Effect of the Frequency of the Microsafe Spraying on the Production Performance and the Microbial Presence in Mouth and Vent of Broiler Chickens

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Abstract

The experiment aimed to study the effects of the number of microsafe detergent spraying periods on the microbial presence in mouth and vent of birds and their product characteristics. A total of 180 one-day old unsexual chickens (Ross-308) strain were used. The birds were randomly allocated to four treatments with 3 replicated of 15 birds each. The treatments were control (C) without microsafe spray and D3, D7 and D10 which were sprayed with microsafe detergent every 3, 7 and 10 days, respectively. Total bacteria count, coliform and E. coli bacteria at 14 and 28 days in both mouth and vent of birds were significantly (p <0.05) lower when microsafe detergent was sprayed at D3, D7 and D10 treatment as compared with control (C). E. coli O157H7 bacteria in mouth and vent of birds at 14 and 28 days, results were indicated high effectiveness of microsafe spraying period on the elimination of this type of bacteria. Body weight, weight gain, feed intake and feed conversation ratio at 28 days were significantly (p <0.05) higher in all number of microsafe spray periods treatments as compared with control.

Keywords: Microsafe, poultry, E. coli, coliform, productive characteristics.
INTRODUCTION

Poultry is one of the most important industries in the world. It participates in the production of 7.6 billion tons of poultry meat in a year (Allen and Fetterer, 2002). The development of this industry faces many determinants, including field conditions and new of modern breeding (Conway and McKenzie, 2007). Poultry diseases are one of the most challenges faced by breeders, which cause large economic losses due to a large number of mortality, low production and high economic cost of, vaccines and veterinary medicines (Simon, 2005).

Burbarelli et al., (2015) used both glutaraldehydes at 250 g/L and formaldehyde at 185 g/L at 0.5 % in water for sterilization of halls and breeding tools the result was that both were effective for killing microbes. Samaha et al., (2013) compared the use of 4 commercial sterilizers: ammonia hydroxide at 0.5% and 2.5% concentration, phenol concentrations (5, 10 and 20%) and Eco. Bio product with a concentration of 5, 10 and 20%. Results showed that phenol at 10% concentration for 24 hours had the best. Payne et al. (2005) evaluated using sterilizers for floor sterilization and hallway equipment, the treatments consisted of 4 different disinfectants, which included a phenolic compound, a quaternary ammonium compound, a nascent oxygen compound, a compound that contained potassium peroxymonosulfate and sodium chloride as the active ingredients, and a control. Each disinfectant was prepared according to the manufacturers’ recommendations using distilled water. He noticed that the first three compounds led to a significant reduction in the incidence of salmonella and decrease in the number of air bacteria, the absence of unwanted odors and some of them cause sensitivity to the eyes and skin poison as well as could be used before and during rearing the birds in the farm.

Microsafe in terms of use during the presence of birds in the farm because it is non-toxic and without any side effects or allergic to the eyes and has no smell and the important thing is my potential Use it before and during rearing the birds in the farm.

Microsafe is very effective in eliminating many viruses such as H5N1 and HIV HIV (Landa-Solis et al., 2005). Therefore, the present study aimed to demonstrate the effect of the number of periods spraying microsafe on the microbial presence in the mouth and the vent of the birds and their productive characteristics.

MATERIALS AND METHODS

The experiment was carried out in the poultry field of the Animal Production department for the period between 2/11/2017 to 29/11/2017. One hundred eighty one day old chickens distributed to 4 treatments with 3 replicates per treatment and 15 birds each. Chicks placed in floor cages, All administrative procedures were followed by sterilization, ventilation and suitable lighting, and fed on a ready-made feed containing 23% protein, 2850 Kcal / kg feed for starter and, 19% protein and 3170 Kcal / kg for finisher.

The treatments were as follows
1. C: control (without spraying Microsafe)
2- D3: Microsafe spraying every 3 days (9 times during the experiment)
3- D7: Microsafe spraying every 7 days (4 times during the experiment)
4- D10: Microsafe spraying every 10 days (2 times during the experiment)

The microsafe was sprayed at 15 mL per replicate and 1 m high from the birds’ using a special pump to convert it to a very fine spray. We took measurements of the body weight, the rate of weight gain, amount of feed consumed, food conversion efficiency, total number of bacteria, *coliform* and *E. coli*. By a special sterilizer at age 14 and 28 days.

