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THE USE OF CITRONELLA OIL FEED ADDITIVES OF A FORTIFYING FEED MIXTURE FOR PHYSIOLOGICAL DESCRIPTION OF BEEF CATTLE BLOOD

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ABSTRACT

The citronella oil feed additive is able to increase the immunity of ruminants and poultry. Because citronella essential oil contains bioactive compounds which are able to kill bacteria, help absorb protein as a material for producing immunoglobulins, immune substances for livestock. This study aims to determine the effect of giving premix supplements with essential oils added as a concentrate feed mixture on the physiological picture of beef cattle's blood. The material used was 14 Simental cattle, with an age range of 1-1.5 years. The feed consists of 60% elephant grass forage and 40% concentrate consisting of (pollard, rice bran, corn tumps), by adding 2% premix as a feed mixture. Feeding was given for one month and the conditions were compared before and after giving the citronella oil additive. The method used was treatment by measuring the condition of the cows before and after giving them. Variables observed included levels of physiological blood indicators (leukocytes, platelets, erythrocytes and hemoglobin) of beef cattle. Data analysis uses quantitative descriptive analysis methods. The results of the study showed 1. The red blood cell level before being given the treatment feed was 4.81 x 106 and the average value after being given the treatment feed was 4.68 x 106 uL. The level was 15.10 g/dL. Platelet levels before being given the treatment feed were around 953.36 x 103 and after giving the treatment feed had a higher value, namely 1463.86 x 103.uL.

Keywords: Citronella Essential oil, Premix, Beef cattle, Physiological Features of Blood, Beer Dregs.

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INTRODUCTION

National demand for meat is not balanced with the number of ready-to-slaughter cattle available domestically. In 2015, per capita meat consumption was 2.56 kg per year, which means 653,980 tons. Local breeders supplied 416,090 tons (64%) of cattle, or 2,447,000 live cattle, while the remainder was imported cattle of 237.89 tons (36%), or 1,400,000 live cattle (Taufiq et al., 2017). Fulfillment of meat consumption in Indonesia is still not optimal because the population of beef cattle, especially beef cattle, as well as productivity as seen from body weight gain and low reproduction (Rajab, 2021).

One of the causes of low ruminant livestock productivity in Indonesia is the lack of sustainable availability of quality feed ingredients in sufficient quantities (Gustian and Permadi, 2015). Therefore, efforts need to be made to meet national meat needs, namely by improving local livestock businesses, one of which is improving feed that is cheap and does not compete with human needs. Feed for ruminant livestock can come from agricultural, plantation or agro-industry residues (Ahmad et al., 2023). One of the efforts to improve the productivity of beef cattle is to improve and add natural feed additives in the form of essential oils to the feed.

Citronella essential oil contains several active ingredients that are able to stimulate the production of enzymes and bile acids which are useful in helping the absorption of nutrients and as an antibacterial. Likewise, several macro and micro minerals in the premix are useful as activators of enzyme work during the metabolic process, so that nutrient absorption will be maximized. Protein nutrition in feed is needed to support growth and immunity, while other nutrients fatty acids and fats greatly influence the levels of erythrocytes, hemoglobin, platelets and leukocytes in the blood of beef cattle (Sujono et al., 2023). Optimal physiological blood levels are able to maintain livestock health and ultimately livestock can produce maximum growth. For this reason, it is necessary to carry out research to determine the response of adding citronella oil in premix as a feed mixture to the levels of erythrocytes, leukocytes and platelets in beef cattle. The aim of this research is to examine the addition of essential oil in premix supplements as a mixture of concentrate feed on the effect of erythrocytes, hemoglobin and blood leukocytes in beef cattle.

METHOD AND MATERIALS

The material used in the research (Case Study) is as follows:

a. The beef cattle used in the research were 14 cattle, consisting of 11 Simental cattle, with an age range of 1-1.5 years.

b. Feed Treatment: The feed ingredients used are

- Pure citronella essential oil comes from PT Pemalang Agro Wangi.

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- Concentrate feed comes from KUBE PSP Maju Mapan in Malang Regency (consisting of: pollard, rice bran, corn tumps)

The composition of the treatment feed consists of rice bran, pollard, soybean meal, soy sauce dregs, corn flour and palm oil meal. The nutritional composition of the treatment feed is presented in Table 1 and Table 2. The addition of essential oils is 2.5% of the total premix supplement and the use of premix as a feed mixture is 2% of the concentrate feed mixed with beer dregs. The amount of feed given to cows is 4 kg / head / day.

