The 6th International Seminar on Tropical Animal Production
Integrated Approach in Developing Sustainable Tropical Animal Production
October 20-22, 2015, Yogyakarta, Indonesia

Utilization of Bee Nest Waste as A Natural Disinfectant on Hatching Eggs Poultry

Ellin Harlia*, Andrianto*, Eulis Tanti Marlina*, Denny Suryanto*

*Faculty of Animal Husbandry Padjadjaran University
Email :harliaelin@yahoo.co.id

ABSTRACT: Sanitation hatching eggs are essential to achieve a high level of hatchability and produce healthy chicks. Sanitation activities are carried out within the hatching eggs is to clean up using naturally based disinfectant can be used, such as waste bee nest, the election bee nest as a disinfectant because it contains approximately 50% resin compounds (flavonoids and phenolic acids). The purpose of this research was to determine how much influence the use of chemical disinfectants and disinfectant from waste bee nest to changes in the amount of bacteriain air space hatching eggs and disinfectant against bacterial inhibition obtained from the air hatching eggs. The method used is the Open petri dish Method; the data were analyzed descriptively with 5 treatments, Control, Water, Bee nest + Alcohol 70%, $KMnO_4$ + Formalin 40% and Alcohol 70% with four replications. Variables measured is the amount ofair space bacteriaandinhibition of disinfectantagainstbacteriaobtainedfrom the airspacehatching eggsThese results indicate that the bee nest can suppress the growth of bacteria by 41.03% and provide more inhibitory zone of 20 mm, which indicates that the disinfectant used is very strong.

Keywords: bee nest, disinfectants, bacteria, hatching eggs, poultry

INTRODUCTION

Efforts implementation of hatching eggs by using the incubator should be noted hygiene eggs or incubator. One factor that is very influential in the process of hatching is the cleanliness of eggshell, given as part of the outer shell are easily contaminated with dirt, especially feces is a source of bacteria and fungi that can attack the embryo. Hygiene eggs would be better if the eggshell is clean and not contaminated with any dirt. Contamination of eggs can occur since the egg is still in the hen through the air and can be outside once the eggs are in the open air. At hatching, the inner and outer equally affect the outcome of the hatch (M. Rasyaf, 2008). The cause of the spread of disease and death of the embryo was one of which resulted from poor sanitation and less than perfect. During the hatching process should be kept as minimal as possible presence of microorganisms. It is therefore necessary to minimize the disinfection of microorganisms that cause death of the embryo. Types of disinfectants that are less precise, including the dosage is too high, or the improper implementation of the disinfection can cause hatchability and mortality low (Mahfouz, 1998). Sanitation or a purge of hatching eggs and equipment can be done by fumigation. Types of disinfectants are widely used in the hatching process is $KMnO_4$ + Formalin 40% gaseous. Fumigation with a concentration of three times the power that is with a dose of 120 ml of 40% formalin, $KMnO_4$ 60 grams, for each volume of 2.83 m^3 chamber for 20 minutes will kill approximately 97.5% to 99.5% of the organisms on brown egg shell, and around 95% to 98.5% of the organisms in eggshell white, the difference may be caused by the fact that the brown egg shell has a thick cuticle that absorb more gas (North and Bell, 1990).

Sanitation hatching eggs are essential to achieve a high level of hatchability and produce healthy chicks (Fueng-Lin Wo, 1996). Beehive consists of approximately 50% resin compounds (flavonoids and phenolic acids), 30% beeswax, 10% aromatic oils, 5% pollen, and 5% of various aromatic compounds (Fatoni, 2008). Propolis is a disinfectant (antibacterial) that kills germs into the nest. In general, propolis works as guard bee colonies from invading microorganisms and

their products (Salatino *et al.,* 2005). Propolis extract 70% ethanol can be used as antibacterial compounds, both gram-positive bacteria (*Staphilococcusaureus* and *Bacillus subtilis*), as well as gram-negative bacteria (*Escherichia coli*), (Hasan, 2006). The minimum inhibitory concentration (MIC) of each extract of propolis for each bacterium was 0.39% against *Staphilococcusaureus*, *Bacillus subtilis* 0.78% against, and 0.78% against *Escherichia coli* (Fearnley, 2001).

