051.76g) treatments 4 (1030.53g) and treatment 5 (1004.47g) (P<0.05). This may be due to the high intensity of skipping feed for birds in treatment 2, occasioned by the overall loss of feeding days thus making less feed available to the birds in this group.

Feed intake of treatments 3, 4 and 5 did not differ significantly. Treatment 5 was however significantly different (P<0.05) from

the control (treatment 1). Despite more total loss of feeding days and the frequency of skipping, feed intake was still higher for treatment 3 than for treatments 4 and 5. In the experiment treatment 3 birds were expose to more bouts of starvation than birds in treatment 4 and 5, which therefore left treatment 3 birds with less residual body energy than in treatments 4 and 5. Birds generally eat to satisfy their body energy requirements. This may have accounted for higher feed intake of birds in treatment 3 and 4 compared to the much lower intake of treatment 5, which appeared to be in an effort by treatments 3 and 4 birds to satisfy their body energy needs.

The feed conversion ratio in all the treatments were not significantly different ($P > 0.05$). However, there were slight numerical variations. In order words efficiency of feed utilization was almost similar although treatment 1 appeared to be numerically the best among the groups. The mean weight gain of birds in treatments 1 (control) 705.53g was significantly higher ($P<0.05$) than the weight gain of birds in treatments 2, 4 and 5 which were 256.68g, 492.40g and 430.97g respectively. The mean weight gain of the control group though numerically higher was not significantly different ($P> 0.05$) from treatments 3 (548.29g). Similarly, treatments 3,4, and 5 were not significantly different ($P > 0.05$).

The total number of days feed was skipped from each group is presented in table 2. The intensity of skipping feed was 4 days in treatment 5 and 10 days in Treatment 2, with treatments 4 and 3 losing 5 and 7 days respectively, which made Treatment 2 the most severely deprived of feed in the experiment.

In the study mean body weight was one of the parameters used to evaluate the effect the number of days feed was skipped had on the broiler chickens. Body weight was significantly affected by the treatments. The body weight of birds in treatment 2 (skipping feed for 10 days) was the lowest. This agrees with the findings of Benibo and Farr (1985) that live weight shrinkage increased with increasing length of feed withdrawal. The highest body weight recorded for the control (*ad libitum* fed groups) agreed with the observation of Leeson and Zubair (1997) and Yu et al., (1990) who reported that full fed chickens gained more weight than birds in the restricted groups. However, the non-significant statistical difference observed

TABLE 4: EFFECT OF SKIP-A-DAY FEEDING ON THE CARCASS CHARACTERISTICS OF BROILER CHICKENS AT 9 WEEKS OF AGE

Treatments	Dressing %	Breast Weight (g)	Wing Weight (g)	Thigh/Drumstick Weight (g)	Neck Weight (g)
1. (Control)	56.73 ± 5.75	197.58 ± 20.75	58.85 ± 7.33	126.63 ± 8.42	39.57 ± 4.10
2. (Skip feed every other day)	54.89 ± 2.68	172.25 ± 19.73	52.52 ± 5.24	111.12 ± 8.44	35.84 ± 2.87
3. (Skip-a-day after every 2 days)	56.90 ± 2.37	225.16± 16.13	57.15 ± 6.86	140.94 ± 17.48	40.09 ± 4.20
4. (Skip-a-day after every 3 days)	59.06 ± 4.81	215.34 ± 40.77	63.10 ± 14.58	124.69 ± 17.41	35.56 ± 3.60
5. (Skip-a-day after every 4 days)	57.09 ± 2.82	214.64 ± 36.46	59.37 ± 5.00	141.22 ± 14.22	38.28 ± 3.48

TABLE 5: EFFECT OF SKIP-A-DAY FEEDING ON THE CARCASS CHARACTERISTICS OF BROILER CHICKENS AT 9 WEEKS OF AGE

	ORGANS (g/100g BODY WEIGHT)			
TREATMENTS	LIVER/BILE	GIZZARD	HEART	SPLEEN
1. (Control)	3.37	2.39	0.53	0.17
2. (Skip feed every other day)	3.30	2.19	0.43	0.11
3. (Skip-a-day after every 2 days)	3.14	2.47	0.51	0.14
4. (Skip-a-day after every 3 days)	3.17	2.29	0.50	0.22
5. (Skip-a-day after every 4 days)	3.61	2.41	0.47	0.34

between some of the treatments (treatment 3 and 4) and the control may be due to the mild nature of skipping feed in those groups.

