

EFFECTS OF SODIUM BICARBONATE SALT AND TURMERIC POWDER ON INTERNAL EGG QUALITY AND BODY PARAMETER MEASUREMENTS OF ISA BROWN HENS

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ABSTRACT

This study was conducted to evaluate the effects of sodium bicarbonate salt and turmeric powder on internal egg quality and body parameter measurements of Isa brown hens. The birds were sourced from CHI Nigeria limited farm and raised under similar management techniques. Isa brown is a hybrid brown egg layer being a cross between Rhode Island Whites and Rhode Island Red. The experiment was conducted at the poultry unit of the Department of Animal Production Abubakar Tafawa Balewa University located in Gubi, Bauchi. A total of one hundred and eighty four (184) Isa Brown hens were used for the research which lasted a period of 16 weeks. The results recovered showed that, supplementation of sodium bicarbonate salt and turmeric powder on the internal egg quality of the hens did not affect albumen height (1.03 ± 0.2) mm, yolk height (1.73 ± 0.2) mm, yolk index (0.51 ± 0.00), and haugh unit (84.47 ± 0.06) mm of the eggs. However, significant ($P < 0.01$) difference was noticed on Yolk diameter where 0.30g sole supplemented sodium bicarbonate salt and interaction between sodium bicarbonate salts and turmeric powder (0.30g NaHCO_3 and 0.70g turmeric) recorded the highest values (3.51 ± 0.08 and 3.48 ± 0.08). Body weight and comb length were not significantly ($P > 0.05$) influenced by supplementation level of sodium bicarbonate salt and turmeric powder. However, shank length was affected ($P < 0.001$) by addition of sodium bicarbonate salt and turmeric powder, it was observed that 0.70g sodium bicarbonate salt inclusion had the longest shank length. It was concluded that supplementation of sodium bicarbonate salt and turmeric powder significantly improved Yolk diameter. This singular improvement will influence the overall quality of the egg and also its ability to produce better quality chicks if used for hatching purposes. Shank length was also improved significantly. Sodium bicarbonate salt and turmeric powder is therefore recommended in Isa brown hens.

Keywords: Turmeric, Sodium Bicarbonate, Egg Quality, Body Parameter, Isa Brown

INTRODUCTION

Over the past few decades the production of eggs has grown faster than that of any other major food in developing countries (Shim *et al.*, 2013). This is as a result of increasing demand for animal product due to increase in population, urbanization and westernization of diet. The popularity of poultry has many advantages over other livestock. Poultry birds are good converters of feed into useable protein in eggs. These product has increased much faster than beef and veal or pig meat (Dutta, 2013). Poultry egg is found to be one of the most complete food known to man, and it provides means by which rapid transformation of animal protein intake can be achieved (Shim *et al.*, 2013). The return on investment is high, due to this there is hardly any household in the rural or semi-urban areas that does not keep one form of poultry or the other. Also, genetic improvement could be attained at a faster rate than most farm animals since they have a shorter generation interval. Eggs are also the means by which reproduction takes place in poultry, hence the internal egg quality play a major role in production of good quality chicks. Therefore this study seeks to determine the effects of sodium bicarbonate and turmeric powder on internal egg quality and body parameter measurements of laying hens.

MATERIALS AND METHODS

The eggs used in this study were laid by Isa brown chicken which were sourced from CHI farm and raised under similar management techniques. Isa brown is a hybrid brown egg layer being a cross between Rhode Island Whites and Rhode Island Red. Isa brown are hardy, they adapt themselves to all climates and environment. It has an egg production rate of approximately 300 eggs per hen in the first laying year (Bukunmi and Yusuf, 2015). The experiment was conducted at the poultry house of Department of Animal Production Abubakar Tafawa Balewa University located in Gubi Village, Bauchi. A total of one hundred and eighty four (184) Isa Brown hens were used for the research which was conducted from July to October.

Albumen Height: To obtain the albumen height, each egg was gently broken into two halves not to break the vitelline membrane that enclose the yolk by using a shape knife and its contents poured into a flat tray placed on a flat surface table. The height was obtained by the use of vernier calliper, the calliper stem was pierced into the albumen at its widest part at a position half way between the yolk and the outer margin and adjusted until it touched the albumen from the top and the corresponding reading was recorded as the albumen height.

Albumen Length: The albumen length was measured with the vernier calliper it was taken as a longitudinal section of thick albumen.

Albumen Diameter: The albumen diameter was measured across the wider part of the albumen using the vernier calliper.

