On the Quality of Market Eggs in Tripoli, Libya

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INTRODUCTION

Egg deterioration is a problem which has been of concern for a long time. Many factors affect the quality of eggs among which are handling and storage, environmental conditions as well as nutritional status of the laying hens. Sharp (11) in a survey of factors affecting quality reported that time, temperature and carbon dioxide affected deterioration of egg albumen. It was also shown that retention of carbon dioxide in an egg retarded both pH increase, and egg quality deterioration (1), and as temperature increased, the amount of carbon dioxide lost from an egg likewise increased (5). Spencer et al. (10) observed that egg albumen quality declined linearly with the logarithm of the elapsed time after breakout.

Eggs should not be packed small end up, because when packed in such a position both candling and broken qualities decline (6). This last observation was confirmed by Orel and Musil who reported that in eggs placed small end up, the average egg albumen index value was 6 to 7% lower than in eggs in the horizontal position and 14.9% lower than in eggs placed small end down. In addition these authors indicated that eggs placed small end up in fillers had been markedly influenced in their candling quality as the yolk became more visible (9). The colour of the yolk and its consistency are decisive factors in the evaluation of egg quality. Many reports appeared in the last decade concerned with the pigmentation of the yolk as a measure of egg quality (4,7,12). Egg shell weight is also a factor involved in the determination of egg quality and calcium nutrition of the laying hen, this was shown in a study where shell weight decreased progressively from the control level of 5.51 ± 0.38 gm on diets adequate in calcium, to 1.56 ± 0.49 gm in calcium deficient diets (8).

The objective of the study to be reported herein was to determine whether any differences exist in egg quality parameters in marketed eggs produced by local commercial, (eggs produced in Tripoli by specialized poultry farms), farm poultry (eggs produced in Tripoli, from small family farms), and imported eggs (eggs imported to Tripoli from foreign countries).

MATERIALS AND METHODS

Thirty-six eggs of each of the three sources mentioned above, were purchased randomly each month for a period of 5 months beginning Nov. 1 and ending April 1, 1972

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from local retailers throughout Tripoli, Libya. The eggs were weighed, candled and scored for cleanliness. Eggs were considered 'clean', when no dirt, and soiling was adhering to the shell, while considered as dirty, when not satisfying the former conditions, yolk centering and air-cell depth were estimated during candling as outlined by Card and Nesheim (3). In addition, shell weight, albumen weight, yolk weight and color, albumen pH and height were determined. Maximum and minimum environmental temperatures, as well as relative humidity figures were kept. Albumen height was measured in the broken eggs by using a spherometer (tripod) which is of a similar nature to the tripod micrometer introduced by Brant (2). The egg albumen quality is reported in Haugh Units. The pH in egg albumen was measured directly on the albumen using Beckmann pH-meter Model 72. The yolk colour was estimated using the Roche colour fan as an indicator of pigmentation.

The results were subjected to statistical analysis of variance to test for significance between-source in egg qualities.

RESULTS AND DISCUSSION

The egg weights and albumen weights from the farm poultry source were significantly smaller than those from the local commercial source ($P < .05$), however these values were not significantly different from the imported eggs (Table 1). Differences in shell and yolk weights were not significant. The variability in albumen weight followed the trend for egg weight (Table 1), this is due to the established correlation between these two traits.

The results secured from candling the eggs are presented in Table 2 which summarizes the data on air cell depth and yolk position. It is clear that no significant difference among sources were observed.

The results in Table 3 indicate that insignificant differences were observed in the percentage of dirty eggs. However, among the different sources it was noted that a considerable percentage of dirty eggs was observed regardless of the egg source indicating that no egg washing was undertaken prior to marketing.

The pH value of the albumen was not significantly different ($P < .05$). The average albumen pH value from all sources was higher than that of fresh eggs which range between 7.6 and 8.2 (Card and Nesheim (3)).

