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SHORT COMMUNICATION

Efficacy of a water-based disinfectant on reduction of egg shell bacterial contamination

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Özet

Uçan US, Gök A. Yumurta kabuğunun bakteriyel kontaminasyonunun azaltılmasında su bazlı dezenfektanın etkinliği. **Eurasian J Vet Sci, 2012, 28, 1, 57-59**

SÜ Veteriner Fakültesi Yumurtacı Tavuk Çiftliğinden elde edilen yumurtalarda su bazlı dezenfektanla püskürtme tarzında muamelenin kontaminant bakteri sayısına etkisi ölçüldü. Toplam 80 yumurta kullanıldı. Kontrol ve PotoClean® ile dezenfekte edilen uygulama grubu yumurtalarında aerobik ve Gram negatif bakteri sayıları konvansiyonel teknikler ile belirlendi. Aerobik ve Gram negatif bakteri sayılarındaki azalma önemli idi ($p<0.001$). Dezenfektan ile muamele yumurta kabuğundaki bakteriler üzerinde genel olarak etkili bulundu. Test edilen dezenfektan yumurta kabuğu bakteriyel kontaminasyonun azaltılmasında ümit verici bulundu.

Abstract

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The aim of the study was to evaluate the bacteria levels of non-sprayed and sprayed eggs with a water-based disinfectant from a layer unit of the Veterinary Faculty Farm of SU. A total number of 80 eggs were used. Eggs with PotoClean® treated or not treated were examined by aerobic and Gram negative bacterial contamination using conventional culture techniques. A significant decreases in the counts of aerobic bacteria and Gram negative bacteria were found ($p<0.001$). Thus, this sanitizer showed a general ability to reduce bacteria on egg shells to a negligible number. The disinfectant tested is highly promising for such purpose.

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European Union (EU) Directives on animal welfare also cover housing systems for poultry. In the EU, conventional cage housing for layers will be banned following EU Directive 1999/74 from 2012 onwards (Anonymous 1999). Egg shell quality and hygiene has recently been investigated in furnished cages and non cage systems (De Reu et al 2009). Productions by breeding methods other than conventional cage housing have been discussed (Wall and Tauson 2002, Rodenburg et al 2008, De Reu et al 2009). One of the outstanding issues concerned has been the egg hygiene since more furnished cages and non-cage systems would lead to decrease egg hygiene by causing an increase on the bacterial cell contamination on egg shell (Deu 2006, Mallet et al 2006). In the production, disinfection before hatching is also routinely made and large quantities of chemicals are used since washing significantly reduces aerobic bacteria and coliforms as documented by Buhr et al (2009). A less toxic, user and environment friendly, economical and practical disinfection methods have been under investigation (Scott 1993, Kuo et al 1996, Klaudia 1999, Russel 2010).

PotoClean® is produced from water and salt in a diaphragmatic cell. The process is the separation of the anode and the cathode chambers via a diaphragm. PotoClean®, is formed at the anode through a electrochemical process. A high efficiency against germs, being at the same time completely eco-friendly has been documented by a high reduction potential of c. 1200 mV. PotoClean® does not contain any aggressive chemical agents but reliably eliminate bacteria and viruses with a voltage that is completely nonhazardous for the human being (Anoymous 2011).

The aim of this study was to determine efficacy of PotoClean® on layer egg shell contamination.

A number of 20 sorted (dirty and macro-cracked eggs were removed) eggs were sampled in each time of the sampling in order to ensure statistically reliable results. The eggs were sampled from the day's production after packing with the sterile gloves and placed in new carton filler-flats. The eggs were brought by car, in ambient conditions, to the Konya Veterinary Control and Research laboratory where they were kept for a maximum of 48 h in ambient conditions before analyzing (Huneau-Salaün et al 2010). Sampling was made 4 times and 80 eggs were collected in total.

Differences between groups were analyzed by ANOVA and Duncan Test. $p<0.001$ was accepted statistically significant (SPSS 15.0).

Half of these eggs (n: 10, treated group) were sprayed with PotoClean® and the half served as controls. The eggs in treated group were sprayed for 1 min with the test disinfectant at 20 ^{0}C, while the remaining eggs (n: 10) were not done. Spraying was done using a plastic hand sprayer. To recovery bacteria from the eggshell, the intact egg was placed in a plastic bag with 10 ml quarter-strength Ringer's solution (Oxoid, Hampshire, UK) and the egg was kept in the bag for 1 min. The diluent was then plated by a pipette on Nutrient Agar (Oxoid) for the determination of the total counts of aerobic bacteria and on VRBG Agar (Merck) for the total counts of Gram-negative bacteria. Plates were incubated aerobically for 3 d at 30 ^{0}C as reported before (De Reu et al 2006).

Counts for both the aerobic bacteria and the Gram negative bacteria from treated and control groups are shown in Table 1. Spraying by the test disinfectant for 1 min significantly reduced aerobic bacteria by 1.38 log cfu/mL (51.88%) and reduced Gram negative counts by 0.08 log cfu/mL (10.26%).

A common practice in the handling of hatching eggs is the treatment of the eggs with a chemical (fumigant or other type of disinfectant) to reduce the number of microorganisms on the shell surface. Although this study tested water based disinfectant to determine its potential for reduction of egg shell surface bacterial load, the effects on hatching egg and even chick performance were not measured. However the observed significant differences in total count of aerobic bacteria from the eggs treated and control are remarkable ($p<0.001$ log cfu/mL egg shell).

It is obvious that the results of disinfection are greatly influenced by the timing of treatment. We treated the eggs with the test disinfectant for only 1 min. The longer treatment would give lesser bacterial count. On the other hand the type of organism involved also would likely have a major effect on the counts. Therefore, experimental trials should be conducted to make clear which microorganisms are how affected. Although they have not been detected in this study, other factors such as cracks or dirt on the shell, dust concentration in the housings or even season may also influence bacterial egg shell contamination.

We believe that more research will examine the effectiveness, safety and ease of use of this disinfectant for use on how hatching and chick quality be altered. The disinfectant tested in this trial is concluded to be an alternative to chemicals that traditionally used.

Table 1. Comparison of bacterial enumeration between treated and control egg shell.

	Number of aerobic bacteria (log cfu/mL rinsate)				Number of Gram negative bacteria (log cfu/mL rinsate)			
Trial No	Treated		Control		Treated		Control	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	1.43	0.5	2.43	0.10	0.17	0.19	0.32	0.24
2	1.28	0.25	2.83	0.14	0.26	0.35	1.60	0.32
3	0.91	0.34	2.58	0.47	0.01	0.003	0.46	0.49
4	1.56	0.46	2.80	0.25	0.01	0.003	0.75	0.60
Total	1.28**	0.46	2.66	0.31	0.70**	0.22	0.78	0.65

*** p<0.001*

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