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## *Full Length Research Article*

# THE EFFECT OF VARIOUS SANITIZING AGENTS ON THE MICROBIAL AND DUCKLING QUALITIES OF KUTTANAD DUCK EGGS

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**ABSTRACT**

An experiment was conducted in the Department of Poultry Science, College of Veterinary and Animal Sciences, Mannuthy, Kerala Veterinary and Animal Sciences University to evaluate the effect of various sanitizing agents on the microbial and duckling qualities of hatching eggs of Kuttand duck (*Anas platyrhynchos domesticus*) eggs. A total of 2400 hatching eggs over a period of six weeks was collected for the study. Each treatment consisted of 600 eggs with 100 eggs per replicate. The selected eggs were randomly allotted to the various cleaning methods (dry cleaning, luke warm water wash, glutaraldehyde wash and sodium hypochlorite wash) and the Total Viable Count of the dead embryos have been carried out to ascertain the effect of various cleaning methods on the dead embryos at 24th day of incubation. Also the duckling quality has been assessed on the day of hatch. The findings of the present study revealed no significant differences in the case of microbial and duckling qualities by using different sanitation methods.



## INTRODUCTION

Hatchability is an important economic trait and represents a major component of reproductive fitness in domestic poultry especially in waterfowls. Generally hatchability of artificially incubated duck eggs is low compared with that of chicken eggs. Hatchability percentage of duck eggs fluctuates during the year and reason for the low hatchability rates compared with chicken eggs is often not clear. The main factor that influence duck egg hatchability in artificial incubation is the microbial contamination of eggs and this is due to watery nature of droppings and semi intensive or extensive system of rearing. In order to control microbial populations on the shell surface of hatching eggs, a sanitizing agent is required. Formaldehyde fumigation has been used for this purpose with considerable success. However formaldehyde has two obvious limitations such as it is an obnoxious gas to work with and also it does not have a long term residual effect. Potential alternate sanitizing products include phenol compounds, hypochlorite solutions, quaternary ammonium products and various antibiotic solutions. Although the sanitizing capabilities of these materials were known, the effect of these chemicals on duck embryo survival or hatchability has to be established. It was therefore considered desirable to evaluate the uses of glutaraldehyde (Proudfoot *et al*., 1985) and sodium hypochlorite (Peebles *et al.,* 1987) sanitizers in the present study. Another important factor influencing hatchability of duck eggs is the dense cuticle which covers the pores of a duck egg shell. The egg shell cuticle is a layer of variable thickness (0.5 to 12.8µm) composed of hydroxyapatite crystals, polysachrides, lipids and glycoprotein (Whittow 2000; Fernandez *et al*., 2001). This organic layer is deposited on the egg shell surface and regulates water exchanges as well as the entry of micro-organisms through blocking of the egg shell pores (Chavez *et al*., 2002). In this regard some scientists opined that hatching eggs should not be washed since egg washing or sanitizing procedure removes the cuticle or "bloom" from the egg shell surface during the treatment. Hence, a study was conceived to assess the microbial and duckling qualities of hatching Kuttanad duck eggs by using different sanitation methods.

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## MATERIALS AND METHODS

An experiment was conducted in the Department of Poultry Science, College of Veterinary and Animal Sciences, Mannuthy, Kerala Veterinary and Animal Sciences University to ascertain the microbial and duckling qualities of hatching

eggs cleaned with various sanitizing agents. Hatching eggs used in the study were obtained from a Kuttanad breeder flock aged 30 to 36 weeks at University Poultry and Duck Farm, Mannuthy in semi intensive system of rearing under standard husbandry conditions. In breeding flock, the male female ratio was maintained at the ratio of 1:6. The eggs were gathered manually at 8 AM daily for hatching purposes.

A total of 2400 hatching eggs over a period of six weeks were collected for the study. Each treatment consisted of 600 eggs with 100 eggs per replicate. The selected eggs were randomly allotted to the following treatments.

T1- Cleaning eggs with dry muslin cloth
T2- Washing eggs with water at $40^0$ C for 5 minutes
T3- Washing eggs with 0.3 per cent glutaraldehyde solution at $40^0$ C for 5 minutes
T4- Washing eggs with 2500 ppm sodium hypochlorite solution at $40^0$ C for 5 minutes.

