

## ANTIBACTERIAL ACTIVITY OF NONI JUICE FRUIT (*Morinda citrifolia* L) ON PERFORMANCE AND HEMATOLOGIC INDICATOR ON SENTUL CHICKEN

Tuti WIDJASTUTI, Iwan SETIAWAN, Abun HASBUNA, Indrawati YUDAASMARA

Faculty of Animal Husbandry, Universitas Padjadjaran, Jalan Raya Bandung-Sumedang Km 21  
Indonesia

Corresponding author email: tuti\_widjastuti@yahoo.com

### Abstract

*Noni juice fruit is a natural antibiotic from herbal plants, and has an anthraquinone active as an antibacterial. The research was held to find out the effect of Noni juice fruit in the drink water on the performance and hematologic indicator on Sentul Chicken. The experimental used 120 day old chick Sentul chicken, with a Completely Randomized Design (CRD), with six treatments and four replications. The ration treatments were P0: control ration without Noni juice fruit, P1: Ration + 1 ml Noni juice fruit, P2: Ration + 2 ml, P3: Ration + 3 ml, P4: Ration + 4 ml and P5: Ration + 5 ml. Variables observed were water consumption, feed consumption, body weight, feed efficiency, and hematologic indicator of Sentul chicken. Statistical analysis showed that the treatment significantly affect ( $P < 0.05$ ) on body weight, feed conversion and hematologic indicator, but not significant effect on feed consumption, and water consumption. It can be concluded that treatment Noni juice fruit 3 ml/litre drinking water produced good performance of Sentul chickens.*

**Key words:** *Noni juice fruit, performance, hematologic indicator, Sentul chicken.*

### INTRODUCTION

Sentul Chicken is a local chicken found in West Java, especially in Ciamis Regency, which has the characteristic of gray and white feathers in general in addition to the combination of gray and yellowish brown color variations. The fur is arranged neatly on its chest like dragon scales, and the color of its scales is gray, white or yellow (Sartika and Iskandar, 2008; Widjastuti et al., 2017). Sentul chicken is susceptible to attack by pathogenic bacteria that often attack poultry including *Escherichia coli* and *Staphylococcus aureus*. The presence of pathogenic bacterial infections often causes disease in chickens, making livestock productivity often decline. To avoid infection due to these bacteria, antibiotics are generally given (Khusnan et al., 2008). Continuous use of antibiotics can cause residues in meat. Therefore the use of natural additive feeds (phytobiotics) in poultry feed can reduce the negative impact of antibiotics. Noni is one of the medicinal plants that can be

used as phytobiotics. Noni plants have bioactive compounds such as anti-bacterial, anti-fungal and anti-oxidant (Singh, 2012). Noni fruit is able to activate the lymphoid follicles that are in the Fabricius exchange which function to produce lymphocytes which will differentiate into B-cells and plasma cells as anti-body producers (Razak et al., 2012). Poultry given noni fruit extract can boost productivity because residues can be avoided by utilizing Noni as a natural feed additive (Hidayati, 2006). Noni fruit has secondary compounds which are very useful for the performance of poultry, containing anthraquinone compounds, alkaloids, and glycosides. This compound is found in Noni leaves and fruit whose main function is to overcome digestive and anti-bacterial problems (Solomon, 1999). Anthraquinone in Noni fruit ranges from 5-36 g/100 g of Noni dry ingredients, the anthraquinone content in Noni fruit is 1.20% higher than the anthraquinone content in aloe vera leaves (Bintang et al., 2008). These compounds are useful for

inhibiting the growth of Gram-positive and negative bacteria that can eradicate pathogenic bacteria in the digestive tract and also make the pH of the digestive tract become acidic which allows the protein-breaking enzyme to work optimally. In the study of Rahayu (2013) the use of 3 ml of Noni juice on poultry provided the best performance of edible weights. Subsequent research on the use of 2 ml of Noni juice in drinking water has a significant effect and low feed conversion of poultry (Sujana et al., 2009). Noni fruit as immunostimulant will improve body health through increasing the body's resistance which can be measured from hematological conditions including measuring erythrocyte levels, leukocytes, hemoglobin, hematocrit and blood glucose. Noni acts as an anti-oxidant includes scopoline, nitric oxide, vitamin C and vitamin A. Vitamin C in Noni plays a role in avoiding stress by inhibiting the increase of corticosteroid hormones from the adrenal gland, and can counteract free radicals, by protecting erythrocytes from free radicals causing an increase the percentage of erythrocytes in transporting hemoglobin which binds to oxygen so that the health of chickens increases (Barclay et al., 2000). In addition to having a positive nature, if Noni fruit juice is used continuously at high doses it can cause negative effects, because Noni juice contains polyphenol compounds that cause a feeling of tighten (Nurhayati et al., 2006). Chemical compounds contained in medicinal plants if given at doses that exceed the tolerance limit in the body of an animal will have negative impact on the performance of chicken organs (Vermurugan and Citarasu, 2010). The results of Fenita (2012) study that the use of Noni juice in drinking water at a dose of 3 ml/litre gave a real effect and low feed conversion of

poultry. Based on the explanation, the purpose of research is to determine the effect of the use of Noni juice fruit in the drinking water on the performance and hematologic indicator on Sentul Chicken.