Propolis also contains flavonoids that are so high that many researchers prefer propolis as flavonoids (Chinthapally *et al.,* 1993). The presence of flavonoids, which are pharmacologically flavonoids, function as an anti-inflammatory, antioxidant, analgesic and anti-bacterial (Manoi, 2009). Flavonoid extracts have antibacterial activity against bacteria test with minimum inhibitory concentration (MIC) of the bacteria *Bacillus cereus* is 0.1% and against *Escherichia coli* was 0.5%. Flavonoid extract inhibits the growth of gram-positive bacteria (Staphylococcusaureus, Bacillus subtilis) and gram-negative (*Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi*) (Ogbulie, 2007). Similar studies indicate that flavonoids extract can inhibit the growth of *Staphylococcus aureus* and *Pseudomonas aeruginosa* with the value of MIC (Minimum Inhibitory Concentration) of 2 mg/ml (Ngemenya, 2006). Waste from beekeeping that can be utilized is expected to be one of the solutions to reduce the pollution to the environment. Waste utilization beehive has flavonoid compounds into value the benefits of waste beehive applicative in the community. With the flavonoid compounds are expected to use the beehive can benefit through changes in population size of bacteria by inhibiting the growth of bacteria.

MATERIALS AND METHODS

The method used to calculate the number of bacterial population, in this study is the Disc Plate Method, is a method of calculating the number of microbes from the air that falls on a surface such as flooring, appliances, tables, etc.

Variables Observed

The parameters observed in this study are:

1. The number of bacteria in the airspace hatching and a decrease in the number of bacteria early and late
2. Inhibitory test, which is calculated by measuring the clear zone formed around the dish paper units (mm).

Data Analysis

Data analysis used is descriptive analysis. The data is calculated by finding the average value, standard deviation and coefficient of variation with 5 treatments and 4 replications,

RESULTS AND DISCUSSION

Table 1. Total Population Bacteria in Poultry Incubator

	Treatment				
	Control	Water	Bee Nest	Formalin	Ethanol
		….			
Mean (…..x 104cell/Cm2)	5.51	4.06	2.40	0	3.17
Standarad Deviation	1.60	1.20	0.76	0	0.22
Coefficient of variation	29.03%	29.56%	31.67%	0%	6.94%
A decrease in the number of bacteria	−	25.23%	41.03%	100%	33.96%

The beehive base material as a natural disinfectant can inhibit even decrease the amount of bacteria populations on poultry incubator. Active compound contained in the beehive are

flavonoids that work to inhibit the growth of microorganisms. This is supported by Manoi(2009) statement that the presence of flavonoids, which are pharmacologically flavonoids function that is antibacterial. The working mechanism of these compounds is by forming complex compounds against extracellular proteins that disrupt the bacterial cell membrane integrity. While the group of ethanol is commonly used as a disinfectant in line with the statement Chin, *et al* (2002) that ethanol can inhibit or kill microbial bacteria, viruses, and fungi, but not spores. Ethanol groups working with and powered denaturation mechanism of action in the range of seconds to minutes and for the virus takes over 30 minutes. The alcohol group is not effective for spore bacteria and viruses are less effective for non-lipid. The advantage of this type of ethanol is its stable, does not damage the material, biodegradable, sometimes suitable for skin and slightly lower activity when interacting with the protein. While some of the disadvantages is the high risk of fire or explosion and very quickly evaporate.Cleaning the machine using water fowl hatching, the quick action that is often done by the poultry farmers. This is because the availability and ease of obtaining water. Incubator used should be cleaned of various types of dirt egg dust. In line with the statement Ratna (1993) that bacteria are everywhere: in the soil, air, water, dust, surface and in all sorts of places and environments. Although water does not have properties to inhibit or kill bacteria, the water can be used for cleaning of various kinds of impurities contained in the incubator poultry such as, dust, feathers, hatching egg shell, and others. Such efforts can reduce the amount of bacteria populations on poultry incubator.

Table 2. Clear Zone of various kinds of disinfectants against bacteria from poultry incubator

Code Bacteria	Group Bacteria	Bee Nest (mm)	Formalin (mm)	Ethanol (mm)
A	Gram +	29.0	34.6	21.0
B	Gram +	21.3	67.3	0.0
C	Gram -	25.6	59.6	27.0
D	Gram +	32.3	44.6	26.0
E	Gram +	25.0	43.6	27.3

Criteria categorized antibacterial power of feeble show inhibition zone ≤ 5 mm, is said to be moderate when it shows the inhibition zone of 5-10 mm, said to be strong when it showed inhibitory zone of inhibition of 10-20 mm and is said to be very powerful when it shows the inhibition zone of more than 20 mm (Davis and Stout, 1971). Beehive extracted using 70% ethanol is proven to inhibit the growth of microorganisms, it can be seen in Table 2.which shows the clear zone. According Harbone (1987) states that 70% alcohol can extract flavonoids which are the highest and most important active compounds in propolis. An advantage of ethanol as a solvent is because it has a low boiling point and volatile, thus minimizing the numbers in the extract. This is in line with Anggraini (2006) that the 70% alcohol aresemipolar so that all active components with different polarity in propolis can be extracted. According to Pelczar and Chan (1988) flavonoids, phenolic compounds hydroquinone and tannins classes of compounds including phenols, because all three of these compounds act as an antibacterial. The third type of disinfectant that is effective for use as a disinfectant, although natural disinfectant with a beehive base material has not been able to inhibit or kill bacteria optimally like mixing $KMnO_4$ + Formalin 40%.

