# Blood Glucose and Urea Levels of Male Bali Cattle Fattened With Complete Feed Containing Fish Meal As a Protein Source

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## Abstract

This research was conducted in 2021 for 3 months at the Faculty of Agriculture, University of Timor. The purpose of this study was to determine the blood glucose and urea levels of male Bali cattle fattened with complete feed containing fish meal as a protein source. This research method uses a completely randomized design (CRD) with 3 treatments and 5 replications so that there are 15 experimental units with treatment given T1; natural grass 30% + milled corn 42% + rice bran 13% + pollard bran 11% + fish meal 4%, T2: natural grass 42% + milled corn 42% + rice bran 9% + pollard bran 11% + fish meal 8 %, T3: natural grass 30% + milled corn 42% + rice bran 5% + pollard bran 11% + fish meal 12%. The variables observed in this study were blood glucose and blood urea levels of male Bali cattle with a time of 0 hours before feeding, 2 hours, 4 hours, and 6 hours after feeding. The data obtained were tabulated and then analyzed by Analysis of Variance (ANOVA) according to a completely randomized design procedure (CRD) using SPSS version 19.0. The results of this study showed that the use of complete feed containing fish meal as a protein source was not significantly different. Blood glucose levels (mg/dL) for each treatment were T1: 73.23±3.50, T2: 76.24±6.21, T3: 71.94±2.54; Blood urea levels (mg/dL) of male Bali cattle for each treatment were T1: 40.23±3.51, T2: 40.95±2.04, T3: 39.67±1.83. It was concluded that giving a complete feed containing fish meal as a protein source gave the same effect for all treatments and resulted in blood glucose and urea levels of fattened male Bali cattle in the normal range.

Keywords : Blood glucose, blood urea, complete feed, Bali cattle.

## Introduction

Bali cattle are one of the local cattle breeds in Indonesia that have very high potential to be developed as beef cattle because they have advantages in terms of reproduction, high carcass percentage, able to adapt to the environment, and can utilize low-quality feed resources (Nurjanah, 2014). Fattening is one of the efforts that can be done by farmers to increase the productivity of livestock that are ready to be slaughtered to produce meat. In North Central Timor (NCT), Bali cattle fattening has been carried out for generations, but in practice there are various limitations such as lack of feed, especially during the dry season, lack of knowledge of farmers on good livestock raising management, and traditional livestock rearing systems. and not yet market oriented (Tahuk and Dethan, 2010). Among several factors that influence the fattening business in the TTU, the factor of limited feed is one of the most important factors that need to find

a solution. This is because the feed aspect is directly related to efforts to increase the productivity of livestock to be fattened. According to Sonjaya (2012), the availability of feed, both in sufficient quality and quantity, is needed to support the growth and production of livestock.

In general, in ENT Province, especially in NCT Regency, the limited availability of forage for livestock is influenced by seasonal factors, especially during the dry season. In general, NCT has two seasons, namely the rainy season (wet) and the dry season (dry). The rainy season (wet) lasts a very short 4 months and the dry season (dry) which lasts quite a long time for 8 months (BPS NCT, 2014). Forage fodder will be abundant during the rainy season so that livestock growth is positive, while in the dry season the availability of forage feed will be reduced and of low quality so that livestock growth is negative, such as decreased body weight, slow growth, and decreased reproduction, which can even cause death (Tahuk and Dethan, 2010).

The solution to overcome the shortage of animal feed ingredients in the dry season is to develop feed processing technology by utilizing abundant forage forage in the rainy season such as field grass that is still available in the field. These feed ingredients can be processed and can be used as complete feed ingredients to overcome feed shortages in the dry season so that the productivity of fattened Bali cattle is guaranteed. Complete feed is a feed ingredient that contains sufficient nutrients to meet the needs of livestock at a certain physiological level which is processed and given as the only feed that is able to meet the basic needs of life and production without the addition of other substances except water (Mide, 2011).

Complete feeds are generally divided into several, such as complete feeds with protein, energy and protein-energy sources. To strive for the availability of feed content in complete feeds, protein sources such as fish meal are needed. The nutritional content of fish meal CP is 58-68%, water is 5.5-8.5%, and salt is 0.5-3.0% (Sitompul, 2004).