## MATERIAL AND METHODS

The study used 120 DOC Sentul chickens with the average of body weight was 27.92 gram (coefficient of variation 8.0%). The Sentul chicken kept in cage until the age of 12 weeks. 24 cages were used and were measured as 90 cm x 90 cm x 60 cm (length x width x height), each cage consisted of 5 chickens. The Noni fruit variety used is *Morinda citrifolia* variety, contains a water content of about 89.10%. Noni fruit is washed and each peeled, then cut into small pieces and then blended without added water, filtered to separate fiber and liquid (Fenita, 2008). The liquid produced is then mixed into drinking water according to the treatment. The feed ingredients of ration comprised of yellow corn meal, soy-bean meal, rice bran, fish meal, CaCO<sub>3</sub> and bone meal. Rations were prepared based on protein and metabolic energy requirement for Sentul chicken growth phase, ie. 17% protein and metabolic energy 2850 kcal/kg (Widjastuti, 1996). The treatments were P0: control ration without Noni juice fruit/litre drinking water, P1: Ration + 1 ml of noni juice/1 litre of drinking water, P2: Ration + 2 ml of Noni juice/1 litre of drinking water , P3 : Ration + 3 ml of Noni juice/1 litre of drinking water , P4 : Ration + 4 ml of Noni juice/1 litre of drinking water and P5: Ration+ 5 ml of Noni juice/1 litre of drinking. The composition, nutrient and metabolizable energy contents are showed in Tables 1 and 2.

Table 1. The composition basal ration

The feed ingredients	%
Yellow Corn Meal	56.00
Soy-Bean Meal	12.00
Rice Bran	21.50
Fish Meal	9.25
Caco3	0.50
Bone Meal	0.75

Note: Ration from Academic Leadership Grant (ALG) 2015

Table 2. The nutrient and metabolism energy content in Basal Ration

Nutrients	
Crude Protein (%)	17.04
Crude Fat (%)	5.92
Crude Fiber (%)	4.51
Calcium (%)	1.16
Phosphorus (%)	0.36
Lysine (%)	1.21
Methionine (%)	0.40
Metabolizable Energy (kcal/kg)	2781

Experiments were conducted experimentally using Completely Randomized Design, consisting of 6 treatments and 4 replications. Data were analyzed using Variance Analysis and differences between treatments using Duncan Multiple Test. Variables observed were water consumption, feed consumption, body weight, feed conversion, and hematologic indicator of Sentul chicken

## RESULTS AND DISCUSSIONS

### Performance Sentul Chicken

The effect of Noni Juice Fruit on water consumption, feed consumption, body weight, and feed conversion Sentul chickens shown in Table 3.

From Table 3, it can be seen that the average consumption of drinking water given the treatment of the use of Noni fruit juice has decreased compared to the control treatment without Noni juice (P0). The results of the statistical analysis showed that the treatment using noni juice in drinking water had no significant effect ( $P > 0.05$ ) on drinking water consumption. These results indicate that the consumption of drinking water per treatment is in the same range. This condition indicates that Sentul chicken is tolerant of the taste and smell of Noni juice added to drinking water to a dose of 5 ml/litre. In Noni fruit has an active compound from the aromatic group which gives taste to drinking water. According to Wang (2004) in Noni fruit there is a content of tannin, capric acid and caprylic acid which have aromatic properties. This shows that Noni juice given to a dose of 5 ml/litre does not have a negative effect on Sentul chicken. In line with the research of Nurhayati et al., (2006) the use

of Noni juice to a level of 10% in drinking water is safe to use for poultry.

Based on Table 3, feed consumption given the treatment of use of Noni juice tends to experience decline compared to the control treatment. The results of analysis of variance showed that the use of Noni juice in drinking water had no significant effect on the feed consumption. This means that the use of noni juice to a dose of 5 ml does not have a negative effect on feed consumption. Noni fruit has polyphenol compounds, tannins and saponine which can cause a feeling of tighten and rancidity, but because of the provision of Noni juice through drinking water so that it does not affect the ration palatability, consequently it does not affect the consumption of rations. Addition of Noni fruit juice did not significantly reduce palatability, because the noni fruit used a ripe fruit so that the taste of tighten has diminished. In accordance with the opinion of Nurhayati et al. (2006) stated that the level of polyphenols will decrease with the maturation of Noni fruit which is characterized by reduced taste.