Table 1: Nutrient Composition of Concentrate Feed

No.	Nutritional Substances	(%)
1.	Water	11,42
2.	Dry Matter (DM)	88,58
3.	Ash	15,89
4.	Proteins	16,27
5.	Crude Fat	3,97
6.	Crude Fiber	21,65

Table 2: Premix supplement feed Composition

No.	Mineral	Content
1.	Calcium (g)	328
2.	Phosphorus (g)	149
3.	Magnesium (g)	12,5
4.	Selenium (g)	8,7
5.	iodine (g)	8,9
6.	Zinc (g)	18
7.	Cobalt (g)	8,69
8.	Vitamin A (IU)	320,000
9.	Vitamin B (IU)	250

Research Design

The research design was experimental by providing treatment with the addition of 2.5% serah wangi essential oil in the premix supplement as a concentrate feed mixture. Observations by comparing the condition of the cows before and after treatment (pre-post research). Provide

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treatment feed as much as 4 kg/head/day for 30 days. Blood from beef cattle was collected twice, namely before and after giving the treatment feed.

Observed variables:

a. independent variable: 2.5% essential oil in premix supplement.

b. Dependent variable: the variable that is observed is the content of erythrocytes, leukocytes and platelets in the blood of beef cattle

Blood Sample Collection

Blood samples were collected aseptically from the jugular vein with a sterile needle into a 5 ml vacutainer tube, then 2.5 ml of blood was put into a tube containing EDTA for hematological profile examination, the remaining 2.5 ml of blood was put into a tube containing heparin for serum nutrient examination. The hematological profile tested includes the number of leukocytes, monocytes, lymphocytes, granulocytes, platelets, erythrocytes, hemoglobin levels, hematocrit and erythrocyte indices which include Mean Corpuscular Hemoglobin Concentration (MCHC), Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Volume (MCV). These parameters were analyzed using a Hematology Analyzer Rayto RT 7600. Serum nutrients tested included triglycerides, cholesterol, glucose and total protein. This examination uses a blood chemistry analyzer with the Ubio-iChem-535 brand. Blood tests were carried out twice, namely before and after giving the treatment feed.

Data analysis

Laboratory data including erythrocyte, Hb, leukocyte and platelet levels in beef cattle blood were processed using Microsoft Excel. quantitatively descriptive. This analysis aims to determine the comparison of the average amount of content in the blood of beef cattle between before and after treatment.

RESULTS AND DISCUSSION

The results of measuring blood levels are presented in Table 3.

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Table 3: Results of Hematology Value Data Analysis

Inspection	Unit	Normal Range	Before (Average)	After (Average)	Difference (%)
white blood cells (WBC)	10^ 3/µL	4,4 – 10,8	15.10	17.46	15.61
Platelets	10^ 3/µL	160 - 650	953.36	1463.86	53.55
Erythrocytes	10^ 6/µL	4,8-7,6	4,81	4,68	-2,82
Hemoglobin	g/dL	8,2-13,0	3,92	3,57	-8,93

Data Source: FKH Laboratory, Brawijaya University Malang (2023).

Blood Erythrocyte Levels

Calculation of red blood cell values cannot be separated from the calculation and assessment of the indices which include MCV, MCH, MCHC, and RDW. The red blood cell index value is useful for obtaining an accurate assessment of the implications of the data obtained. MCV and MCHC can be used to measure adequate levels of iron in the blood. Based on Table 3, the results of data analysis show that the red blood cell value in simmental cattle before was 4.81 x 106 and the average value after being given the treated feed was 4.68 x 106. However, this value can still be categorized as a normal vulnerable value which ranges from 4.8-7.6. This decrease is likely due to worm infections in cows. . Factors that influence variations in hematological values are feed, genetics, environment, maintenance management and analysis methods. This is in accordance with the opinion expressed by (Sonjaya, 2012) that ruminants who experience mild symptoms of anemia have a hematocrit interval value of 20-26%, moderate 14-19%, severe 10-13%, and very severe <10%. (Pujiastari, 2015) added that the hematocrit percentage for normal cattle is 37.35 ± 1.09%, meanwhile, the normal standard hematocrit value for beef cattle is in the interval 30–50%, different from the findings of (Weiss and Wardrop, 2010) which showed that the hematocrit level for male simmental cattle was 42 ± 1.00%.