The body weight gains in Experiment 1 were significantly affected by the treatments. Broilers in treatment 2 had the lowest body weight gain. However, the body weight gain for treatment 3 (548.29g) did not significantly differ from that of the control (705.53g). Also the weight gain of treatments 3, 4 and 5 were not significantly different. This may be due to the fact that the intensities of skipping feed in these treatments were milder than in treatment 2. This result is in agreement with the findings of Robinson et al., (1993), Sizemore and Barbato (1992), Yu et al., (1990), Summers et al., (1990), Leeson et al., (1996) and Scheideler and Baughman (1993) all of whom reported poor weight gain of feed restricted birds as compared with the *ad libitum* fed counterparts. For instance Yu et al (1990),reported that the full fed birds weighed 270g more than their restricted counterparts.

Experiment 2:

The performance of the birds in this experiment is presented in Table 3. The control treatment had the highest live weight (1444.16g) while treatment 4 (skipping feed after every 3 days of feeding) recorded the lowest live weight (1134.54g). However, treatments 1, 3 and 5 were similar and significantly different ($P<0.05$) from treatments 2 and 4 which were also similar. The similarity of Treatment 4 with Treatment 2 in the body weight was unexpected. Infact, Treatment 4 should have performed better than Treatment 2, which was subjected to more days of skipping feed (5 for Treatment 4 as against 10 for Treatment 2).

There were no significant differences among the respective feed conversion ratios. Efficiency of feed utilization was generally poor in all the groups. The mean weight gains for treatments 1 (567.69g), 3 (454.29g) and 5 (441.56g) were not statistically different ($P > 0.05$) although treatment 1 had a higher numerical value.

These Treatments (1, 3 and 5) were significantly different from Treatment 2 (305.33g) and treatment 4 (260.43g). The low performance of birds in Treatment 2 in this respect, is not, unrelated to the greater intensity of skipping feed in that treatment while the much lower weigh gain of treatment 4 might have been cost by possible presence of a sub clinical infection which coincides with similar observation in respect of body weight. If there was such an occurrence he did not become obvious.

Data on carcass characteristics are presented in Tables 5 and 6. The dressing percentage, breast, wing, thigh/drumstick and neck weights, as well as organ weights (expressed in g/100g body weight), were not significantly affected by the different feeding regimens ($P > 0.05$).

As in experiment 1, the intensity of skipping feed, which was 4 days in Treatment 5, 10 days in treatment 2, with treatments 4 and 3 losing 5 and 7 days respectively, made treatment 2 the most severely deprived of feed followed by treatments 3, 4 and 5 in that order. This severity of skipping feed in Treatment 2 may account for the poor performance observed in this group in all the parameters examined, with the exception of liver weight.

From the study, the modalities of skipping feed had significant effect on the body weight. This was most severe in Treatment 2 in both experiments, with 10 days loss of feeding days, which represented the most drastic of all the treatments. The lowest body weight of treatment 4 (experiment 2), although not significantly different from treatment 2, in the same experiment. This could be due to a sub-clinical infection, which did not become obvious. Infact, going by the loss of feeding days, Treatment 4 should have performed better. The reduced body weights in all the skip-a-day treatment groups, generally, vis-a-vis the control groups, agrees with the findings of Leeson and Zubair (1997), Yu et al (1990) who reported more weight gain in full fed birds than the restricted groups. The non-significant differences observed between the weight again of the *ad libitum* fed control and themilderforms of skipping feed (treatments 3 and 5), are similar to the observations of Plavnik and Balnave (1992) and Azahan (1984), who found no significant differences between *ad lititum* fed broilers and their restricted counterparts.

