The Effect of Katuk Leaf Supplementation in the Ration on the Number of Erythrocytes and Hemoglobin Value in Rex Rabbits

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Abstract

Increased productivity of rabbits was through improved feed. Katuk plant has high nutritional value and its leaves contain nutrients needed by the body. The protein content in feed greatly affects the character of the blood. The purpose of this study was to optimize the effect of using katuk leaf supplementation on the number of erythrocytes and the hemoglobin value of rex rabbits. The research material were 18 rex rabbits, basal feed added with katuk leaves. The research method used was Completely Randomized Design (CRD) with three treatments, each treatment repeated six times, so that there were 18 experimental units. The treatments were R0: basal diet without katuk leaf supplementation, R1: basal diet with 5% katuk leaf supplementation, R2: basal diet with 10% katuk leaf supplementation. The variables measured were the number of erythrocytes and the value of hemoglobin. Data were analyzed using analysis of covariance (ANCOVA). The results showed that rabbit rex erythrocytes were R0 = 4.7 ± 0.39 x 106/µL; R1 = 4.99 ± 0.28 x 106/µL; R2 = 4.76 ± 0.31 x 106/µ. The average result of the three treatments above was 4.83 ± 0.83 x 106/µL. The erythrocyte mean results were still in the normal range. The results of the analysis of variance showed that the three treatments did not show significant differences. The conclusion of the study was that katuk leaf supplementation can be given to rabbit rex up to a level of 10% without affecting the physiological process of livestock in terms of the number of erythrocytes and hemoglobin values which are relatively the same.

Key words : erythrocytes, hemoglobin, katuk leaves, rabbit rex.

Introduction

Rabbits are one of the meat-producing livestock that can be used as an alternative to meet the needs of animal protein. rabbits can breed quickly and a high growth rate can make rabbits as meat-producing animals. Another advantage in raising rabbits is that rabbit farming does not require a large area of land and the maintenance costs are relatively low so that raising rabbits has great potential to be developed.

Increased productivity of rabbits is through improved feed. The problems that exist in feeding rabbits generally only consist of forage and vegetable waste with low nutritional or nutritional content. These efforts can be overcome through the management of forage feeding mixed with katuk leaves so that it has a high nutritional content. One of the plants that contain high protein is katuk leaf which can increase the hormone progesterone in the blood, so that it can increase rabbit milk production

(Subekti *et al.*, 2008). The protein content of fresh leaves is about 7% and katuk leaves are a source of pro-Vit A, Vitamin C, calcium, iron, and magnesium (Kasmirah *et al*., 2013).

Evaluation of the use of alternative feeds can be viewed from a physiological aspect, one of which is through a blood profile in the form of erythrocytes, hemoglobin, hematocrit and leukocytes. Iron is the most abundant essential micro mineral. This substance is mainly needed in homeophoiesis (blood formation), namely in the synthesis of hemoglobin (Hb) (Sediaoetama,*et al*., 2006).

The high content of protein and minerals in the ration will support the value of a good blood profile and homeostasis system in livestock. The process of forming blood cells that are produced every day in the bone marrow requires precursors such as iron, manganese, cobalt, vitamins, amino acids and hormones to synthesize the formation of blood cells (Hoffbrand *et al*., 1996). In the body, most of the Fe is conjugated, such as (hemoglobin, myoglobin, transferrin, ferritin and hemosiderin) with protein and is present in the form of ferrous or ferric. The active form of iron is usually found as ferrous, while the inactive form is ferric (eg storage form) (Sediaoetama,*et al*., 2006).

Blood is a specialized tissue consisting of blood plasma which is rich in protein (55%) and blood cells (45%). Blood cells consist of red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (blood cells or platelets). Erythrocytes are passive and carry out their functions in blood vessels as carriers of nutrients that have been prepared by the digestive tract to body tissues, carriers of oxygen from the lungs to tissues and carbon dioxide to the lungs, carriers of metabolic wastes from tissues to the kidneys for excretion, and maintain balance and buffer systems

Materials and Methods

Research Time and Place

This research was conducted on August 11, 2014 to October 18, 2014, at Angora Rex Farm, Karang Gintung Village, Sumbang District, Banyumas Regency and the Laboratory of the Bunda Arif Hospital, Purwokerto.

