APRW -71

Response of Domestic Chickens to Fasting and Non-Fast Moulting Programs in a Humid Tropical Environment

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Abstract

This paper reports the effect of fasting and non-fast moulting methods on the performance of indigenous and Shaver brown (SB) hens in the hot humid tropical environment of Nsukka, Southeastern Nigeria. One hundred and twenty indigenous and Shaver brown hens (60/genotype) aged between 75 and 80 weeks were shared into three groups (20/group), T_1: hens fed layers diet at 125 g/bird/day (control group), T_2: layers mash supplemented with 20,000ppm Zn as ZnO at 125 g/bird/day for 14 days, and T_3: feed deprivation for 14 days. Water was given *ad libitum* to all birds. Data analyzed were pre-moult and moulting body weight, hen-day egg production (HDEP), and egg weight. Moulting method significantly ($p<0.05$) affected body weight in SB, as well as HDEP in both genotypes with fasting resulting in a greater loss in body weight and early cessation of egg production compared to zinc supplementation. It was concluded that zinc supplementation at 20,000ppm in the diet of laying chickens was as effective as fasting for moulting of aged exotic and indigenous layer chickens.

Keyword: Induced moulting, egg production, shaver brown, local chickens

Introduction

Egg production in laying flocks decreases with age of hen. The ageing process and cessation of egg production initiate natural moulting which occurs annually and lasts for about four months. Some commercial egg producers employ induced moulting to circumvent natural moulting and to induce spent hens to rapidly enter a second laying cycle thereby enhancing the laying flock performance (Aygun and Olgun, 2010). Programs employed to moult hens include feed deprivation, photoperiod reduction, mineral (Ca, Cu, Zn, Al, etc.) supplementation and the use of low energy diets. Feed deprivation was the primary method of induced moulting in hens (Aygun and Olgun, 2010). Other moulting techniques have been developed in response to welfare concerns associated with fast moulting of birds (Yousaf and Ahmed, 2006). Moulting causes cessation of egg production, shading of body fat, renewal of the reproductive organs and improves post moult performance relative to the immediate pre-moult period (Webster, 2003). Moulting by Zn supplementation seems attractive because zinc is an important micro mineral, and possesses immune-potentiating and antioxidant effects (Ogbu *et al.,* 2016).Induced moulting of aged hens reduces the frequency of restocking, minimizes the costs and losses associated with brooding of chicks (Moustafa *et al.,* 2010). There is however, limited information on moulting methods and the practice is rare in indigenous hens.

This aims to evaluate the performances of indigenous and Shaver brown layers subjected to fast and non-fast moulting methods.

Materials and Methods

One hundred and twenty local and Shaver brown hens (60/genotype) aged 75 – 80 weeks were used for the study. The birds were shared into three treatment groups (T) namely: birds fed layers diet at 125 g/bird/day or control group (T_1), birds fed layers mash supplemented with 20,000 ppm zinc as ZnO (El-Deek and Al-Harthi, 2004) for 14 days at 125 g/bird/day (T_2), and birds subjected to feed deprivation for 14 days (T_3). Water was provided *ad libitum* to birds belonging to each treatment. The experimental groups were evaluated for body weight, egg production, and egg weight before induction of moulting (pre-moult), and during moulting treatment. Data collected were subjected to analysis of variance in completely randomized design to compare between treatment groups.

Results and Discussion

Highest hen-day egg production (HDEP) was 75% in SB hens before moulting and at day 3 and 4, respectively in the one week pre-moult evaluation (Figure 1, panel A), however, HDEP ranged between 45 to 75% within this period in SB hens subjected to ZnO treatment but 52 to 60 % in those of FD.