Conclusion

The conclusion from this study is that the modalities of skip-a-day feeding programme

applied in these experiments affected the body weight performance of the broiler chickens during both phases of growth (namely, the starter and finisher periods) and was more severe where there was the greatest loss of feeding days. This was manifested in the two experiments where the 10 days loss of feeding days had the most depressing effect on body weight. In the finisher phase, however, the mild form of the treatment, skipping feed after every 4 days, enabled the birds to attain market weight comparable with the control group in the experiment, with savings in feed concomitant with the number of days lost in feeding. The other levels, such as skipping feed after every 2 and 3 days, which also produced birds similar to those where feed was skipped after every 4 days, may also be applied to take advantage of the prevalent market practice whereby live broiler chickens are marketed not by weight, but by visual appraisal where the differences of a few grams in weight between birds are not considered in determining the price demanded by the producer. With this in mind, these modalities of restricting feed would result in reduced feed cost with beneficial result to the producer in greater profit margin.

REFERENCES

Azahan, E. 1984. Response of broilers to a restriction in feeding time. MARDI Research Bulletin. 12: 361 – 365.

Benibo, B. S. and Farr, A. J. 1985. The effects of feeds and water withdrawal and holding shed treatments or broiler yield parameters. Poultry Sci. 64: 920 – 924.

Bremner, A. S. 1977. Poultry meat Hygiene and inspection Bailliere Tindall, London. P. 50.

Fontana, E. A., Weaver, W. D. Jr. Watkins, B. A. and Denbow, D. M. 1992. Effect of early feed restriction on growth, feed Conversion and mortality in broiler chickens. Poultry Sci. 71: 1296 – 1305.

Hocking, P. M., Maxwell, M. H. and Mitchell, M. A. 1993. Welfare assessment of broiler breeder and layer females subjected to food restriction and limited access to water during rearing. Brit. Poult. Sci. 34: 443 – 458.

Leeson, S., Caston, L. and Summers, J. D. 1996. Broiler response to diet energy. Poultry Sci. 75: 529 – 535.

Leeson, S. and Zubair, A. K. 1997. Nutrition of the Broiler chicken around the period of compensatory growth. Poultry Sci. 76: 992 – 999.

Plavnik, I. And Balnave, D. 1992. Responses of different strains of Australian broiler chickens to feed restriction at an early age. Aust. J. Agri. Res. 43: 1253 – 1258.

Pinchasov, Y., Nir., I. And Nitsan, Z. 1985. Metabolic and anatomical adaptations of heavy bodied chicks to intermittent feeding I. Food intake, growth rate, organ weight and body composition. Poultry Sci. 64: 2098 – 2109.

Robinson, F. E., Classen, H. L., Hanson, J. A. and Onderka, D. K. 1992. Growth performance, feed efficiency and the incidence of skeletal and metabolic disease in full-fed and feed restricted broiler and roaster chickens. J. Appl. Poultry Res. 1:33 – 41.

Robinson, F. E. Lupicki, M. E. and Hardin, R. T. 1993. Short-term consequences of sudden increase in feed allowance in broiler breeder hens. Can. J. Anim. Sci. 73: 159 – 167.

Scheideler, S. E. and Baughman, G. R. 1993. Computeristed early feed restriction programmes for various strains of broilers. Poultry Sci. 72: 236 – 242.

Sizemore, F. G. and Barbato, G. F. 1992. Effects of feed restriction at different ages in chickens selected for high 14 or 42 days exponential growth rate. Poutlry Sci. 71 (suppl. 1): 90 (abstr.).

Snedecor, G. W. 1970. Statistical methods. 6th Edition state University Press. Ames. Iowa, p. 24.

Steel, R. G. and Torrie, J. H. 1980. Principles and procedures of statistics. A biometrical approach. 2nd Edition, McGraw-Hill, Kagakusha limited, Tokyo, p. 688.

Summers, J. D., Spratt, D. and Atkinson, J. L. 1990. Restricted feeding and compensatory growth of broilers. Poultry Sci. 69: 1855 – 1861.

Washburn, K. W. 1990. Effects of restricted feeding on fatness, efficiency, and the relationship between fatness and efficiency in broilers. Poultry Sci. 69: 502 - 508.

Yu, M. W. Robinson, F. E., Clandinin, M. T. and Bodnar, L. 1990. Growth and body composition of broiler chickens in response to different regimen of feed restriction. Poultry Sci. 69: 2074 – 2081.