STUDIES ON CERTAIN QUALITIES OF DIFFERENT SOURCES OF CHICKEN EGGS*

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ABSTRACT

A study was conducted to determine certain qualities of different sources of chicken eggs namely indigenous chicken, farm chicken, market chicken and Giriraja chicken. Out of these four groups of chicken, the eggs of farm chicken were superior both in external and internal qualities. However, the eggs of farm chicken reared in deep litter exhibited comparatively higher microbial count on the egg shell. The indigenous chicken eggs were smaller in size with better internal and external qualities with appealing yolk quality. The market chicken eggs (imported from other state) were comparatively poor in respect of internal qualities as compared to other groups of chicken eggs studied. It may be concluded that unless adequate refrigerated transportation and storage facilities to suit the requirements of different channels of egg markets are ensured, the consumer would always be deprived of quality eggs in the market.

Keywords: Qualities, Different sources, Chicken eggs.

INTRODUCTION

Egg is the only balanced food of animal origin next to the cow milk which is consumed and relished by majority of the population of the world. Egg is the most nutritious, unadulterated and cheaper natural food with high digestible co-efficient. Despite its nutritional supremacy, the per capita availability of eggs in India is only 38 eggs against ICMR recommendation of 180 eggs per person per year (Rao, 2005). Low per capita availability of egg may be attributed to the enormous population explosion coupled with significant post harvest loss of eggs due to lack of proper storage and transportation leading to early spoilage. At least one out of every 30 eggs produced does not reach the consumer in good condition. During storage the inner membranes and egg contents are contaminated (Prasad *et al*., 1987). Therefore, it is essential to maintain quality of eggs at all levels from the farm to the table. However, required levels of emphasis have not been paid in India in maintenance of quality of table eggs and literature surveyed did not reveal any work on evaluation of quality of market eggs in Assam. Therefore, the present study has been undertaken to determine certain quality aspects of different sources of chicken eggs sold in and around the Guwahati city.

MATERIALS AND METHODS

The study involved 50 numbers of eggs each from four groups of chicken namely indigenous chicken, farm chicken (BV 300 strain of commercial chicken), market chicken and Giriraja chicken. During collection of eggs, efforts were made to know the source of production, mode of transportation and length of retention from the probable day of lay. The eggs were kept in refrigerator at 10-15º C

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overnight for homogenization. In the next morning at 9.00 a.m. the eggs were taken out of the refrigerator and kept at room temperature for about an hour to facilitate thawing of egg shell and then they were analyzed for qualities like cleanliness of egg shell, egg shell colour, egg weight, shape index (Shultz, 1953), total aerobic mesophilic bacterial count of the egg shell (American Public Health Association, 1996), egg shell thickness, albumen index (Heiman and Caver, 1936), yolk index (Funk, 1948), Haugh unit, albumen and yolk p^H (p^H meter) and colour of yolk as per standard procedures. Statistical analysis of data was done as per methods described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

The egg shell cleanliness of all groups of chicken eggs was found to be clean. The egg shell colour of indigenous and Giriraja chicken were brown shelled whereas, it was white in farm chicken and market chicken eggs. There is no relationship between egg shell colour and interior quality characteristics (Stadelman and Cotteril, 1977) in egg.

The mean values of external and internal qualities of eggs of different groups of chicken are presented in Table 1.

The mean egg weight was significantly ($P<0.01$) higher in eggs of farm chicken (60.08 g) which is followed by Giriraja, market chicken and indigenous chicken. Contrary to the present value, higher egg weight of indigenous chicken eggs were recorded by Kumar *et al*. (1971), Jain *et al*. (1977), Mahapatra *et al*.(1982), Dutta (1993) and Ramappa *et al*. (2004). In the present study the mean egg weight of farm chicken was higher than the reports of Kumar *et al*. (1971), Jain *et al*. (1977), Mahapatra *et al*. (1982) in Rhode Island Red (RIR) and Premavalli and Viswanathan (2004a) in eggs of White Leghorn chicken. The egg weight of Giriraja chicken reported by Ramappa *et al*. (2004) was in close agreement with the present result. The differences in egg weight amongst the different groups of chicken might be due to the fact that egg weight is usually related to the strain, size of the bird, rate of laying, number of egg laid, management, nutrition and other environmental factors.

In respect of shape index of eggs, farm chicken had highest values followed by indigenous, Giriraja and market chicken. Mahapatra *et al*. (1982) and Dutta *et al*. (1991) reported similar shape indices in indigenous chicken eggs. On the other hand, lower indices were recorded in desi (Kumar *et al*., 1971) and White Leghorn chicken (Premavalli and Viswanathan, 2004a). The variation of shape index among the different groups of chicken eggs might be due to the differences in their genetic make up, age and system of management.

