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Effects of Antimicrobial Application of Greencop-Pro1, Greencop-Pro2 and Nano-Aq on Chick Quality in the Incubation Period of Japanese Quail (Coturnix Coturnix Japonica)

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Abstract- World-wide poultry production is increasing day by day. One of the problems encountered in poultry production is disinfection. There are many microorganisms such as bacteria, viruses, fungi and parasites in the incubators. These microorganisms have negative effects such as the incubation of eggs incubated in the embryonic period, low chick weight, and poor chick quality. These effects lead to significant economic losses in commercial production. There are many disinfection applications to prevent these economic losses. In this study, the effects of antimicrobials on Japanese quail eggs in the embryonic period were investigated. The study control group consists of the 4th group as Greencop-Pro1, Greencop-Pro2 and Nano-Aq. There are 100 eggs for each group and 400 eggs for recurrence.In the study, a total of 1200 Japanese quails were used for 3 recurrences. For each antimicrobial 1 liter, 25 mg / kg x 5 was diluted to 25 mg / kg.

Keywords: *chick quality, antimicrobial, greencop-pro1, greencop-pro2, nano-aq.*

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Keywords: chick quality, antimicrobial, greencop-pro1, greencop-pro2, nano-aq.

I. Introduction

Due to the developments in poultry farmingworldwide, poultry meat production has increased significantly in the last 30 years. When world meat production is examinedtoday, 37.27% of the production amount is provided from chicken, whilepork meat is produced by 36.52%, cattle meat by 21.69% and ovine meat by 4.51% (FAO, 2018). While the total amount of meat producedwas330.5milliontons in 2018, FAO announcedthat the total amount of meat will reach 357.5 milliontons in 2025, it is estimatedthat the amount of poultry meat will have the highest share in this production share. In particular, in the world chicken meat production in the United States, Brazil, China, European Union, India, Russia, Mexico, Argentina, Turkey, Thailand, Indonesia is located in the first row (USDA-FAS 2018). In addition to chicken meat production worldwide, the consumption of small species such as turkey, goose, duck, partridge and quail has increased significantly in recent years.It occurs in various problems with the increase in production significantly. These problemsincludepoorcleaning of the incubator, tools and equipment (Avens et al., 1974; Whistler and Sheldon, 1989,; Brake and Sheldon, 1991).There are various microorganisms such as bacteria, viruses, fungi and parasites on them. The medium in the embryo has the necessary conditions for the growth of microorganisms. Under unfavorable conditions during incubation, embryo development is prevented. Accordingly, it has negative effects on chick quality, embryonic deaths, growth and development. In addition, economic losses increase due to losses (Sacco et al., 1989; Scott and Swetnam, 1993, Reid et al., 1961). To providedisinfection during the incubation period; materials such as fumigation, UV light, spray, various organicacids, vinegar, antimicrobial and antibacterial are used. (Adler et al. 1979; Arhienbuwa et al. 1980; Kuhl, 1989; Proudfoot et al., 1985; Sacco et al., 1989; Whistler &Sheldon, 1989).Preventing the formation of microorganisms such as bacteria, viruses, fungi and parasites in incubation causesboth the decrease in embryonic mortality rate and the increase of chick quality (Scott and Swetnam, 1993; Sacco et al. 1989; Reid et al. 1961).

a) Some Studies Done Worldwide

It was for Fren and Sheldon, (1990) to apply different doses of couverternar ammonium (1.05% and 3%) to eggs obtained from flocks of five different ages (32, 36, 42, 46, 62 weeks).In the study, Brake and Sheldon (1990) stated that the application of couverternar ammonium increased hatching efficiency by 6% in eggs. In a study using turkey derived eggs used as model animal, Sacco et al. (1989) observed the effects of quaternary ammonium compounds and formalin fumigation on shell antimicrobial activity, efficacy and embryonic survival. Sacco et al. (1989) stated that embryonic viability of the group in which the application of couverternar ammonium was applied in 2