CONCLUSIONS

Extracting the beehive is able to reduce the amount of bacteria in the incubator of 41.03% with a relatively very strong inhibition zone.

REFERENCES

Anggraini AD. 2006. P*otensi Propolis Lebah Madu Trigona spp. Sebagai Bahan Antibakteri. Bogor: Program Studi Biokimia Fakultas Matematika dan Ilmu Pengetahuan Alam.* Institut Pertanian Bogor

Chin, J.H. Azhar, S. Hoffman, B.R. 2002. Inactivation of endothelial derived relaxing factor by oxidised lipoproteins. Journal of clinical investigation.Vol89 : 10-18.

Chinthapally V, Rao, Valhalla NY. 1993. Propolis. Medical Journal 53:1482-1488.

Davis dan Stout. (1971). Disc Plate Method of Microbiological Antibiotic Essay. Journal Of Microbiology.Vol 22 No 4. 39

Fatoni A. *Pengaruh Propolis Trigona spp Asal Bukit Tinggi Terhadap Beberapa Bakteri Usus Halus Sapi dan Penelusuran Komponen Aktifnya* [Tesis]. Bogor: Program Pascasarjana, Institut Pertanian Bogor; 2008.

Fearnley, J. 2001. Bee propolis:Natural Healing from the Hive. Souvenir Press ltd: London

Fueng – Lin Wo, J.B. Carey, S.C. Ricke, dan S. D HA, 1996. Peroxidase catalyzed chemical dip, egg shell surface contamination, and hatchi. J. appl. Poult. Res. 5:6-13.

Harbone, J. B. 1987. *Metode Fitokimia.* Terbitanke-II.a.b. Kosasih Padmawinata. Penerbit ITB. Bandung. 40

Jenie, Betty S.L dan Srikandi Fardiaz. 1989. *Uji Sanitasi Dalam Industri Pangan. Pusat Antar Universitas Pangan dan Gizi* (IPB). Bogor.

Krell, R. 1996. Value-Added Products From Beekeeping; FAO Agricultural Services Bulltein No. 124. Food dan Agriculture Organization of the United Nations Rome 1996.www.fao.org/docrep.htm.

Manoi F., 2009, *Binahong (Anrederacordifolia) sebagai obat.* Warta Penelitian Pengembangan TanamanObat, 15: 3-6.

Rasyaf, M. 2008. P*anduan Beternak Ayam Pedaging.* Penebar Swadaya, Jakarta.

Mahfudz, L.D. 1998. *Manajemen Penetasan Telur Unggas.* Fakultas Peternakan Universitas Diponegoro.

Ngemenya. 2006. "Antibacterial Effects of Some Cameroonian Medicinal plants against common pathogenic bacteria". African Journal of Traditional,Complementary and Alternative Medicines. 3, (2), 84-93.

North, M. dan D. D. Bell. 1990. Commercial Chicken Production Manual. Van Nostrand Reinhold, New York.

Ogbulie. 2007. Antibacterial Activities and Toxicological Potentials of Crude Ethanolic Extracts of Euphorbia hirta. African Journal of Biotechnology. 6, (13), 1544-1548.

Pelczar, Michael, J., E.C.S Chan. 1988. *Dasar – Dasar Mikrobiologi,* Jakarta: UI Press.

Ratna, S.H. 1993. *Mikrobiologi Dasar Dalam Praktek, Teknik dan Prosedur Dasar Laboratorium. Bogor:* Lab. Mikrobiologi FMIPA IPB. 42

Scott, T.A. araid C. Swetnam, (1993). Screening sanitizing agents and methods of application for hatching eggs. I. Environment and user friendliness. J. Appl. Poultry Res.2:1-6.

Salatino, Antonio Erica Weinstein Teixeira, Giuseppina Negri dan Dejair Message. 2005. Origin and Chemical Variation of Brazilian Propolis.EvidanceBased Compl and Alt Medicine, Volume 2,1 . Pp.33-38.

Simon M. Shane' and Annfaust. 1996. Evaluation of Sanitizers for Hatching Eggs. Applied Poultry sfienc+ Inr