SHORT COMMUNICATION

THE EFFECT OF AGE OF BIRD ON SHELL QUALITY AND COMPONENT YIELD OF EGGS.

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ABSTRACT

The effect of age of birds on shell quality and yield components of egg was studied. The birds' age were 25, 30, 58 or 78 weeks. The eggs' weight increased by 9.92%, 26.43% and 31.46% for birds at 30, 58 and 78 weeks, respectively. While the shell weight was found to increase by 15.10, 34.55 and 30.44% for birds at 30, 58 and 78 weeks, respectively. The yolk and albumen weights were found to increase by 4.05%, 11.39%, 44.72%, 18.06% and 44.72%, 26.41% for hens at 30, 58 and 78 weeks old respectively. The yolk: albumen ratio was highest (0.478 ± 0.12) with eggs laid by 58 weeks old birds. Albumen pH decreased with increase in the age of birds.

Key words: Shell quality, component yield of egg.

INTRODUCTION

The production of good quality uniform eggs round the year is a major concern of producers. One of the major economic problems of egg production is that egg shell quality decreases after few months of lay resulting in cracked and thin shelled eggs even though the birds are at prime of production. Many reasons have been adduced by various researchers for the decline in shell quality with advance in hen's age (Peterson, 1965, Roland, 1979).

The increase in the hen's age caused egg weight, dry shell weight, deformation and percent yolk to increase while percent shell, percent albumen and percent albumen solids decreased (Fletcher, *et al*; 1981). Recently, Hussein *et al*; (1993) observed yolk: albumen ratio to increase with age of birds. In Nigeria, most egg farmers will normally dispose their laying hens as spent layers immediately they

are 52 weeks or some few weeks above this age.

This experiment was therefore undertaken to determine the economic gains or otherwise of raising laying birds to 78 weeks of age.

MATERIALS AND METHODS

The eggs used in this study were collected within 12 hours of lay at the Kwara Livestock and Feed Company Limited Farm, Ilorin (KWFCO). The eggs were obtained from birds of four different ages, (25, 30, 58 and 78 weeks old). However, the birds were of the same commercial strain hatched on the same farm. All the birds used in this experiment were raised on the same ration. At the time of egg collection, the birds were given a ration containing 16% protein, 3.5% calcium and 0.45% phosphorus, manufactured by KWFCO. The birds were housed two per cage in an open-type house.

Thirty eggs from each age group were selected at random and transported to the Department of Animal Production, University of Ilorin where the eggs were cleaned with a damp hand towel to remove feed and faecal smears before they were weighed to the nearest 0.01g using a triple beam balance. The egg length and width were determined with a vernier calliper, results were used to calculate the egg shape index which is egg width over egg length. The eggs were broken with knife and the contents placed on a piece of flat glass positioned on a flat surface. The albumen and yolk heights were measured using the tripod micrometer. The yolk diameter was taken as the maximum cross sectional diameter of the Yolk using a pair of divider which was read on a ruler in millimetre. The yolk weight was obtained by carefully separating the yolk from

TABLE 1: QUALITY TRAITS OF EGGS FROM FLOCKS OF VARYING AGES

TRAITS	FLOCK AGE (weeks)			
	25	30	58	78
Egg Weight(g)	44.95 ^a ± 1.1	49.41 ^b ± 0.71	56.83 ^c ± 1.2	59.09 ^d ± 1.1
Shell Weight (g)	4.37 ^a ± 0.04	5.03 ^b ± 0.04	5.88 ^d ± 0.05	5.70 ^c ± 0.05
Shell Thickness (mm)	0.348 ^c ± .002	0.344 ^b ± .001	0.344 ^b ± .001	0.339 ^a ± .002
Percent Shell	9.72 ^a ± .03	10.18 ^b ± .03	10.35 ^c ± .03	9.65 ^a ± .02
Egg Shape Index	0.722 ^c ± .001	0.726 ^d ± .002	0.714 ^b ± .002	0.692 ^a ± .001
Yolk Weight (g)	11.36 ^b ± .01	11.82 ^b ± .10	16.44 ^c ± .21	16.44 ^c ± .20
Yolk Index	0.367 ^b ± .001	0.355 ^a ± .001	0.357 ^a ± .002	0.356 ^a ± .002
Albumen Weight (g)	29.23 ^a ± 0.31	32.56 ^b ± 0.46	34.51 ^b ± 0.42	36.95 ^c ± 0.44
Adjusted Percent Yolk ²	28.0 ^b ± 0.5	26.6 ^a ± 0.51	32.3 ^d ± 0.50	30.8 ^c ± 0.5
Adjusted Percent albumen ³	72.0 ^c ± 0.41	73.4 ^d ± 0.45	67.73 ^a ± 0.42	69.21 ^b ± 0.3
Yolk: Albumen ratio	0.389 ^b ± 0.011	0.365 ^a ± 0.013	0.478 ^d ± 0.012	0.446 ^c ± 0.011
Haugh unit	91.16 ^b ± 1.21	85.89 ^a ± 1.30	86.58 ^a ± 1.24	84.36 ^a ± 1.30
Albumen pH	8.47 ^d ± 0.02	8.43 ^c ± .02	8.40 ^b ± .02	8.38 ^a ± .02