The albumen height measurements in millimeters were low for all sources of eggs. There was a significant difference in Haugh Units between farm poultry and imported eggs; no such difference was present between the farm poultry and the local Commercial

Table 1 Means and Standard errors of egg, albumen, shell and yolk weights in eggs from three sources in Tripoli.

Observation Sources of eggs	egg wt. gm	albumen wt. gm	shell wt. gm	yolk of 3m
Local commercial	58.80($\pm$2.4)[1]	30.40 $\pm$ 1.7	7.1 $\pm$ 0.24	20.4 $\pm$ 2.4
Farm poultry	50.50 $\pm$ 2.2	25.90 $\pm$ 1.8	6.9 $\pm$ 0.15	18.8 $\pm$ 1.3
Imported	54.50 $\pm$ 3.55	27.30 $\pm$ 3.4	7.1 $\pm$ 31	19.1 $\pm$ 1.1
l s d[2]	7.33	3.73	N.S.	N.S.
$P < .05$				

[1] Standard error of the mean.

[2] Differences between any two means exceeding the respective lsd are significant.

Table 2 Air cell depth and yolk positions in eggs from three sources in Tripoli.

Observation Sources of eggs	Air cell depth % of eggs with		Yolk Position % of eggs with	
	1/4 inch	1/8 inch	centered yolks	off-centered yolks
Local commercial	31.3	69.70	51.30	48.7
Farm poultry	26.14	73.86	71.1	28.9
Imported	31.80	68.20	64.4	35.6
l s d[1] P < .05	N.S.	N.S.	N.S.	N.S.

[1] Means are not significantly different at (P < .05)

eggs although a significant difference in egg weights between them was observed (Table 1).

The yolk colour score was highest for farm poultry eggs where a value of twelve was obtained, compared with scores of nine and seven observed for local commercial eggs and imported respectively. The differences in yolk colour were significant (P < .05) between the farm poultry and the local commercial as well as imported eggs.

The mean maximum temperature during the five months period in which this study was undertaken was 20.5°C, ranging from 18.4°C. to 22.3°C. The minimal temperatures were 7.6°C, 6.3°C–9.9°C. for the mean minimum, and the range respectively. Those for the relative humidity were 68.8 % for the mean and ranging from 57.1 % to 78.7 %.

Although evidence exists on the relationship between temperature and carbon dioxide loss from the egg as well as the temperature and inferior quality of the egg, the authors of this paper are of the opinion that long periods of storage in improper environments were more of a contributing factor towards deterioration of egg quality in the marketed eggs in Tripoli.

It is important to note that farm poultry eggs are never packed. These eggs get introduced to the market shortly after being laid without packing in filters, which results in their inferior quality. This observation is in agreement with that reported in the literature (9).

The shell weights in the eggs from the three sources is indicative of adequate supply of calcium in the rations of the laying hens. The increase in the pigmentation of the yolk in the farm poultry eggs may be attributed to the green grass or forages and seeds that are usually available in conventional family farms.

Table 3 Percentage dirty eggs, Haugh units, pH of albumen and yolk colour in eggs from three sources in Tripoli market.

Observation sources of eggs	Dirty eggs %	Haugh units	Albumen pH	Yolk colour score
Local commercial	29.6	65	8.6	9
Farm poultry	55.8	73	8.6	12
Imported	36.8	55	8.7	7
l s d[1] (P < .05)	N.S.	8	N.S.	2.18

[1] Differences between any two means exceeding the respective lsd are significant.

SUMMARY

Eggs from three sources were selected randomly throughout Tripoli, Libyan Arab Republic. The sources of eggs were commercial local, farm poultry and imported from foreign countries. The eggs were subjected to qualitive and quantitative analysis related to their quality. The results indicated that all eggs were of a poor quality irrelative of the source. This could be attributed to improper handling and storage practices by producers and or marketers. The eggs from farm poultry were better than either of the local commercial or imported eggs from a quality standpoint. This is probably due to marketing the eggs directly from producer to consumer, a marketing procedure which usually is popular in a country with a deficit in home egg production.

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