White Blood Cell Levels

Based on the results of data analysis, it is known that there was an increase in white blood cells before being given the treatment feed by 15.10 x 103 and after giving the treatment feed it had a higher value, namely 17.46 x 103. (13). The leukocyte levels of the cows used in the samples were higher than the normal range, this was because the cows used as samples from the fecal analysis were infected with worms and coccyx. Variations in hematological values indicate normal blood hematological values in different intervals. Factors that influence variations in hematological values are feed, genetics, environment, maintenance management and analysis methods. Based on

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the results of this study, it is known that the white blood cell value has a high value compared to normal values. Fluctuations in lymphocyte values are caused by some animals having individual characteristics with different characteristics in reacting to stimuli created by the environment, resulting in changes in the number of white blood cells (Sonjaya, 2012).

Hemoglobin levels

The hemoglobin value had a lower average value before being given the treatment feed, namely around 3.92, whereas after being given the treatment feed the average value was 3.57. This decline is likely due to worm infections in cows (Anis, 2022). Red blood cells contain hemoglobin which is a high component of iron and protein that binds blood oxygen through the lungs, distributes it and releases it to tissues and organs throughout the body. The percentage of blood volume that contains red blood cells is called hematocrit. The difference in the average amount of hemoglobin before and after being given the experimental feed was -8.93%, so this data shows that the protein in red blood cells which carry oxygen from the lungs to the rest of the animal's body is still low (not normal) after being given beer dregs and essential oils. So, the low hemoglobin value in cattle is thought to be related to the low number of erythrocytes. Based on the statement (Kalaitzakis, 2014) states that hemocrit and hemoglobin have a close relationship. According to Indah et al (2020), the hemoglobin level of male Simmental cattle fed a mixture of field grass silage, corn crop silage and sunflower seed meal ranges from 13.47 ± 0.47 g/dL. Meanwhile, according to (Weiss and Wardrop. 2010), the normal hemoglobin value in cattle has an interval between 8.4-12 g/dL. A low average hemoglobin value indicates that anemia can occur in livestock.

Platelet Levels

Platelets which also have an important role, the value of platelets themselves are the smallest cells in the blood whose normal number ranges from 150,000-450,000 pieces per micro liter of blood. Like red blood cells, platelets do not have a nucleus and cannot carry out cell division, known as mitosis. The platelet volume in simental cattle after feed treatment was around 1463.86, this value was higher compared to the platelet level before treatment which was only around 953.36. This increase in platelet levels is also influenced by the amount of production, consumption, absorption and loss (13). Platelets are also closely related to mean platelet volume (MPV) where the average platelet/MPV is 4.0-4.8 femtoliters (Anis, 2022). According to (Indah et al., 2020) the average platelet value is around 298.50 x 103/µl. This also correlates with research by Samuelsom (2007) which states that livestock platelet values usually range from 200 to 500 x 103/µl so that the platelet values from the research are above the normal range. This is due to the influence of consumption on feed treated with beer dregs with an essential oil biostimulator. According to (Nugroho et al., 2021), the provision of beer dregs in the ration has an influence on PK consumption, TDN consumption and SK consumption. Apart from that, the addition of essential oils made from the

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processing of citronella distillation waste can increase the palatability of feed consumption. This is in accordance with the statement (Pond et al., 1995) which states that the level of palatability influences the level of ration consumption which, among other things, is influenced by taste, smell, temperature and texture.

CONCLUSIONS AND SUGGESTION

Conclusion

1. The addition of essential oils in the premix supplement as a concentrate feed mixture to red blood cell levels before being given the treatment feed was 4.81x 106 and the average value after being given the treatment feed was 4.68 x 106.
2. The addition of essential oils in the premix supplement as a concentrate feed mixture to white blood cell levels before being given the treatment feed was 15.10 x 103 and after giving the treatment feed it had a higher value, namely 17.46 x 103.
3. The addition of essential oils in the premix supplement as a concentrate feed mixture resulted in hemoglobin levels before being given the treatment feed at 3.92, while after being given the treatment feed the average value decreased by 3.57.
4. The addition of essential oils in the premix supplement as a concentrate feed mixture on the Platelet levels before being given the treatment feed was around 953.36 x 103 and after giving the treatment feed it had a higher value, namely 1463.86 x 103.

Suggestion

The addition of a 2% premix supplement to cows infected with coccyx was not able to normalize the hematological condition of the blood in the cows. Further research is needed to add premix supplements at higher doses to cows infected with worms and coccyx to normalize the cow's hematological condition.

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