a,b,c, Means within each row with different superscripts are significantly different ($P < 0.05$)

1 Albumen weight = Initial whole egg weight - (Yolk + dry shell weight)

2 Adjusted percent yolk = (Yolk weight/(Initial whole egg weight - dry shell weight)) X 100

3 Adjusted percent albumen = [(Albumen weight/(Initial egg weight - dry shell weight)) x 100]

the albumen by hand. The yolk was then rolled on damp paper towel to remove any adhering albumen prior to weighing. The yolk index was calculated as the proportion of yolk height to yolk diameter in millimeters.

The shell of each egg was carefully washed to remove the albumen and dried at 105°C for 24 hours before the weight was determined using the triple beam balance. Shell thickness was obtained using a micrometer screw gauge to three decimal places, and average of three readings: broad and narrow end, and the middle portion was taken. The percent shell present in each egg was calculated. The albumen pH was determined by separating the albumen from the yolk into a small beaker and then homogenized with a hand whip. pH was read from a glass electrode pH-meter.

The data were subjected to the analysis of variance and the multiple range test of Duncan was utilized to locate significant differences (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The influence of age of birds on shell quality and component yields of eggs was

found to be significant, the results are presented in Table 1. Egg weight was significantly ($P < 0.05$) influenced by the age of birds which increased by 31.46% from birds of 25 weeks old to those of 78 weeks old, while shell weight increased by 30.44% and shell thickness decreased by 0.009 mm during the same age differential.

The decrease in shell thickness would be due to the greater increase in total egg mass as compared to the increase in shell weight. The weakness or changes in the muscle tone of the oviduct with age of birds could also cause the decrease in shell thickness. The yolk weight increased significantly from 11.36g for 25 week old birds up to 16.44g for both 58 and 78 week old hens, while the albumen weight increased from 29.23g up to 36.95g for 25 and 78 week old birds, respectively.

When the percent yolk and percent albumen were adjusted by removing the effect of shell differences (Fletcher, *et al*; 1981), no clear cut pattern was observed as regard the effect of age. The yolk and albumen were found to have increased by 44.72% and 26.41%, respectively from birds of 25 weeks

old to those of 78 week old. As the birds increased in age, the yolk: albumen ratio increased; an indication that eggs from older birds contain higher level of cholesterol. The yolk index which is a measure of the standing up quality of the yolk was found to decline with age of the birds. This could be due to increase in Yolk solid that had been observed to increase with increasing age of the birds (Fletcher, *et al*; 1981). The interior quality of the eggs as measured by the Haugh unit was significantly superior with eggs laid by the 25 - week old birds than with the older birds. The albumen pH was found to significantly ($P < 0.05$) decline with age of the birds.

In conclusion, hens should not be raised to 78 weeks of age as more cracks are likely at this age. Also, eggs produced by birds of 58 weeks old had almost all the parameters considered better than those of 78 weeks.

REFERENCES

- FLETCHER, D.L.; BRITTON, W.M.; RAHN, A.P. and SAVAGE, S.I. (1981). The influence of layer flock age on egg component yields and solid content. *Poultry Sci.* 60: 983 - 987.
- HUSSEIN, S.M.; HARMS, R.H. and JANKY, D.M. (1993): Effect of age on the Yolk to albumen ratio in Chicken eggs. *Poultry Sci.* 72: 594 - 597.
- PETERSEN, C.F. (1965). Factors influencing egg Shell quality. *World Poultry Sci. J.* 21: 110 - 138.
- ROLAND, D.A., SR. (1979). Factors influencing Shell quality of aging hens. *Poultry Sci.* 58: 774 - 777.
- STEEL, R.G.D. and TORRIE, J.H. (1980). *Principles and Procedures of Statistics. A biometrical approach* 2nd Ed. McGraw Hill, NY.