Technique of Petri film was also detected by the presence of *E. coli* O157H: 7 through the use of latex.

Method of Petri film to estimate total count bacteria and *E.Coli, Coliform*

The method of Petri film used for
counting bacterial number, which is characterized by high accuracy and showing shortening time as compared to conventional counting methods, the bacterial colonies of the red and blue developing on the segments of the Petri, some of them producing gas bubbles around their colonies has been fermented lactose sugar producing (Kanagawa et al., 2018). It consists of a flat plate containing a circle divided into 20 small squares. One ml of dilution prepared for the implanting transferred by micropipette to the Petri film and left for a period to ensure equal spread. Then it incubated at a temperature of 37°C for 24 - 48 hours and then the colonies calculated (Blackburn and McCarthy 2000). The percentage of low total bacteria, E. coli and Coliform was calculated, according to Behrad et al. (2009). The differences between the averages were also tested using the least significant difference (L.S.D) using the SPSS (2013).

RESULTS AND DISCUSSION

Different spraying microsafe periods at treatments D3, D7 and D10 resulted showed a significant (p<0.05) decrease in the mouth and Vent total bacteria, coliform and E.coli bacteria at 14 days compare without microsafe spraying treatment (control C) table 1. These treatments were decreased (-52.15, -52.15 and -52.98%) respectively for total bacteria count compared with the control treatment. But coliform and E. coli, bacteria were decreased by -100% lower in mouth samples birds.

The vent samples at the same age were decreased for total bacteria count, (-12.93, -15.25, -13.51) %, coliform bacteria (-13.38, -17.91 and -14.37) % and for E.coli (-14.68, -20.63 and -15.87) % in treatments D3, D7 and D10 respectively.

Table 2 was illustrated the mouth and vent total bacteria, coliform and E. coli bacteria count at 28 day. It was indicated that the mouth bacteria count decreasing significantly (p < 0.05) in D3, D7 and D10 as compared with the control, it observed that the decrease percentage were (-33.64, -33.64 and -24.38)% for total bacteria, whereas the decrease in coliform (-15.38, -31.81 and -15.58)% while E. coli was -100% lower in treatments D3, D7 and D10 respectively.

Microsafe spraying treatments as compared with control for birds vents indicated the total count, coliform were decreased significantly (p < 0.05) to (-14.52, -14.68 and -29.04)% for total bacteria respectively while the decreased for the number of Coliform bacteria (-19.42 and -37.14 and -9.71)% respectively and the E.Coli bacteria was decreased by (-20.0, -40.0 and -7)% for the spray microsafe treatments respectively in relation with control.

It is clear appearance in table 1 and 2 that the effect of period’s microsafe spraying, indicated the decrease in total count, Coliform and E.Coli bacteria in mouth and vent birds at 14 and 28 days, this result were shown to be agreement with Landa-Solis et al. (2005). When using this sterilizer in US hospitals, the results were 100% effective against E. coli, Staphylococcus aureus, Salmonella

Table 1. Effects of microsafe spraying on average on bacteria counts in mouth and Vent of birds in 14 days ± SE (CFU/g)

| Treatments | Total Amount | Coliform | E.coli |
|------------|--------------|----------|--------|
|            | Vent | Mouth | Vent | Mouth | Vent | Mouth |
| C           | 5.18 ± 0.01 | 4.18 ± 0.01 | 5.08 ± 0.02 | 4.00 ± 0.02 | 5.04 ± 0.01 | 3.70 ± 0.03 |
| D3          | 4.51 ± 0.03 | 2.00 ± 0.02 | 4.40 ± 0.01 | 0.00 ± 0.00 | 4.30 ± 0.03 | 0.00 ± 0.00 |
| D7          | 4.39 ± 0.02 | 2.00 ± 0.01 | 4.17 ± 0.02 | 0.00 ± 0.00 | 4.00 ± 0.01 | 0.00 ± 0.00 |
| D10         | 4.48 ± 0.03 | 1.84 ± 0.02 | 4.35 ± 0.01 | 0.00 ± 0.00 | 4.24 ± 0.03 | 0.00 ± 0.00 |