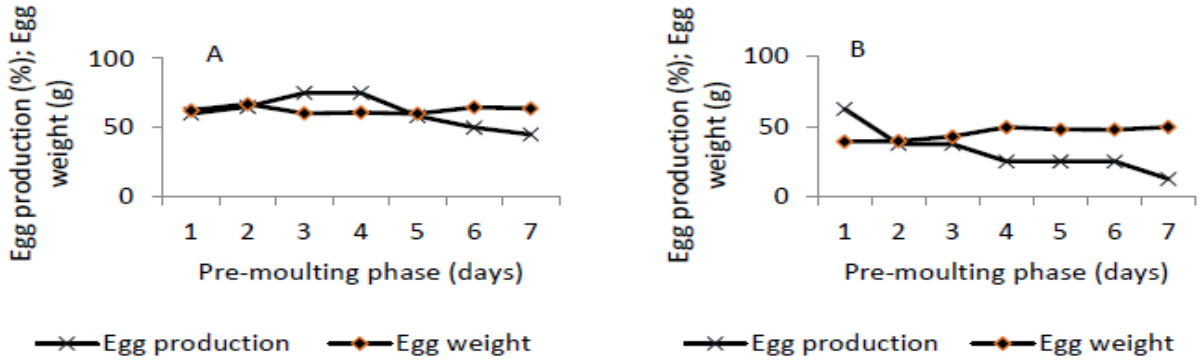


Fig. 1: Egg production and egg weight of Shaver brown (panel A) and indigenous hens (panel B) before moulting.

For the IH (panel B), HDEP in the week before moulting ranged between 12.5 and 62.5% for ZnO group and 40 and 80% for those of FD. HDEP decreased gradually in SB but rapidly in IH. Egg weight did not fluctuate as much as egg production and showed some increase as egg production decreased. Body weight ranged between 1.50 and 1.95 kg and 1.45 and 1.90 kg in SB of ZnO and FD groups, respectively. The values for IH were 1.00 and 1.80 kg and 1.25 and 1.60 kg, respectively. The fluctuating and declining HDEP in the two genotypes indicate the need for replacement stock or induction of moulting of the hens (Moustafa *et al.,* 2010).

SB hens supplemented with ZnO lost 15.6% of their body weight by wk 2, while those subjected to FD lost 27 % (Table 1). HDEP decreased significantly ($p<0.05$) by week 2 of moulting in SB hens subjected to ZnO treatment. In the FD group, HDEP decreased to 0.00% in wk 2, while egg weight was not significantly affected. SB hens in the control group showed a significant increase in body weight at the end of the treatment. IH fed ZnO lost 16.2% of their initial body weight at the end of moulting, while those subjected to FD lost 32.6 % (Table 2). HDEP decreased less by week 2 of moulting in the ZnO group than in those subjected to FD, while egg weight was not significantly affected. The results agree with values reported by El-Deek and Al-Harthi (2004) and Sohail *et al.* (2011). The higher body weight loss by IH could be due to their lower content of adipose tissue. SB hens subjected to FD had significantly ($p<0.05$) lower body weight at the end of moulting compared to those moulted by ZnO, while the control group had the highest body weight (Table 3).

Table 1: Body weight, egg production and egg weight of Shaver brown hens during moulting

Shaver brown	Body weight (g)	Egg production (%)	Egg weight (g)
ZnO supplementation			
Initial (before moulting)	1.67 ± 0.05^{a}	61.19 ± 6.16^{a}	62.70 ± 1.05
WK_1	1.43 ± 0.05^{b}	30.73 ± 6.46^{b}	63.91 ± 1.05
WK_2	1.41 ± 0.06^{b}	8.32 ± 7.65^{c}	62.40 ± 1.25
Feed deprivation (FD)			
Initial	1.62 ± 0.07^{a}	58.14 ± 6.52^{a}	62.49 ± 0.69
WK_1	1.29 ± 0.07^{b}	28.57 ± 6.52^{b}	63.89 ± 0.69
WK_2	1.18 ± 0.07^{b}	0.00 ± 0.00^{c}	-
Control			
Initial	1.63 ± 0.04^{b}	60.00 ± 6.97	58.80 ± 1.38
WK_1	1.67 ± 0.04^{ab}	62.14 ± 6.97	60.70 ± 1.38
WK_2	1.76 ± 0.04^{a}	59.29 ± 6.97	60.04 ± 1.38