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trials differed statistically (P <0.05).They also reported that there was no significant difference in antimicrobial activities in the third trial group.In a study by Shahein and Sedeek (2014), they observed the effects of 7% and 14% propolis, 0.5% and 0.7% thyme essential oil, 70% ethyl alcohol, formaldehyde and control group.In the study, the number of chicks obtained from 14% propolis application was higher than the other groups; reported that embryonic mortality rates were at least 7% and 14% in propolis-treated groups. In the study where Japanese quail was used as a model animal, Fouad et al. (2018) used garlic oil as a disinfectant. In the study, they observed that the application of 1ml / liter and 2ml / liter of garlic oil solution was significantly higher in hatching efficiency, chick weight, and chick length compared to the control group (P <0.05). Fouad et al. (2019) in their study, they observed the differences between the control group and the hatching efficiency of the vinegar applied in 3 different doses (1.25%, 2.5 and 5) as disinfectant. In the study, they stated that the vinegar they applied as a spray was statistically more embryo weight, chick weight and length (P <0.05).In a similar study, Manwar et al. (2012) reported that vinegar application increased chick weight. In another similar study, they stated that the application of vinegar as disinfectant has effects on embryo development, egg weight, gas exchange, metabolism and development (Paganelli et al., 1978; Rahn et al., 1979, Rahn and Ar, 1980 and Burton and Tullet, 1983).In a study by Debes and Basyony (2011), they examined the effects of thyme (Origanum vulgarel) and ginger (Zingiber officinale) oil on White Leghorn and Matrouh chicken eggs. When the incubation efficiency was examined in the study, 86.45% in the control group, 89.46% in formaldehyde, 87.08% in alcohol group, 94.40% in thyme oil, they stated that it was 93.66% in ginger oil and 94.96 ± 0.266% in thyme and ginger mixture. They also reported that the application of thyme and ginger oil reduced embryo mortality, increased chick weight and had a positive effect on performance. Batkowska et al. (2018) used red grapefruit juice as a disinfectant for Japanese quail eggs. First group control group in the study, group 2 formaldehyde and KMnO4 and red grapefruit juice was applied to the third group. In the study results, they stated that using red grapefruit juice as a disinfectant had no effect. In their study, Marlina et al. (2017) used three different amounts (25%, 50%, 75%) as antibacterial disinfection of guava leaf water. In the study results, they stated that the use of 75% guava leaf water decreased the total number of bacteria by 89.53%.

b) Determination of Chick Quality

A quality chick shouldpossess the characteristics of optimum development during incubation, high survival, good growth after emergence, and efficiency in accordance with standards. The eyes of a quality chick thatcomes out of the incubation and driesshould be bright, without anydeformity or wound in the body, the belly is completelyclosed, the yellow is completelyremoved, and it is free from the membrane and shell residues. This chicks should be able to give a reaction, thereshould be no edema, lesion or similarswelling in the body, it shouldreact to externalsounds or different stimuli, be awake and activelyrelated to itsenvironment (Tona et al., 2005).Considering all these features, chicks are divided into different classes according to physical features (Tona et al., 2004, 2003a, 2003b, 2001).

c) Tona Score Method

The general activity and appearance of chicks of a day old age that has justhatched and dried out the tonna score, the presence and amount of yellowresidue, the condition of the eyes, navel area and legs, the presence and quantity of hered membranes, ıt is a qualitative method that is evaluated over 100 pointsconsidering the egg yolk withdrawal criteria.The quality criteriondecreases for an abnormality in eachcriterionconsidered. Also performance, efficiency, etc. It helps to estimate the criteria (Tona et al. 2003).

Table1.1: Criteria for Determining Chick Quality in Tona Score Method

Quality criterion	Determination Conditions	Score
Activity	Activity is assessed by laying the chick on itsback to determine how quickly it returned to itsfeet. A quick spring back on to its feet was regarded as good, but trailing back on to its feet or remaining on its back was assessed as weak.	6-0
Down and appearance	The chick body wasexamined for dryness and cleanness. It wasregarded as normal if it is dry and clean. If it is wet or dirty or boththen it is not good.	10-8-0
Retracted yolk	The chick was put on itsbackobliquely on the handpalmuntil abdominal movement totally stopped. The height of its abdomen wasestimated. The consistency of the abdomen to touch was then estimated. If the height of abdomen was estimated to be higher and harder to touchthan normal, then yolk retracted was regarded as large and consistent.	16-12-8-4-0

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Eyes	The chick was put on the legs, and its eyes were observed. The state of brightness and wideness of the gape of the eyelids were estimated.	16-8-0
Legs	The chick was put on itsfeet to determine if it remaine dupright well. The toes were examined for their conformation. If the chick remaine dupright with difficulty, articulations of the knees were examined to detect signs of inflammation or redness or both.	16-8-0
Navel area	Navel and surrounding are as were examined for closure of the navel and its coloration. If the colorwas different from the skin color of the chick, then it was regarded as bad.	12-8-4-0
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.	12-6-0
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.	12-0

(Tona et.al., 2003).

II. Material and Method

In the study, 4 experiment groups, Greencop-Pro1, Greencop-Pro2, Nano-Aq and controlgroup were used. A separate incubator was used for each trial group. A total of 400 Japanese quail eggs, 100 of which were included in each incubator, were placed. A total of 1200 Japanese quail eggs were used, 400 for each recurrence. Greencop-Pro1, Greencop-Pro2 and Nano-Aq used antimicrobially in the study were systematically adjusted by automated sprays during the incubation period. For each antimicrobial 1 liter, 25 mg / kg was diluted in the amount of 25 mg / kg x 5. In the study, the chick quality obtained from each incubator was determined using the Tona Score method. In addition, the incubation efficiency was examined for eachgroup. In addition, the total number of chicks obtained from the eggs laid for each incubator was also examined.

