Microbiological and Nutritional Quality of Freshly Laid Emu Eggs Collected from Different Farms Located in Thane District Of Maharashtra

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ABSTRACT

A total of 60 freshly laid emu eggs were collected from six different emu farms located in Thane district of Maharashtra state. The eggs were analyzed for enumeration of Total Viable Count (TVC) and differential count and for determination of nutritional quality. The microbiological analysis of eggs revealed that average TVC (log cfu/ml) of emu eggs collected from Farm A, B, C, D, E and F were 2.68±0.56, 2.73±0.42, 2.92±0.36, 2.90±0.31, 2.91±0.41 and 2.95±0.44 while yeast and moulds counts were 1.44±0.22, 1.37±0.27, 1.62±0.15, 1.61±0.25, 1.45±0.18 and 1.68±0.17, respectively. Average S. aureus count (log cfu/ml) in emu eggs procured from Farm A, B, C, D, E and F observed were 1.72±0.10, 1.75±0.15, 1.54±0.38, 1.92±0.27, 1.88±0.20 and 1.84±0.10, respectively. However, E. coli and Salmonella spp. were not detected in any of the samples analyzed. The proximate analysis i.e. percent moisture, fat, protein, and ash content of emu egg samples from all the emu farms were in the range of 65.99±3.32 to 67.96±2.74, 14.99±0.78 to 16.28±0.79, 11.27±0.82 to 12.07±0.89, 1.40±0.30 to 1.76±0.57, respectively. Thus, it is concluded that the emu eggs collected from all the six different farms were nutritionally adequate and microbiologically safe for human consumption.

Key words: *Emu egg, Farms, Microbiological quality, Nutritional quality*

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INTRODUCTION

In India, the emu is in demand due to its multifarious characteristics as meat, oil and eggs which can be utilized efficiently for economical and health benefits. The color of the emu egg ranges from a medium green to a dark green (almost black) with some having a very smooth glossy texture. An average emu egg weigh between 500 and 700 gms and it is considered as complete food for the growth and maintenance of human beings due to their nutritive value. However, eggs are known to carry several microorganisms that can either spoil it or lead to food-borne diseases to the consumers. Egg possess several natural defense mechanisms against such microbial invasion albeit fail to prevent absolute invasion. But certain precipitating factors such as defects in the shell formation or post-harvest handling could lead to entry of microorganisms into the interior of eggs. The microorganisms enter into eggs during the process of their formation (maternal or vertical means) in the oviduct or soon after laying and thereafter could be due to handling/environmental contamination or horizontal means.

Many research works have been carried out on chicken eggs but limited literatures were found on the quality of emu eggs. Different emu egg products such as egg bhurji, egg curry, boiled eggs, egg omelet are available in various hotel and restaurants and peoples are accepting as delicacy. Therefore, to protect consumers' health and make them aware about its nutritional and microbiological quality the present research work was undertaken.

MATERIALS AND METHODS

Sample Collection: A total of 60 freshly laid emu eggs were collected from six different emu farms located in thane district of Maharashtra state with all aseptic precautions. The eggs were analyzed for microbiological (viz. TVC and differential count) and nutritional quality (viz. Percent moisture, protein, fat and total ash) to determine its wholesomeness for selling human consumption.

Microbiological Analysis: Total viable counts and differential counts were carried out as per the methods of APHA (1984) with suitable modifications. The surface of emu eggs was sterilized using 70% ethanol and beaten into a sterile polyethylene bag. The bags were subjected to stomacher (Seward Stomacher 80, Fisher Scientific, U.K.) for 60 sec. to obtain a uniform homogenate. Then, 10 ml of egg homogenate was mixed in 90 ml of sterile NSS followed by 10-fold serial dilution in sterile NSS. Thereafter, 0.1 ml each dilution of inoculum was transferred into sterile petri plates in duplicates. Poured about 15-20 ml nutrient agar cooled at 43-450C for TVC and Different selective media viz. EMB, VJ Agar, BGSA, SDA were used for the isolation of E. coli, S. aureus, Salmonella spp. and yeast and moulds, respectively. Isolated microorganisms were characterized by morphological and biochemical examinations and average microbial count was compared with table grade, whole chicken egg standard of Food Administration Manual, version 2.0, published in October 1995 as standards for emu egg was not available.

Proximate Composition: The moisture, fat, crude protein and total ash contents of emu egg were determined as per the standard procedures of Association of Official Analytical Chemists (AOAC, 1995).

