

Effect of Egg Weight on Chick Hatch-Weight and Productivity of Indigenous Naked Neck Chickens Raised under Intensive Management System.

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Abstract

This study was conducted to determine the effect of egg weight on chick hatch-weight and productivity of indigenous Naked neck chickens. A total of 300 Naked neck chicks hatched from three egg weight categories (Large: > 55 g, medium: 45 – 55 g and small: < 45 g) were assigned into three treatments in a complete randomized design. The chickens were fed on isocaloric and isonitrogenous diets. Hatch-weight, live weight, weight gain, feed intake, feed conversion ratio and mortality were influenced ($p < 0.05$) by the egg weight at both the initial and final growth stages with the chicks from large sized-eggs having a better value except from the mortality in which the chicks from the medium sized-eggs having lower mortalities (3.43 % and 0.49 %). All carcass characteristics measured were influenced ($p < 0.05$) by the weight of hatched eggs. The chickens from large sized-eggs had higher values except in the thighs and drum sticks in which the medium had a higher value (193.48 g and 142.24 g, respectively). This result suggests that the use of large sized-eggs appears to be more desirable for indigenous Naked neck chicken production.

Key words: Naked neck, hatch-weight, Productivity, carcass characteristic

Introduction

Indigenous chickens are nutritionally, economically and culturally important to rural households of Sub-Saharan Africa [1]. However, these chickens produce few and small eggs. These eggs have low hatchability and hatched chicks have low growth and high mortality rates [2]. There is evidence that the quality of hatching egg has an imperative effect on chick hatch weight, growth and carcass characteristics of broiler breeder [3,4], Hampshire, Rhode island chicks [5] and quail [6]. The sizes of eggs have been reported to have effect on the embryonic development and hatchability of indigenous Venda chickens, rock partridge and ostrich, respectively [7, 8]. The literature on the effect of egg weight on chick hatch weight, chick development and carcass characteristics in indigenous chickens is limited and not conclusive. Therefore, the objective of this study was to determine the effect of egg weight on chick hatch-weight and productivity of indigenous Naked neck chickens raised under intensive management system.

Materials and Methods

This research was conducted at the experimental farm of the University of Limpopo, South Africa. A total of 300 indigenous Naked neck chicks hatched from three egg weight categories (Large, medium and small) were distributed into three treatments (based on egg weight), each treatment was replicated five times in a complete randomized design. Each replicate had 20 chicks. Thus 15 floor spaces were used. The egg weighing >55g were categorized as large, those between 45 – 55g as medium and those < 45g as small. A 0.01g sensitivity level electronic scale (RADWAG) was used to weigh the eggs.

The experimental diet for chicks from one to seven week of age contains 13.10 % protein and 11.97 MJ energy while from eight to thirteen weeks they were given 12.23 % protein and 12.23 MJ energy. The birds were offered feed and water *ad libitum*. The daily lighting program was 24 hours.

The live weights of birds were taken at hatching and recorded as hatch-weight. The live weight, growth rate, feed conversion

ratio, mortality and carcass characteristics were measured according to the procedure described by [7].

Effects of egg weight on productivity and carcass characteristics were analysed using the general linear model procedure of the statistical analysis system [9]. Duncan's test for multiple comparisons was used to test the significant difference between treatment means ($P < 0.05$).

Results

Table 1 presents the effect of egg sizes on hatch-weight, live weight, weight gain, feed intake, FCR, and mortality percentage on indigenous Naked neck chicken from one to seven weeks of age. The egg size had effect ($p < 0.05$) on all the parameters measured. Hatch-weight of chicks for large sized-eggs were bigger ($p < 0.05$) than the medium sized-eggs. The hatch-weight of chicks in medium sized-eggs were equally bigger ($p < 0.05$) than those in the small sized-eggs. The live weight, weight gain, feed intake and feed conversion ratio (FCR) followed the same trend. Mortality percentages in the large (5.38 %) and small (6.17 %) sized-eggs were similar ($p > 0.05$) they were, however higher ($p < 0.05$) than those hatched from medium sized-eggs (3.43 %).

The results of the effect of egg weight on egg sizes on feed intake, growth, FCR, live weight at thirteen weeks and mortality percentage on indigenous Naked neck chicken from eight to thirteen weeks is presented in Table 2. The effect of egg weight on feed intake of chickens in large (82.45) and medium (81.07) are similar ($p > 0.05$) they are, however, higher ($p < 0.05$) than those intake of chickens from small sized-eggs. The growth rate followed the same pattern. The FCR is similar to those at the initial stage. Chickens from large sized-eggs had better ($p < 0.05$) FCR than those from medium sized-eggs which were in turn better ($p < 0.05$) than those from small sized-eggs. Live weight of the chicken from large sized-eggs (1215.31g) maintained their superior weight from the initial weight, they were higher ($p < 0.05$) than those from medium sized-eggs (1094.51g), likewise chickens from medium sized-eggs had higher

($p < 0.05$) live weight than those chickens from small sized-eggs (994.92g). Chickens from medium sized-eggs had the lowest mortality (0.49 %) and was significantly lower ($p < 0.05$) than those from small sized-eggs (1.22 %), mortality from those chickens hatched from small sized-eggs were in turn lower ($p < 0.05$) than those from large sized-eggs (2.11%).