The total microbial count of egg shell of farm chicken was significantly ($P<0.05$) higher (4.15 $\log^{10}$ cfu/ml) than the other groups of chicken eggs, which might be due to the fact that these eggs were collected directly from the farm where birds were reared on deep litter system. In contrary to the present finding, Prasad *et al*. (1987) reported a lower value of bacterial load on surface content of fresh chicken eggs. Lower microbial count recorded in egg shell of indigenous chicken, market chicken and Giriraja chicken might be due to washing and cleaning of eggs with a moist cloth to give an appealing look during sale.

Amongst the four groups of chicken eggs, higher shell thickness was recorded in eggs of Giriraja chicken (0.31 mm) followed by farm chicken, market chicken and indigenous chicken. Mahapatra *et al*. (1982) recorded higher values of egg shell thickness (0.33 and 0.34 mm) in 3 breeds of chicken and Dutta *et al*. (1991) reported lower values (0.24 mm) in Miri birds of Assam. Higher shell thickness may be due to poor egg production as there is a negative correlation between shell thickness and egg production (Kumar *et al*., 1971).

The albumen index was significantly ($P<0.05$) different among the four different groups of chicken eggs. Farm chicken had higher albumen index (0.11), followed by indigenous, Giriraja and market chicken. This might be due to shorter storage period as there was a gradual decline in albumen index as the storage period increase (Reddy and Reddy, 1991). Lower

albumen index in market chicken eggs might be due to vibrations in shaking during transportation causing deterioration of albumen quality and also due to the duration of the transit.

The yolk indices were significantly (P<0.01) higher in farm chicken (0.46), followed by indigenous, market chicken and Giriraja chicken. Contrary to the present findings, higher yolk index (0.48) in eggs of RIR (Kumar *et al.,* 1971) and lower value in White Leghorn (Dutta *et al.*.1991) and farm chicken eggs (Premavalli and Viswanathan, 2004a) were reported.

The mean Haugh unit values were higher in farm chicken eggs (86.98), followed by indigenous, market chicken and Giriraja chicken. The Haugh unit value is dependent on the strain of the bird, storage conditions and time lapsed during transit.

The average albumen and yolk weight differed significantly (P<0.01) amongst the groups of chicken eggs. The differences in albumen and yolk weight in different groups of chicken may be attributed to the differences in genotypes, age of the birds, managemental and feeding regime (Prasad *et al*., 1987). Higher albumen and yolk weight found in the farm chicken eggs might be due to freshness of eggs.

The mean p^H of albumen and yolk showed significant (P<0.01) differences among different groups of chicken. The present range of albumen p^H (7.3 to 7.5) of indigenous and farm chicken eggs were similar with the value reported by Prasad *et al*.,(1987) in freshly laid chicken eggs (7.51) of Andhra Pradesh. On the other hand, Reddy and Reddy (1991) recorded higher value (8.57) of albumen p^H in eggs of White Leghorn as compared to the present study. The higher albumen and yolk p^H (8.73 and 6.78) of market chicken eggs found in the present study might be due to comparatively longer retention period during marketing of eggs. Similar observation was made by Reddy and Reddy (1991).

The yolk colour of indigenous and Giriraja chicken was recorded as medium yellow (+2) and pale yellowish (+1) in case of farm and market chicken eggs. The variation in yolk colour among different groups of chicken might be due to nutrition, age, system of management and genetic make up (Kumar *et al*., 1971; Dutta, 1993 and Premavalli and Viswanathan, 2004a).

Table 1

Mean (± SE) values of external and internal qualities of eggs of different groups of chicken

Traits	Indigenous chicken eggs	Farm chicken eggs	Market chicken eggs	Giriraja chicken eggs
Egg weight (g)	37.20±0.64^a	60.08±0.64^b	50.44.±0.84^d	52.72±0.97^c
Shape index	75.88±0.76^a	78.59±0.82^b	72.27±0.68^c	73.44±0.69^c
Microbial count (Log^{10} cfu/ml)	3.94±0.01^a	4.18±0.05^b	3.91±0.01^a	3.92±0.02^a
Egg shell thickness	0.29±0.003^a	0.30±0.000^{ac}	0.30±0.005^a	0.31±0.005^{bc}
Albumen index	0.09±0.004^a	0.11±0.002^b	0.08±0.002^c	0.08±0.002^{ac}
Yolk index	0.39±0.012^a	0.46±0.003^b	0.38±0.006^a	0.38±0.006^a
Haugh unit	80.48±1.09^a	86.98±0.55^b	79.26±0.72^a	78.80±0.78^a
Albumen weight (g)	21.11±0.67^a	31.70±0.37^b	26.90±0.59^c	28.12±0.63^c
Yolk weight (g)	15.71±0.45^a	23.64±0.52^b	20.66±0.49^c	20.62±0.44^c
Albumen p^H	7.31±0.01^a	7.51±0.01^b	8.73±0.01^c	7.77±0.01^d
Yolk p^H	5.93±0.04^a	6.03±0.01^b	6.78±0.01^c	6.10±0.01^d

Figures in a row with at least one superscript in common do not differ significantly (P<0.05).