Yolk Height: The yolk height was measured using the vernier calliper it was taken at the highest point of egg yolk. It was done the same way albumen height was obtained

Yolk Colour: The Yolk colour has been standardized by the "Roche" colour fan, which is a set of yellow coloured blades varying from a very light yellow (number 1 on the fan) to a dark or almost reddish yellow (no 14).

Yolk Length: This was measured as the widest horizontal circumference with a vernier calliper

Yolk Diameter: Yolk diameter determined along the chalazae line was with the calliper.

After collecting egg samples, the birds were weighed individually while the shank length and comb length were measured using a rule.

RESULTS AND DISCUSSION

Table: 1 Effects of Sodium Bicarbonate and Turmeric powder on Internal Egg Quality

Variable (%)	N	Albumen height	Albumen diameter	Albumen length	Albumen index	Yolk height	Yolk diameter	Yolk index	Haugh unit
Overall		1.03±0.01	6.06±0.06	7.22±0.03	0.16±0.00	1.73±0.02	3.40±0.011	0.51±0.00	84.47±0.06
Treatment		NS	NS	NS	NS	NS	***	NS	NS
Control	67	0.58±0.09	5.75±0.43	7.15±0.02	0.15±0.02	1.75±0.06	3.37±0.08 ^c	0.49±0.02	84.03±0.39
S30	99	1.08±0.09	5.89±0.42	7.12±0.20	0.17±0.01	1.71±0.05	3.51±0.08 ^a	0.51±0.02	84.75±0.38
S70	124	1.04±0.09	5.98±0.38	7.19±0.18	0.16±0.01	1.68±0.05	3.47±0.08 ^{ab}	0.51±0.02	84±51±0.34
T30	115	1.08±0.09	5.89±0.41	7.13±0.19	0.17±0.01	1.75±0.05	3.44±0.08 ^{abc}	0.53±0.02	84.74±0.37
T70	119	1.01±0.09	6.23±0.40	7.31±0.19	0.15±0.01	1.74±0.05	3.40±0.08 ^{abc}	0.50±0.02	84.44±0.37
S30T30	108	1.11±0.09	6.18±0.41	7.24±0.19	0.17±0.01	1.75±0.05	3.43±0.08 ^{abc}	0.51±0.02	84.77±0.37
S30T70	107	0.93±0.09	6.35±0.41	7.44±0.19	0.14±0.01	1.72±0.05	3.45±0.08 ^{ab}	0.47±0.02	84.01±0.07
S70T30	116	1.05±0.09	5.88±0.41	7.12±0.19	0.16±0.01	1.75±0.05	3.48±0.08 ^{ab}	0.53±0.02	84.62±0.37
S70T70	121	0.10±0.09	6.66±0.40	7.35±0.19	0.15±0.01	1.72±0.05	3.40±0.08 ^{abc}	0.50±0.02	84.39±0.37
Months		***	***	***	***	***	****	***	***
July	492	0.86±0.02 ^b	6.07±0.08 ^a	7.55±0.4 ^a	0.13±0.00 ^b	1.68±0.01 ^b	3.48±0.02 ^a	0.47±0.01 ^c	83.45±0.07 ^b
August	205	1.09±0.03 ^a	5.69±0.12 ^b	6.87±0.6 ^d	0.17±0.00 ^a	1.77±0.02 ^a	3.32±0.02 ^c	0.53±0.01 ^a	84.82±0.11 ^a
September	194	1.0.9±0.03 ^a	6.29±0.13 ^a	7.12±0.6 ^c	0.16±0.00 ^a	1.75±0.02 ^a	3.41±0.02 ^b	0.51±0.01 ^{ab}	84.80±0.12 ^a
October	152	1.11±0.03 ^a	6.20±0.14 ^a	7.34±0.07 ^b	0.16±0.01 ^a	1.75±0.02 ^a	3.40±0.02 ^b	0.51±0.01 ^b	84.83±0.13 ^a

***=P<0.001 NS=Not Significant

Means for groups with the same superscript (s) are statistically similar

S30=0.30g, S70=0.70g NaHCO₃ salt and S30=0.30g, T70=0.70g Turmeric powder inclusions in diet.

Means for groups with the same superscript(s) are statistically similar

S30 =0.30g, S70=0.70g NaHCO₃ salt, T30 =0.30g, T70=0.70g turmeric powder inclusion in the diet;

N= overall 1043

Table 1 shows the results for effects of sodium bicarbonate and turmeric powder on internal egg quality. The results recovered showed that, supplementation of sodium bicarbonate salt and turmeric powder on the internal egg quality of layers did not affect albumen height (1.03± 0.2) mm, yolk height (1.73±0.2) mm, yolk index (0.51±0.00), and haugh unit (84.47±0.06) mm of the eggs.