Different letters between treatments in the same column mean significant p<0.05
C: control (without spray), D3: Spray Microsafe every 3 days, D7: Micro-sprayed every 7 days, D10: Micro-sprayed every 10 days.
and other pathogenic bacteria. Microsafe have the ability to perform a wide spectrum action to eliminate pathogenic bacteria (Tanaka et al., 1996; Schneider 2013 and Nakano et al., 2015), as well as those agreed with Horiba et al. (1999) which showed a significant decrease (p < 0.01) in the number of pathogenic bacteria as a result of the use microsafe sterilization technique as compared with the solution of iodine in the feet of people suffer from foot ulcers due to diabetes, which reduced the time of healing wounds for these patients. The microsafe is 99.97% oxidative water reduces the time of sterilization, toxicity and reduce the infections (Netson, 2000). It has the ability to kill single-celled microbes such as bacteria, viruses, and other microorganisms. Its function is to analyze it into high concentrations of positive H+ and other negative charges OH-. These charges are unstable and the walls of the bacteria and viruses attract these ions because they have low concentrations of them, which make these ions to rush into the interior through their production of oxygen free radicals, which are produced by the enzyme NADPH Oxidase. These roots kill bacteria by penetration the walls of the cell and tearing and thus killing them with high efficiency (Horiba et al., 1999).

Table 2. Effects of micro save spraying on average on bacteria counts in mouth and Vent of birds in 28 days ± SE (CFU/g)

| Treatments | Total count |  | Coliform |  |  | E. coli |  |
|------------|-------------|---|----------|---|---|---------|---|
|            | Vent        | Mouth | Vent | Mouth | Vent | Mouth |  |
| C          | 6.06 ± 0.04a | 6.48 ± 0.02a | 5.25 ± 0.04a | 3.08 ± 0.01a | 5.00 ± 0.02 | 2.84 ± 0.01a |
| D3         | 5.18 ± 0.04b | 4.30 ± 0.02b | 4.23 ± 0.02b | 2.60 ± 0.01b | 4.00 ± 0.01b | 0.0 ± 0.00b |
| D7         | 5.17 ± 0.03b | 4.30 ± 0.02b | 3.30 ± 0.02b | 2.10 ± 0.01b | 4.00 ± 0.02b | 0.0 ± 0.00b |
| D10        | 4.30 ± 0.01b | 4.90 ± 0.03b | 4.74 ± 0.03b | 2.60 ± 0.02b | 4.65 ± 0.03b | 0.0 ± 0.00b |

Average of decrease in bacteria numbers

C: control (without spray), D3: Spray Microsafe every 3 days, D7: Micro-sprayed every 7 days, D10: Micro-sprayed every 10 days.

Table 3. Effects of microsafe spraying on present of E. coli bacteria O157H:7 in mouth and Vent of birds in 14 & 28 days ± SE

| Treatments | 14 days | 28 days |
|------------|---------|---------|
|            | Vent | Mouth | Vent | Mouth |
| C          | +   | +     | +    | +     |
| D3         | -   | -     | -    | -     |
| D7         | +   | -     | -    | -     |
| D10        | +   | -     | -    | -     |

Table 4. Effect of microsafe spraying on the average live body weight and body weight gain (gm) of broiler chickens ± SE

| Age (days) | Weight gain |  | Body weight |  |
|------------|-------------|---|-------------|---|
| 7          | 14          | 28 | 7           | 14          | 28 |
| C          | 165.5± 2.4  | 415.5± 5.2 | 1403± 18.2a | 126.5± 2.4  | 250.5± 5.1 | 988± 17.8a |
| D3         | 165± 3.1    | 426.5± 6.1 | 1547± 20.3a | 127.5± 3.1  | 261± 5.9  | 1121± 19.2a |
| D7         | 165± 2.5    | 430.5± 4.5 | 1525± 14.1a | 127.5± 2.5  | 264.5± 4.3 | 1095.5± 14ab |
| D10        | 165.5± 2.0  | 430.5± 4.3 | 1542.5± 17.8a | 127.5± 2.0  | 265.5± 4.1 | 1112± 17.5a |

Different letters between treatments in the same column mean significant p<0.05

C: control (without spray), D3: Spray Microsafe every 3 days, D7: Micro-sprayed every 7 days, D10: Micro-sprayed every 10 days.
Table 3 was indicated the effect of microsafe spraying on the presence of *E. coli* O157:H7 bacteria in the mouth and Vent of the birds at the age of 14 and 28 days. It was showed high effectiveness of microsafe in the elimination of this type of bacteria, which are found naturally in bird feces but are not active and became active with a decrease in bird immunity such as infection with viral diseases, Morita *et al.* (2000) refer to that the microsafe has a high effectiveness in reducing the effectiveness of viruses such as HIV-1, which affects humans by affecting the effectiveness of the surface protein hepatitis B virus.