WK: week; a-c: means in the same column with different superscripts are significantly different ($p<0.05$)

Table 2: Body weight, egg production and egg weight of indigenous hens during moulting

	Body weight (g)	Egg production (%)	Egg weight (g)
ZnO supplementation			
Initial	1.36 ± 0.10	32.14 ± 6.25^{a}	45.19 ± 2.02
WK_1	1.27 ± 0.10	37.50 ± 6.25^{a}	43.36 ± 2.02
WK_2	1.14 ± 0.11	12.50 ± 6.25^{b}	40.77 ± 2.18
Feed deprivation			
Initial	1.38 ± 0.10	60.00 ± 5.39^{a}	41.52 ± 0.67
WK_1	1.05 ± 0.10	40.00 ± 6.03^{b}	42.10 ± 0.75
WK_2	0.93 ± 0.09	0.00 ± 0.00^{c}	-
Control			
Initial	1.08 ± 0.08	35.71 ± 5.71	43.70 ± 1.70
WK_1	0.97 ± 0.08	25.71 ± 5.71	39.34 ± 1.70

Table 3: Body weight, egg production and egg weight of Shaver brown hens subjected to different moulting methods

Shaver brown	ZnO	FD	Control
Body weight (kg)			
Initial	1.67 ± 0.06	1.61 ± 0.05	1.63 ± 0.05
WK_1	1.43 ± 0.07^{b}	1.29 ± 0.06^{b}	1.67 ± 0.06^{a}
WK_2	1.41 ± 0.06^{b}	1.18 ± 0.05^{c}	1.76 ± 0.05^{a}
Egg production (%)			
Initial	66.67 ± 5.91	58.14 ± 5.00	60.00 ± 5.00
WK_1	41.36 ± 9.66^{ab}	28.57 ± 8.16^{b}	62.14 ± 8.16^{a}
WK_2	8.32 ± 6.47^{b}	0.00 ± 0.00^{c}	59.29 ± 5.47^{a}
Egg weight (g)			
Initial	62.60 ± 0.47^{a}	62.49 ± 0.40^{a}	59.80 ± 0.40^{b}
WK_1	62.58 ± 1.70	63.89 ± 1.44	60.70 ± 1.44
WK_2	62.40 ± 1.34	-	60.04 ± 1.13

abc: means on the same row with different superscripts are significantly different ($p<0.05$).

No significant differences in body weight were observed between indigenous hens moulted by different methods and between moulted and unmoulted hens (Table 4). However, HDEP differed significantly ($p<0.05$) between the different moulting methods and between moulted and unmoulted groups of each genotype. Egg weight was similar across treatment groups. Similar results have been reported by Aygun and Olgun (2010) and Santos *et al.* (2014).

Table 4: Body weight, egg production and egg weight of indigenous hens subjected to different moulting methods

	ZnO	FD	Control
Body weight (kg)			
Initial	1.36 ± 0.15	1.38 ± 0.10	1.21 ± 0.13
WK_1	1.27 ± 0.15	1.05 ± 0.10	1.08 ± 0.13
WK_2	1.14 ± 0.14	0.93 ± 0.09	1.07 ± 0.11
Egg production (%)			
Initial	32.14 ± 6.58^{b}	54.29 ± 6.58^{a}	35.71 ± 6.58^{ab}
WK_1	37.50 ± 7.46	22.86 ± 7.46	25.71 ± 7.46
WK_2	10.71 ± 3.25^{b}	0.00 ± 0.00^{c}	35.71 ± 3.25^{a}
Egg weight (g)			
Initial	45.19 ± 1.73	41.60 ± 1.73	43.70 ± 1.73
WK_1	43.36 ± 1.67	42.10 ± 2.21	39.34 ± 1.67
WK_2	40.77 ± 1.83	-	39.34 ± 1.69

abc: means on the same row with different superscripts are significantly different ($p<0.05$).

Conclusion

Zinc supplementation at 20,000 ppm in the diet of laying chickens as a moulting agent is a milder but equally effective moulting method as fasting and is recommended for intensive commercial and rural indigenous poultry production.

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