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Level of bacterial load on guinea fowl fresh egg shell and internal contents

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Bacterial contamination of shell egg is an important factor contributing to egg losses. Due to excellent shell quality attributes, guinea fowl eggs are generally considered relatively wholesome among poultry eggs (Danilova and Shipts 1978; Mahapatra *et al.*, 1987; Parkhurst and Mountney, 1988; Singh, 1991). However, the rearing system and season of laying may influence the level of microbial contamination of eggs. The present investigation was, therefore, aimed at assessing the level of bacterial load on the shell and in the contents of guinea fowl eggs as influenced by rearing system, seasons and egg white lysozyme levels.

Fresh eggs free from visible blemish were obtained from indigenous guinea fowl layers of same genetic stock and same age maintained at this institute under standard management and identical feeding conditions. Sampling for microbiological assay was done by swabbing 1 cm^2 on the shell surface and by taking 1 g mixed sample of contents. Suitable dilutions were plated on plate count agar and counts were reported per cm^2 of the shell area and per gram of egg contents. Chi-square test of significance was used to compare the mean values. Lysozyme was also analysed in representative samples (Wilcox and Cole, 1954).

Results showed that the cage laid eggs had a higher hygienic quality and lower percent of dirty eggs as compared to floor eggs. The mean bacterial counts on shell of floor eggs (18.6×10^2) was found to be significantly higher than the shell count for cage eggs (12.9×10^2). Forsythe *et al.* (1953) reported an average of 6.3×10^4 microorganisms on the egg shell produced at experimental poultry farm in temperate climates. Existence of much higher microbial load on egg shell was reported for chicken eggs produced in tropics by Bhargava *et al.* (1975). The results pertaining to the bacterial counts in egg contents revealed similar mean values for cage and floor eggs (5.7×10^1/g), although mean shell counts were significantly different. Average bacterial loads were comparatively

higher for monsoon than for summer months but differences between seasons were not significant. The bacterial load of contents when expressed as percentage (Table 1) of the shell count showed that the bacterial counts (Cage 37.4%, Floor 38.2%) were also not significantly different for the eggs from the two rearing systems. The thickness of egg shell averaged 0.48 mm which is much higher than that of chicken egg shell. Besides shell quality and shell membranes, the antimicrobial defence efficacy of eggs is also attributed to egg white protein components like lysozyme, avidin and conalbumin (Board, 1966). The mean lysozyme content in the albumen of cage laid eggs was found to be 1.74 mg/ml and it was negatively correlated with the counts of egg contents. Very low or negative correlation values were also observed between egg shell thickness and bacterial counts of content (Table 2). These observations indicate their direct and important role in antimicrobial defence, and perhaps the guinea fowl eggs are better adopted to counter the hostile environmental stresses of the tropics.

Table 1. Rearing system and seasonal effect on mean bacterial counts of guinea fowl eggs

Season	Month	Rearing system	Av. Temp. (°C)		Bacterial counts		Internal count as % of shell count
			Max.	Min.	Shell ($x10^2/cm^2$)	Contents ($x10^1/g$)	
Summer	Mar.-Apr.	Cage	30.7	17.6	13.4 ± 0.78	6.7 ± 0.49	38.36
	Apr.-May	Floor	36.3	23.3	18.1 ± 1.17	7.5 ± 0.86	37.02
Monsoon	Aug.	Cage	33.0	22.0	20.3 ± 0.13	10.1 ± 1.68	32.86
	Sep.	Floor	30.4	21.9	19.1 ± 1.06	8.3 ± 0.92	40.51

Table 2. Bacterial load correlations

Egg content count correlation with	Egg source		
	Cage	Floor	Pooled
Shell count	0.541	0.674	0.708
Shell thickness	0.027	0.006	–0.065
Lysozyme	–0.066	—	—

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