The results of the effect of egg weight on the carcass characteristics of indigenous Naked neck chickens at thirteen weeks of age is shown in Table 3. Like the live weight at both initial and final stages of chickens growth, the carcass weight, dress percentages, breast meat yield of chickens hatched from large sized-eggs were higher ($p < 0.05$) than those from medium sized-eggs. Those chickens hatched from medium sized-eggs in turn had higher ($p < 0.05$) values than the chickens hatched from small egg sizes. The chickens hatched from medium sized-eggs had bigger ($p < 0.05$) thighs and drum sticks than those hatched from large egg sizes. The chickens hatched from large sized-eggs in turn had bigger thighs and drum sticks than those from small sized-eggs. The gizzard sizes ranged from 37.84g (small egg chickens) to 83.42g (large egg chickens). The heart of chickens from large and medium sized-eggs were similar ($p > 0.05$), however, they were bigger ($p < 0.05$) than those hatched from small size-eggs.

Discussion

Egg weight had an effect on hatch-weight of indigenous Naked neck chickens which is in agreement with earlier reports that higher hatch-weight were attained from large sized eggs of broiler and Potchefstroom Koekoek, respectively [10, 7]. Smaller chicks hatched from smaller eggs while large chicks hatched from large sized eggs. However, some workers found that egg size had no influence on hatch-weight of broiler chickens [11, 12]. Feed intake and feed conversion ratio of indigenous Naked neck chickens was affected by egg size. This is in agreement with the findings of [13] who indicated that the above parameters were influenced by egg size. Chicks that were hatched from large

sized eggs tend to maintain the initial weights. On the contrary Ulmer-Franco [3] reported that feed intake and feed conversion ratio of broiler chickens were not influenced egg size. Initial and final live weight of Naked neck chickens were influenced by egg size. This is in agreement with the findings of [14] who reported that the live weight was high in chicks hatched from the large sized eggs of pheasants. Mortality of Naked neck chickens in this study was found to be low in medium and small-sized eggs. Aydin [14] reported that egg size did not influence mortality of pheasants. The carcass weight, dress percentages and breast meat were influenced by egg sizes. Chickens that hatched from large-sizes eggs had higher carcass characteristics compared to those from medium and small sized eggs. The

above findings agreed with [13] who indicated that higher dress percentage and breast meat were attained in chickens hatched from large-sized eggs.

Conclusion

This study indicated that hatch-weight and subsequent performance of Naked neck chickens was attained from large-sized eggs. It can therefore, be concluded that eggs be sorted according to weight and size before incubated to ensure optimum growth performance of Naked neck chickens and the smaller sized eggs can be put to other uses.

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Table 1: Effect of egg sizes on hatch-weight, live weight at seven weeks, weight gain, feed intake, feed conversion ratio (FCR), and mortality percentage on indigenous Naked neck chicken from one to seven weeks

Variable	LARGE	MEDIUM	SMALL	SE
Hatch-weight (g/bird)	32.55 ^a	30.47 ^b	28.41 ^c	0.91
Live weight (g/bird)	413.12 ^a	336.35 ^b	245.23 ^c	24.28
Weight gain (g/bird/day)	7.74 ^a	6.35 ^b	4.41 ^c	0.48
Feed intake (g/bird/day)	33.84 ^a	31.91 ^b	28.95 ^c	0.72
Feed conversion ratio	6.49 ^a	5.10 ^b	4.26 ^c	0.33
Mortality (%)	5.38 ^a	3.43 ^b	6.17 ^a	0.43

^{a, b, c} Means in the same row not sharing a common superscript are significantly different ($P < 0.05$). SE: Standard error

Table 2: Effect of egg sizes on feed intake, growth, feed conversion ratio (FCR), live weight at thirteen weeks and mortality percentage on indigenous Naked neck chicken from eight to thirteen weeks

Variable	LARGE	MEDIUM	SMALL	SE
Feed intake (g/bird/day)	82.45 ^a	81.07 ^a	73.36 ^b	1.429
Growth (g/ bird/day)	25.89 ^a	23.54 ^a	20.47 ^b	0.858
FCR	3.35 ^a	3.42 ^b	3.65 ^c	0.047
Live weight (g/bird)	1215.31 ^a	1094.51 ^b	994.92 ^c	31.931
Mortality (%)	2.11 ^a	0.49 ^c	1.22 ^b	0.248

^{a, b, c} Means in the same row not sharing a common superscript are significantly different ($P < 0.05$). SE: Standard error

Table 3: Effect of egg weight on the carcass characteristics of indigenous Naked neck chickens at thirteen weeks of age (g).

Variable	LARGE	MEDIUM	SMALL	SE
Carcass weight	982.96 ^a	857.13 ^b	802.09 ^c	33.95
Dressing percentage (%)	85.09 ^a	82.75 ^b	76.55 ^c	1.28
Breast meat	254.45 ^a	237.68 ^b	185.59 ^c	10.51
Thighs	159.86 ^b	193.48 ^a	123.79 ^c	10.81
Drum sticks	143.48 ^b	172.24 ^b	118.38 ^c	0.72
Gizzard	83.42 ^a	66.66 ^b	37.84 ^c	6.67
Heart	9.04 ^a	9.07 ^a	5.50 ^b	0.60

^{a, b, c} Means in the same row not sharing a common superscript are significantly different ($P < 0.05$). SE: Standard error

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