Table 4 showed the effect of microsafe spraying during certain periods on body weight, weight gain rates at 7, 14 and 28 days. It’s showed no significant differences during the 7 and 14 days’ periods. while showed significant effects at 28 days, as compare with control but no significant change appears between treatments (D3, D7 and D10) the body weight and the weight gain in these treatments become (1547, 1525, and 1542.5) g and (1121, 1095 and 1112 g) for respectively compare with Control when the body weight became (1403) g and weight gain (988) g.

Table (5) referred to the effect of microsafe spraying during different periods on average feed intake and feed conversion efficiency. It’s showed no significant differences during the period 7 and 14 days of the age of birds in all treatments. The control treatment was showed significantly higher (p < 0.05) in 28 days for feed intake which was 1922.5 g and Feed conversion coefficient 1.98 g feed/g body weight gain compare with spraying treatments where no different between them significantly and the amount of feed intake was (1836.6, 1868 and 1821 g) feed conversion coefficient (1.7 and 1.7 and 1.63) g/g for D3, D7 and D10 respectively. They were decreased significantly (p < 0.05) for these treatments as compared with control.

Table 5. Effect of microsafe spraying on the average feed intake and feed conversion (g) of broiler chickens ± SE

| Treatments | Average feed intake | Average feed conversion |
|------------|---------------------|-------------------------|
|            | 7                   | 14                      | 28 accumulation | 7       | 14       | 28 accumulation |
| C          | 118.5 ± 4.5         | 368.5 ± 11.4            | 1922.5±21.1t   | 0.90 ±0.01 | 1.39 ± 0.08 | 1.94 ± 0.09c | 1.76±0.063c |
| D3         | 115.5 ± 6.6         | 350 ± 16.2              | 1836.5±24.2a   | 0.92 ± 0.02 | 1.39 ± 0.05 | 1.71 ± 0.08b | 1.53±0.052a |
| D7         | 117 ± 3.9           | 353.5 ± 12.4            | 1868 ±18.6b    | 0.91 ± 0.01 | 1.33 ± 0.04 | 1.73 ± 0.07a | 1.57±0.045b |
| D10        | 116 ± 2.8           | 365.5 ± 8.2             | 1821 ±15.9c    | 0.90 ± 0.01 | 1.37 ± 0.05 | 1.63 ± 0.06a | 1.53±0.042b |

Different letters between treatments in the same column mean significant p<0.05.  
C control (without spray), D3: Spray Microsafe every 3 days, D7: Micro-sprayed every 7 days, D10: Micro-sprayed every 10 days.

Present of bacteria, neither harmful or benefit naturally presence in the digestive tract of birds. These have a clear effect on the health of birds thus affect the various functions such as feeding, immunity and physiology status of birds (Kohl, 2012). The microsafe spraying treatments was indicated that decrease numbers of harmful bacteria will help beneficial bacteria to grow and multiply and thus improve the productive performance of birds as body weight and weight gain with an improvement in the feed conversion coefficient of birds. Ahmed *et al.*, (2015) showed that the (Bacillus spp.) and Lactobacillus spp., which represent significant beneficial bacteria not affected when using Clo2 in percentage (0, 0.05 and 0.1%) as a sterilizer, The effect was clear on Salmonella and *E. coli* bacteria, which had a positive effect on production performance For birds. Microsafe spraying has a positive effect through reducing odors emitted from bird feces as it plays a role in eliminating the bacteria that produce these odors when they degrade animal waste (Zhu, 2000).

We conclude from the above that it was possible to use microsafe sprayer during the breeding period of the broiler chickens for several times to reduce the harmful effects of the infectious microbes and improve the environmental conditions of breeding as it a component of water 99.97%, which reflects positively the production values.

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CONFLICT OF INTEREST  
The authors declares that there is no conflict of interest.
AUTHORS’ CONTRIBUTION
All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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DATA AVAILABILITY
All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT
This article does not contain any studies with human participants or animals performed by any of the authors.

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