Research Material

The material used in this study was 18 tail rex rabbits, basal feed added with katuk leaves. The basal diet consisted of 11% natural grass, 14% milled corn, 16% bran, 27% coconut cake, 29% pollard, 2.6% molasses, and 0.4% mineral mix.

Table 1. Composition and Nutrient Content of Treated Feed

Feed ingredients	**R0 (%)**	**R1 (%)**	**R2(%)**
Natutal grass	11	11	11
Corn	14	14	14
Bran	16	16	16
Coconut cake	27	27	27
Pollard	29	29	29
Molases	2.6	2,6	2.6
Min Mix	0.4	0.4	0.4
Katuk leaves	0	5	10
Total	**100**	**105**	**110**

Nutrien content (%)			
Dry matter	80.06	84.17	88.29
Crude protein	15.9	17.09	18.37
Fat	6.2	6.55	6.9
Crude fiber	15.09	15.58	16.07
Total Digestible Nutrient	71.4	74.92	78.44
Calcium	0.44	0.55	0.67
Phospor	0.23	0.28	0.34

Research Methods and Variables

The research method used was experimental, completely randomized design (CRD) with 3 treatments, each treatment was repeated 6 times, so there were 18 experimental units. The treatments were R0 : basal diet without katuk leaf supplementation, R1: basal diet with 5% katuk leaf supplementation, R2: basal diet with 10% katuk leaf supplementation. The variables measured were the number of erythrocytes and the value of hemoglobin. Data were analyzed using analysis of covariance (ANCOVA). If the results are significantly different ($P< 0.05$) followed by Orthogonal polynomial, instructions (Steel, 1993).

Results and Discussion

Rabbit rex . erythrocyte count

Erythrocytes are passive and carry out their functions in blood vessels as carriers of nutrients that have been prepared by the digestive tract to body tissues, carriers of oxygen from the lungs to tissues and carbon dioxide to the lungs, carriers of metabolic wastes from tissues to the kidneys to be excreted and maintain balance and buffer system (Guyton, 2010). The results of the average number of erythrocytes can be seen in the following table :

Table 2. The average number of erythrocytes of rabbit rex

Treatments	Average of erythrocyte (10^6 / µL)	Average standard deviation (sd)
R0	4.70	0.39
R1	4.99	0.28
R2	4.76	0.31

R0 = Basal feed (control)
R1 = Basal feed + 5% katuk leaves
R2 = Basal feed + 10% katuk leaves

The results showed that rabbit rex erythrocytes were R0 = 4.7 ± 0.39 x 106/µL; R1 = 4.99 ± 0.28 x 106/µL; R2 = 4.76 ± 0.31 x 106/µL. The erythrocyte mean results were still in the normal range. The results of the analysis of variance showed that the three treatments did not show significant differences. This indicates that the katuk leaf supplementation treatment in rabbits during the experiment has not affected the number

of blood erythrocytes. It was seen that the number of erythrocytes from each treatment was almost the same. The results of the above study showed the number of erythrocytes was still in the normal range. This is the same as Rukayah's opinion (Rukayah, 2008) which states that the normal erythrocyte count of female rabbits is between 4.89 - 6.85 x 106/mm3. In addition, it is also supported by the results of other researchers Smith and Mangkoewidjojo (1988), stating that the total number of normal rabbit erythrocytes is 4-7 x 106/mm3. This is because the level of treatment feed consumption does not significantly affect the number of erythrocytes.

This is also supported by the results of research by Raharjo (Raharjo, 2005) which states that feed consumption per head per day is as follows: adult rabbits 110 – 125 g, pregnant rabbits 200 – 250 g, growing rabbits (1.5 – 6 months) 80 g. According to Whendrato and Madyana (1983), the number of rations given to rabbits depends on the type of rabbit, the weight of the rabbit and the age of the rabbit. The medium type requires more food than the small type but less than the large type. Adult rabbit feed with an average body weight of 2-4 kg that can be given is around 120-180 grams/head/day.