However, significant ($P<0.01$) difference was noticed on Yolk diameter where 0.30g sole supplemented sodium bicarbonate salt and interaction between sodium bicarbonate salts and turmeric powder (0.30g NaHCO_3 and 0.70g turmeric) recorded the highest values (3.51 ± 0.08 and 3.48 ± 0.08), the lowest values were observed on interaction between sodium bicarbonate salt and turmeric powder 0.30g NaHCO_3 and 0.70g turmeric. The improvement on the yolk diameter could be as a result of the incorporation of turmeric powder as reported by Balnave and Muhereeza (1997) who incorporated NaCl with NaHCO_3 and sowed that the results improved internal egg quality (Yolk diameter) in different breed of pullets. The authors concluded that 1 %. Supplemental NaHCO_3 improved egg shell and internal qualities (Yolk diameter) in Rhode Island Red. Internal egg qualities parameters shows that Albumen height, diameter, length, index and Yolk height, diameter, index and haugh unit were significantly ($P<0.01$) affected the months of production. It was observed that Albumen height, index, Yolk height and haugh unit were better in August, September and October and the least values were observed in July on the various parameters. On the other hand July, September and October were the best months with the highest value in albumen diameter, while the lowest was on August. Similarly July was the best month with the highest values for albumen length and yolk diameter. More so, August had the highest value of Yolk index and the lowest value was noticed in July.

Table 2: Effects of Sodium Bicarbonate and Turmeric Powder on Body parameters measurements.

Variable (%)	N	Body weight	Shank length	Comb length
Overall		1.78 $\pm$ 0.03	6.81 $\pm$ 0.05	6.45 $\pm$ 0.12
Treatment		NS	***	NS
Control	6	1.76 $\pm$ 0.09	6.67 $\pm$ 0.15 ^{cd}	6.53 $\pm$ 0.37
S30	6	1.97 $\pm$ 0.09	7.05 $\pm$ 0.15 ^{abc}	6.05 $\pm$ 0.37
S70	6	1.75 $\pm$ 0.09	7.47 $\pm$ 0.15 ^a	6.87 $\pm$ 0.37
T30	6	1.78 $\pm$ 0.09	6.83 $\pm$ 0.15 ^{bcd}	5.98 $\pm$ 0.37
T70	6	1.75 $\pm$ 0.09	6.53 $\pm$ 0.15 ^{cd}	6.45 $\pm$ 0.37
S30T30	6	1.98 $\pm$ 0.09	6.33 $\pm$ 0.15 ^d	7.22 $\pm$ 0.37
S30T70	6	1.80 $\pm$ 0.09	6.65 $\pm$ 0.15 ^{cd}	6.12 $\pm$ 0.37
S70T30	6	1.72 $\pm$ 0.09	7.37 $\pm$ 0.15 ^{ab}	6.53 $\pm$ 0.37
S70T70	6	1.55 $\pm$ 0.09	6.57 $\pm$ 0.15 ^{cd}	6.22 $\pm$ 0.37

***= $P<0.001$, NS=Not Significant Means for groups with the same superscript(s) are statistically similar

S30 =0.30g, S70=0.70g NaHCO_3 salt, T30 =0.30g, T70=0.70g turmeric powder inclusion in the diet; N= overall 60

Table 2 shows the results for effects of Sodium Bicarbonate and Turmeric Powder on Body parameters measurements. Body weight and comb length were not significantly ($P>0.05$) influenced by supplementation level of sodium bicarbonate salt and turmeric powder. However, shank length was affected ($P<0.001$) by addition of sodium bicarbonate salt and turmeric powder. It was observed that 0.70g sodium bicarbonate salt inclusion had the best longest shank length and the least was observed on 0.30g sodium bicarbonate salt and 0.30g turmeric powder combination. The inconsistency observed in the result could be as a result of turmeric powder and sodium bicarbonate combination, though best shank length noticed on 0.70g sodium bicarbonate salt could be attributed to the fact that NaHCO_3 plays vital role in bone formation.

CONCLUSION AND RECOMMENDATIONS

Supplementation of sodium bicarbonate salt and turmeric powder significantly improved Yolk diameter. This singular improvement will influence the overall quality of the egg and also its ability to produce better quality chicks if used for hatching purposes. Shank length was also improved significantly. Sodium bicarbonate salt and turmeric powder is therefore recommended in Isa brown hens. Further research is also recommended.

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