Statistical Analysis: The data generated from different quality characteristics during the experiment were compiled and

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Table 1: Microbial count (log cfu/ml) observed in internal content of emu eggs collected from different locations

Location	TVC	S.aureus	E.coli	Yeast and Mould	Salmonella spp.
Farm A	2.68±0.56	1.72±0.10 (3)	-	1.44±0.22 (7)	-
Farm B	2.73±0.42	1.75±0.15 (3)	-	1.37±0.27 (5)	-
Farm C	2.92±0.36	1.54±0.38 (4)	-	1.62±0.15 (6)	-
Farm D	2.90±0.31	1.92±0.27 (4)	-	1.61±0.25 (4)	-
Farm E	2.91±0.41	1.88±0.20 (3)	-	1.45±0.18 (4)	-
Farm F	2.95±0.44	1.84±0.10 (3)	-	1.68±0.17 (4)	-

Figures in parenthesis indicate the number of samples positive

analyzed by Randomized Block Design using software "WASP-Web Agree Stat Package- 2.0" developed at ICAR research complex, Goa.

RESULTS AND DISCUSSION

Microbiological quality of emu eggs: The microbial load of emu eggs was evaluated by Total plate count (TVC), E. coli, Salmonella spp., S. aureus, and yeast and mould counts. The results of average microbial count of emu eggs are presented in Table 1. Average TVC of emu eggs from Farm A, B, C, D, E and F observed were 2.68±0.56, 2.73±0.42, 2.92±0.36, 2.90±0.31, 2.91±0.41 and 2.95±0.44 while yeast and moulds count were 1.44±0.22, 1.37±0.27, 1.62±0.15, 1.61±0.25, 1.45±0.18 and 1.68±0.17 log cfu/ml, respectively. Average S. aureus count observed in emu eggs from Farm A, B, C, D, E and F were 1.72±0.10, 1.75±0.15, 1.54±0.38, 1.92±0.27, 1.88±0.20, and 1.84±0.10 respectively. However, none of the emu egg sample was found positive for E. coli and Salmonella spp. No significant difference was found in average microbial count of emu eggs collected from different farms.

Although the emu bird is a native of Australia no standards are available for raw emu egg in Food Standards Australia-New Zealand since it is rarely available for sale in Australia and require considerably different production systems to those of avian species (Food standards Australia-New Zealand, 2011). After screening various national and international reputed journals, books, websites and other study materials about microbial standards for raw emu egg did not revealed any relevant reference. Therefore, average microbial count was compared with table grade, whole chicken egg standard (Food Administration Manual, 1995). The TVC obtained in the present study was found less than prescribed limits (Food Administration Manual, 1995), whereas E. coli, coliforms, and Salmonella has not found in any of the sample analyzed. Thus, the entire emu egg sample analyzed found microbiologically safe for human consumption.

Proximate Composition: The average percent moisture, protein, fat and total ash observed in each trial is presented in Table 2. The percent moisture, fat, protein, and total ash content

Table 2: Proximate composition (Mean ± SD) of emu eggs collected from different locations in thane district

Location	Proximate Composition (%)			
	Moisture	Fat	Protein	Ash
Farm A	67.16±3.27	14.99±0.93	11.78±0.98	1.67± 0.32
Farm B	66.87±2.75	15.58±0.80	11.50±0.86	1.53±0.46
Farm C	67.96±2.74	15.16±0.87	11.27±0.82	1.40±0.30
Farm D	66.15±2.71	15.97±0.98	12.07±0.89	1.76±0.57
Farm E	65.99±3.32	15.09±0.91	11.81±1.01	1.61±0.40
Farm F	67.09±2.50	16.08±0.95	11.53±0.75	1.59±0.29

found in all the samples collected from the different emu farms were in the range of 65.99±3.32 to 67.96±2.74, 14.99±0.93 to 16.08±0.95, 11.27±0.82 to 12.07±0.89, 1.40±0.30 to 1.76±0.57, respectively. None significant differences were found in proximate composition of emu eggs collected from different farms. Thus, values observed in the present study were in agreement with Angel (1993) and Minnaar (2013). Angel (1993) found that the moisture present in the emu egg was 73.9% whereas, the percent protein, fat, calcium and phosphorus on dry matter basis were 42.9, 48.1, 0.245 and 0.817%, respectively. Minnaar (2013) studied and compared the nutritional values of emu and chicken eggs and observed that the percent moisture, protein and fat present in the emu egg were 67.2, 11.9 and 16.0%, respectively.

CONCLUSION

The study concluded that emu egg collected from all the six different farms were found to be microbiologically safe and nutritionally adequate containing the various components within the standards prescribed by various authorities. Further the study needs to be carried out on large scale by collecting the more egg samples from the various farms located in different parts of state/country to establish the standard at national level.

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