**Table 1. Assessment of different parameters for determining duckling quality (Tona *et al.*, 2003)**

| PARAMETERS | ASSESSMENTS |
|---|---|
| Activity | Activity is assessed by laying the duckling on its back to determine how quickly it returned to its feet. A quick spring back onto its feet was regarded as good, but trailing back onto its feet or remaining on its back was assessed as week. |
| Down and appearance | The duckling body was examined for dryness and cleanness. It was regarded as normal if it is dry and clean. If it is wet or dirty or both (which can be a source of contamination), then it is not good. |
| Retracted yolk | The duckling was put on its back obliquely on the hand palm until abdominal movement totally stopped. The height of its abdomen was estimated. The consistency of the abdomen to touch was then estimated. If the height of abdomen was estimated to be higher and harder to touch than normal, then yolk retracted was regarded as large and consistent. |
| Eyes | The duckling was put on the legs, and its eyes were observed. The state of brightness and wideness of the gape of the eyelids were estimated. |
| Legs | The duckling was put on its feet to determine whether it remained upright well. The toes were examined for their conformation. If the duckling remained upright with difficulty, articulations of the knees were examined to detect signs of inflammation or redness or both. |
| Navel area | Navel and surrounding areas were examined for closure of the navel and its coloration. If the color was different from the skin color of the chick, then it was regarded as bad. |
| Remaining membrane | Observation of the navel area allowed estimation of the size of any remaining membrane. The size of any remaining membrane was classified as very large, large or small. |
| Remaining yolk | Observation of the navel area allowed estimation of the size of any remaining yolk. The size of any remaining yolk was classified as very large, large or small. |

Standard incubation procedure was followed after the treatment of eggs. The Total Viable Count (TVC) of each dead embryo sample was estimated by pour plate technique, as described by Morton (2001) after $24^{th}$ day of incubation. The hatch was taken after 28 days of incubation. All ducklings were counted, weighed individually and arranged treatment wise. They were examined macroscopically to assess different characteristics as per the procedure described by (Tona *et al*., 2003) as shown in Table 1. These characteristics were scored according to their importance with a total scale of 100 (Onbasilar *et al*., 2011) as shown in Table 2.

**Table 2. Day old duckling quality scores (Onbasilar *et al*., 2011)**

| Parameters | Characteristics | Score |
|---|---|---|
| Activity | Good | 16 |
| | Weak | 0 |
| Down and | Clean and dry | 14 |
| appearance | Wet | 8 |
| Eyes | Opened and bright | 16 |
| | Opened and not bright | 8 |
| | Closed | 0 |
| Legs | Normal legs | 16 |
| | One infected leg | 8 |
| | Two infected legs | 0 |
| Navel | Completely closed and clean | 12 |
| | Not completely closed | 0 |
| Remaining | No membrane | 12 |
| membrane | Small membrane | 8 |
| | Large membrane | 4 |
| Retracted yolk | Body with normal swallowed yolk | 14 |
| | Body with swallowed large yolk and rather hard to touch | 0 |

## RESULTS AND DISCUSSION

The mean Total Viable Count ($log_{10}$ cfu /ml) of dead embryos on $24^{th}$ day of incubation obtained for $T_1$, $T_2$, $T_3$ and $T_4$ were 19.83, 20.14, 20.68 and 18.94 respectively. Statistical analysis of data recorded no significant difference among treatments. The findings on Total Viable Count of dead embryos on $24^{th}$ day of incubation were scanty and the studies available were related to shell and shell contents only. Hence the findings of the present study could not be discussed in detail with regard to TVC of dead embryos on $24^{th}$ day of incubation. The mean Duckling quality obtained for $T_1$, $T_2$, $T_3$ and $T_4$ were 80.92, 78.75, 80.67 and 78.33 respectively. The highest duckling quality was recorded in dry cleaning of eggs ($T_1$) followed by glutaraldehyde ($T_3$), luke warm water ($T_2$) and sodium hypochlorite ($T_4$). Statistical analysis of data recorded no significant difference among treatments. The day old duckling quality of all the treatments obtained in the present study is fairly good without any significant difference between them and the values are fairly in agreement with Tona *et al*. (2003) and Onbasilar *et al*. (2011). The data on effect of sanitizing agents on Total Viable Count of dead embryos on $24^{th}$ day of incubation and the duckling qualities are presented in Table 3.

**Table 3. The data on effect of sanitizing agents on Total Viable Count of dead embryos on $24^{th}$ day of incubation and the duckling qualities**

| Treatments | Total Viable Count ($log_{10}$ cfu /ml) | Duckling quality (score out of 100) |
|---|---|---|
| $T_1$ Dry cleaning | 19.83±0.71 | 80.92±1.86 |
| $T_2$ Luke warm water | 20.14±0.55 | 78.75±2.02 |
| $T_3$ Glutaraldehyde | 20.68±0.45 | 80.67±2.49 |
| $T_4$ Sodium hypochlorite | 18.94±0.48 | 78.33±3.03 |

## Conclusion

The study concluded that there was no significant difference in the effects of different sanitizing agents on the microbial and duckling qualities of hatching Kuttanad duck eggs. It also substantiates that the sanitizing agents have their sanitizing property only topically and these agents are not capable of preventing acquired internal infection of the eggs. From this study it is also concluded that such agents are not harmful for the developing embryos and can be very well used for sanitizing hatching eggs.

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