From Table 3, it can be seen that the final body weight of Sentul chickens at 12<sup>th</sup> week ranged from 670.80 - 874.88 grams. From the results of the variance analysis showed that drinking water added with Noni juice had a significant effect ( $P < 0.5$ ) on the final body weight Sentul chicken. The final body weight of the treatment P1, P2 and P3 had a higher average real body weight compared to treatments P0, P4 and P5. Noni juice contains antioxidants, anti-bacterial and additives that can improve the performance of the digestive tract of the poultry, so that it can produce higher body weight. Anti-bacteria found in herbal plants can reduce the growth of pathogenic bacteria in the intestine. Noni fruit

contains active ingredients anthraquinone, acubin and alizarin, these substances are useful for optimizing the performance of digestive enzymes in the poultry. (Bangun and Sarwono, 2002). Noni fruit also contains the proxeronase enzyme which will form an active substance in the digestive organ called xeronine. Xeronine will bully the enzymes to function more perfectly so as to optimize the absorption of nutrients so that it will produce a higher body weight. The decrease in body weight in treatments P4 and P5 was caused by the crude fiber content consumed too high so that the performance of the proxeronine enzyme was less optimal which caused body weight to decrease. This is in line with Nurhayati (2006) research in male chickens that the use of Noni fruit juice at the level of 5% through drinking water has decreased body weight, Table 3 shows that the average feed conversion of Sentul chicken during the study ranged from 4.07 - 5.02. The results of the variance analysis

show that silver has a significant effect on ration conversion. Giving Noni fruit juice at a dose of 1-3 ml/litre of drinking water has a significant effect on the value of lower ration conversion. The amount of ration consumption is not significantly different, but produces a different body weight, thus affecting the ration conversion value. This means that more efficient consumption of rations is used to produce higher body weight. The anthraquinone content in noni fruit can be consumed properly so that it will affect the ration conversion value. In addition, the content of l-arginine in Noni fruit helps to optimize ration conversion by increasing the relaxation of blood vessels so that the absorption of nutrients is optimal (Rahayu et al, 2013).

#### **Effect of Noni Juice Fruit on Hematologic Value of Sentul Chicken Blood**

Mean hematologic values (number of erythrocytes, leucocytes and haematocrit) of Sentul chicken can be seen in Table 4.

Table 3. The average of were water consumption, feed consumption, body weight, feed efficiency Sentul chickens

Variable	P0	P1	P2	P3	P4	P5
water consumption (ml)	7348.47 a	7234.85 a	7065.70 a	6777.20 a	6260.45 a	62350.45a
Feed Consumption (ml)	3796.47 a	3665.47 a	3490.10 a	3440.87 a	3345.40 a	3340.80 a
Body weight (g)	702.13 b	830.27 a	874.88 a	811.92a	680.86 b	670.80 b
feed conversion	5.02 b	4.04 a	4.02 a	4.06 a	4.83 b	4.88 b

Description: P0= 0% Noni Juice, P1=1 ml Noni Juice, P2= 2 ml Noni Juice, P3=3 ml Noni Juice, P4= 4 ml Noni Juice, P5= 5 ml Noni Juice. Mean values within a row having different superscripts are significantly different by least significant difference test.

Table 4. Effect of Noni juice fruit in the drinking water on number of erythrocytes, haemoglobin, leucocytes and haematocrit of Sentul chicken blood

Treatments	Number of Erythrocytes (items x 10 <sup>6</sup> )	Haemoglobin (g/dL)	Number of Leucocytes (item x 10 <sup>3</sup> )	The Haematocrit value (%)
P0	2.01 b	10.15 b	20.05 b	26.41 b
P1	2.67 a	12.57 a	23.65 a	29.53 a
P2	2.50 a	12.27 a	22.30 a	28.53 a
P3	2.67 a	12.37 a	23.32 a	29.82 a
P4	2.71 a	11.25 a	22.35 a	30.07 a
P5	2.59 a	12.47 a	22.42 a	31.42 a

Description: P0= 0% Noni Juice, P1=1 ml Noni Juice, P2= 2 ml Noni Juice, P3=3 ml Noni Juice, P4= 4 ml Noni Juice, P5= 5 ml Noni Juice. Mean values within a row having different superscripts are significantly different by least significant difference test.