For the variables that meet the parametric test assumptions for the statistical analysis of the data obtained from the study, it was revealed whether there is a difference between the variance analysis technique and the experiment groups at the level of 5% significance. All statistical analyzes were done using SPSS statistical software. Variance analysis technique for variables has been demonstrated with anova test whether there is a difference between experiment groups and 5% significance level. Duncan and Tukey multiple comparison tests were conducted for the parametric test to determine which group or groups originated from the differences. For non-parametric groups, Games Howell test test was applied.

III. Results

In the study, when the incubation efficiencies were examined in the first recurrence Greencop-Pro1 84%, Greencop-Pro2 91%, Nano-Aq 97% and control group 87% determined to be.In the secondrecurrence, it wasobservedthat the incubation efficiencywas 90%, 86%, 94% and 83% in the same order. In the thirdrecurrence, 85%, 87%, 96% and 86% were determined in the same order. In the study, it was found that the highest incubation efficiency among the groupswas in the group with Nano-Aq antimicrobial application (Table1.1.). When recurrence group average was examined, it wasfound as 89.75, 88.25 and 88.5. Of these mean values, Nano-Aq antimicrobial applied group was estimated to have a statistically significant difference in hatching efficiency (Table 1.1.).

In the second recurrence, it wasobservedthat the incubation efficiencywas 90%, 86%, 94% and 83% in the same order.In the third recurrence, 85%, 87%, 96% and 86% were determined in the same order.In the study, it wasfoundthat the highest incubation efficiency among the groups was in the group with Nano-Aq antimicrobial application (Table1.1.). When recurrences group average was examined, it wasfound as 89.75, 88.25 and 88.5. Of these mean values, Nano-Aq antimicrobial applied group was estimated to have a statistically significant difference in hatching efficiency (Table 1.1.).

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Tablo 1.1: Number of chicks obtained from Greencop-Pro1 Greencop-Pro2 Nano-Aq and Control Groups

	Greencop-Pro1	Greencop-Pro2	Nano-Aq	Control Group	Groupsmean
		1st recurrence			
Number of eggs	100	100	100	100	100
Number of chicks	84	91	97	87	89.75
		2 strecurrence			
Number of eggs	100	100	100	100	100
Number of chicks	90	86	94	83	88.25
		3 strecurrence			
Number of eggs	100	100	100	100	100
Number of chicks	85	87	96	86	88.5

When the chick quality for the first recurrence was examined in the study, Greencop-Pro1 Greencop-Pro2 Nano-Aq and Tona Score scores for the control group were; It was found as 93.6, 97.29, 99.85 and 93.27 (Table 1.2.).It was determined that the group with the highest chick quality among the groups with antimicrobial application was in the group with Nano-Aq. When the second recurrence is examined, Tona Score scores are in the same order; The grooves 95.15, 93.86, 99.2 and 92.42were estimated. For the third recurrence, Tona is for Score scores; Designed as 96.68, 95.27, 98.6 and 93.86(Table 1.2.)

Tablo 1.2: Of Greencop-Pro1 Greencop-Pro2 Nano-Aq and Control Groups' Tona Score and Pasgar Score.

	Greencop-Pro1	Greencop-Pro2	Nano-Aq	Control Group	Groupsmean
			1st recurrence		
Tona Skor Mean	93.6	97.29	99.85	93.27	93.86
			2 strecurrence		
Tona Skor Mean	95.15	93.86	99.2	92.42	95.15
			3 strecurrence		
Tona Skor Mean	96.68	95.27	98.6	93.86	96.01

When the results obtained in the study are analyzed, Nano-Aq antimicrobial application group; Tona Score score was higher than other groups. Nano-Aq antimicrobial administration has affected the chick quality positively in the incubation period. When the total number of chicks hatched from the egg was examined, it was observed that the incubation efficiency of the group with Nano-Aq antimicrobial application was highest.

IV. Conclusions

In the study, when the incubation efficiency was examined for Greencop-Pro1, Greencop-Pro2, Nano-Aq and antimicrobial applications, it was observed that Nano-Aq antimicrobial application increased the incubation efficiency in the 1st, 2nd and 3rd recurrences. In the study, when eggs were examined after incubation, it was found that early and late embryonic deaths were highest in the control group. When the chick quality was examined in the study, the lowest (93.27, 93.27, 92.42) value in all three recurrences belonged to the control group; the highest (99.85, 99.2, 98.6) value was found to be in the group with Nano-Aq application. Chick quality defects; The foot problem was observed that the navel area was not closed and the yellow sac was not pulled in. The group with the most effective results in Greencop-Pro1, Greencop-Pro2, Nano-Aq and antimicrobial applications applied in the study was determined as the group that applied Nano-Aq.

Nano-Aq content feature is bacteria, virus, fungus and parasite. The effective feature of Greencop-Pro1 content is bacteria. The effective feature of Greencop-Pro2 content is on mushrooms. Since the applied antimictobials are commercial products, content information Ertuğrul ARPAÇ belongs to.

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