The consumption of feed given in this study was katuk leaf supplementation. Katuk leaves have a fairly high nutrient content including protein. Protein is the main element in the formation of blood erythrocytes. The process of forming new erythrocytes every day requires precursors to synthesize new cells. The precursors needed include iron, vitamins, amino acids, and hormones (Hoffbrand *et al*., 1996). In this study, there were differences in the consumption of feed given to rabbits that had different nutrient adequacy as well. The nutrient content contained in katuk leaves will be absorbed by the livestock body then into the digestive tract starting from the stomach, will experience a nutrient revolt that produces protein, digestion occurs more in the small intestine, protein is degraded into amino acids, absorbed by the small intestine villi and carried by blood vessels to the liver, which will be channeled through the blood resulting in the formation of erythrocytes. Lack of precursors such as iron and amino acids that help the process of formation of erythrocytes will cause a decrease in the number of erythrocytes (Wardhana, 2001). This situation can be caused by impaired absorption or reduced nutritional value in the feed given so that it will affect the organs that play a role in the production of blood cells.

In addition, factors that affect the difference in the number of erythrocytes include age, nutrition, blood volume, species, and altitude, season, time of sampling, the type of anticoagulant can also affect the number of erythrocytes (Jain, 1993).

Hemoglobin Value of Rabbit Rex

Hemoglobin in vertebrate erythrocytes performs two important transport functions, namely: (1) transporting O2 from respiratory organs to peripheral tissues, and (2) transporting CO2 and various protons from peripheral tissues to respiratory organs for further excretion out of the body.

Table 3. Average value of rabbit hemoglobin rex

Treatments	average of hemoglobin (g / 100ml)	Average standard deviation (sd)
R0	9.00	0.98
R1	9.90	0.51
R2	9.40	0.45

R0 = Basal feed (control)
R1 = Basal feed + 5% katuk leaves
R2 = Basal feed + 10% katuk leaves

The results of hemoglobin values in each group were R0 = 9.00 ± 0.98 gr%; R1 = 9.90 ± 0.51 gr%; R2 = 9.40 ± 0.45 gr%. The average result of the three treatments above was 9.43 ± 0.64 gr%. The results of the analysis of variance showed that the three treatments did not show significant differences. This indicates that the treatment using katuk leaf supplementation given to rabbits during the experiment has not affected the value of blood hemoglobin. It can be seen that the level of value of each treatment is almost the same. The results above have hemoglobin values that are still below the normal range. This is in accordance with the opinion of Leeson and Summer (2001) which shows that the normal hemoglobin level of rabbits is 10-15 grams%. It is also supported by research conducted by Harkness and Wagner (1983) which states that the normal hemoglobin value of rabbits is 10-15 grams%.

The results of the hemoglobin covariance analysis showed that katuk leaf supplementation for rex rabbits had no significant effect (P>0.05) on the hemoglobin value. This is because the level of treatment feed consumption has no significant effect on the hemoglobin value. Feed consumption in each study group had different consumption, namely R0 = 81.06 ± 10.61 g; R1 = 82.40 ± 13.28 g; R2 = 80.38 ± 16.05 g. The average yield of the three treatments was 81.28 ± 13.31 g. The results of the average consumption are still low compared to the normal average range.

Consumption of feed with katuk leaf supplementation contains quite high nutrients. The content of nutrients contained include protein. Protein is degraded into amino acids and iron, synthesized through the liver and transported through the blood to form hemoglobin. Iron is a nutrient that plays an important role in the formation of hemoglobin. This is in accordance with the opinion of Ganong (2002), stating that iron content has an important role, namely if the hemoglobin is damaged, the released iron content will go to the liver and then be reused for new hemoglobin needs.

Other factors that can affect the hemoglobin value are gender, age, species, number of erythrocytes, individual health conditions, and altitude of residence. Decreased hemoglobin levels can occur due to impaired erythrocyte formation (erythropoiesis). erythropoiesis will increase in the blood when iron stores are reduced (Harper, 1985). In addition, it can also be caused by a disturbance in the synthesis of amino acids, especially glycine so that hemoglobin synthesis is disrupted Ganong (2002). Other factors that affect hemoglobin levels are animal age, species, environment, feed, presence or absence of erythrocyte damage, and blood handling at the time of examination (Coles, 1982).

Conclusion

Katuk leaf supplementation can be given to rabbits rex up to a level of 10% without affecting the physiological processes of livestock in terms of the number of erythrocytes and hemoglobin values which are relatively the same.

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