Table 4 shows that erythrocytes from each treatment giving a Noni juice (P1, P2,P3, P4 and P5) a higher tendency of treatment without Noni juice (P0), erythrocyte ranges from 2.01 x 10<sup>6</sup>-2.67 x 10<sup>6</sup>/mm<sup>3</sup>, the amount of hemoglobin ranges between 10.25 - 13.85 g/dL, the number of Sentul chicken leucocytes ranges from

21.30- 23.45 x 10<sup>3</sup>/mm<sup>3</sup>. From Table 4, it can be seen that giving Noni juice through drinking water until the level of 5 ml/litre of drinking water (P1–P4) significantly increases the number of erythrocytes compared to P0 (control). This means that the giving of Noni juice through drinking water can be acts

antioxidant so that it can protect erythrocytes from free radicals so that erythrocytes can carry out its function of transporting hemoglobin which binds to oxygen. Noni as an anti-oxidant can capture free radical compounds by giving electrons from the -OH group so as to produce stable compounds, this leads to physiologically increased chickens (Barclay et al., 2000). Anti-oxidants are capable to protect membrane of erythrocytes from oxidation reactions, erythrocytes have the function of channeling nutrients to the body's tissues and carrying oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs. The number of normal erythrocytes in chickens according to Bell, (2002) is about  $3.0 \times 10^6/\text{mm}^3$ . Blood leucocyte results of the study ranged from  $21.30 - 23.45 \times 10^3/\text{mm}^3$  still in the normal range. The results of variance showed that the treatment had a significant effect on the number of leukocytes. This means that the addition of Noni juice in drinking water as an immunostimulant can increase the body's resistance through increasing leukocytes as the body's defense against infection. The function of leucocyte is to help the body fight various infectious diseases as part of the immune system. In line with the opinion of Smith (1988) that chicken blood leucocyte ranges from  $16 - 40 \times 10^3 /\text{mm}^3$ . Increasing the number of leukocytes in the treatment of Noni fruit juice indicates the body is able to fight infection. Therefore the administration of Noni juice can increase immunity so that it can act as a natural or herbal immunostimulant, which can increase the body's resistance against infection so that the physiology of chicken's health can be maintained.

Hemoglobin shows that the treatment has a significant effect ( $P < 0.05$ ) on the amount of hemoglobin. This means that the use of noni juice can increase metabolism so that the need for oxygen bound by hemoglobin increases. Blood hemoglobin levels describe their ability to raise oxygen for oxidation in the body's metabolism. According to Kusumasari et al (2012), the number of erythrocytes in normal conditions is positively correlated with hemoglobin levels which are when the amount of erythrocytes in the blood increases, the hemoglobin level also increases. The role of Noni juice as an antioxidant is able to protect

erythrocytes from free radicals so that there is no damage to the erythrocyte membrane, this causes hemoglobin that is bound to erythrocyte can perform its role well. Chicken blood hemoglobin levels in the study were in the normal range, according to Jain (1993) normal hemoglobin in chickens was in the range of 7.0-13.0 g/dL, whereas according to Sturkie (2000) normal hemoglobin levels in chicken broiler blood were 9.8%.

The measurement results of Sentul chicken hematocrit values ranged from 27.53 to 32.41%. The amount of hematocrit treatment of noni juice through real drinking water ( $P < 0.05$ ) is higher than the control treatment. Haematocrit is the percentage of red blood cells in all blood volumes, where red blood cells are responsible for carrying oxygen from the lungs throughout the body. The components of Noni fruit are natural antioxidants derived from plants and are known to have an anti-oxidant effect in cells without side effects (Inano et al, 2000). Giving Noni fruit in drinking water can act as an anti-oxidant in counteracting free radicals, causing an increase in the percentage of erythrocytes which also shows the percentage of haematocrit. Normal haematocrit values in chickens are 29.0-40% (Sturkie, 2000). The results of this study indicate that hematocrit levels are still within normal limits. Normal animals have a hematocrit value comparable to erythrocytes and hemoglobin levels.

## CONCLUSIONS

1. The best performance of heat chickens (water consumption, feed consumption, body weight and feed conversion) were given Noni fruit juice 3 ml/litre of drinking water.
2. Noni fruit juice can be used until 5 ml/litre in drinking water without affecting chicken health (erythrocytes=  $2.01 \times 10^6 - 2.67 \times 10^6/\text{mm}^3$ , leukocytes =  $21.30 - 23.45 \times 10^3/\text{mm}^3$ , hemoglobin 10.25 - 13.85 g/dL, and hematocrit = 27.53-32.41%.) and Noni juice can be natural antibiotics from herbal for Sentul chicken.

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