In the effort of fattening livestock, the maximum utilization of feed by Bali cattle can be seen and known from the physiological status of livestock such as blood glucose and urea levels. Therefore, the feed consumed by livestock will be digested and absorbed into the bloodstream to be flowed throughout the animal's body for the development of the animal's life. Nutrients that flow through the blood can be absorbed in the form of blood glucose or in the form of blood urea. Blood glucose is one of the clues to be able to describe the nutrient adequacy capacity given to male Bali cattle during fattening, especially energy adequacy (Parakkasi, 1999). On the other hand, blood urea is the end product of the protein metabolism process in the body of ruminants, which if not utilized optimally by the animal's body, is excreted in the urine. Blood urea can describe the maximum utilization of feed protein by livestock or not (Tillman et al., 1991). The use of complete feed by farmers in NCT for fattening Bali cattle is still very low and has not been done much. As a result, information on fattening livestock related to blood glucose and urea status in livestock is still lacking. Therefore, this scientific study related to blood glucose and urea is feasible to determine the nutritional capacity of cattle fattened with complete feed. With the provision of fish meal as a source of protein, it is expected to increase the digestibility value of feed ingredients so that it is expected to have an impact on blood glucose and urea levels.

## Materials and Methods

### Time and place

This research was conducted in 2021 for 3 months at the Faculty of Agriculture, University of Timor. Analysis of blood samples was carried out at the Laboratory of Reproductive Biology and Animal Health, Faculty of Animal Husbandry, University of Nusa Cendana.

### Animal Research Materials

The livestock used in this study were male Bali cattle aged 1.5-2 years with an initial body weight of 100-160 kg, totaling 15 heads.

### Tools and materials

The tools used in this study include milling machines, lawn mowers, tarpaulins, sacks, digital scales with a capacity of 2 tons, sitting scales, suction needles, blood tubes with lithium heparin, coolbox, stationery and cameras. Cage cleaning equipment, namely: broom sticks, shovels, buckets, water hoses, water drums, and carts. The cages used were individual elongated cages consisting of 15 plots with a length of 200 cm, a width of 150 cm, a height of 200 cm, and equipped with a feeder.

Blood glucose and urea analyzers are spectrophotometer, blood tube, standard reagents. The materials used in the preparation of the complete ration consisted of natural grass, corn flour, rice bran, pollard bran, and fish meal. Blood glucose and blood urea analysis materials were fattened male Bali cattle blood samples.

### Research methods

The research method used in this study was a completely randomized design (CRD) which consisted of 3 treatments and 5 replications so that there were 15 experimental units. The treatment given is as follows:

T1: natural grass 30% + milled corn 42% + rice bran 13% + pollard bran 11% + fish meal 4%
T2: natural grass 30% + milled corn 42% + rice bran 9% + pollard bran 11% + fish meal 8%
T3: natural grass 30% + milled corn 42% + rice bran 5% + pollard bran 11% + fish meal 12%

The nutritional content of the feed ingredients that make up the complete feed ration is shown in Table 1.

Table 1. The nutritional content of the feed ingredients that make up the complete feed ration

| Nutrient content | Grass | Bran pollard | Fish meal | Corn | Rice bran |
|---|---|---|---|---|---|
| DM (%) | 90.668 | 87.628 | 91.034 | 88.194 | 90.050 |
| OM (%DM) | 82.318 | 82.970 | 70.148 | 86.905 | 76.318 |
| CP (%DM) | 2.773 | 18.500 | 55.674 | 9.318 | 8.602 |
| CFt (%DM) | 1.387 | 5.468 | 8.922 | 4.891 | 9.677 |
| CF (%DM) | 35.656 | 6.729 | 4.894 | 1.712 | 18.290 |
| CHO**(%DM) | 78.159 | 59.002 | 5.552 | 72.696 | 58.040 |
| FEN**(%DM) | 42.500 | 52.273 | 0.658 | 70.984 | 39.750 |
| Gross Energi** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MJ/kg DM | 14.667 | 16.557 | 17,498 | 14,503 | 15.427 |
| Kkal/kg DM | 3,492.05 | 3,942.08 | 4.166,17 | 3.929,38 | 3,673.09 |
| EM** Kkal/kg DM | 2,053.42 | 3,408.55 | 2.958,92 | 3.792,41 | 2,868.76 |

Note : The results of the analysis of the feed chemistry laboratory of the Faculty of Animal Husbandry, Nusa Cendana University (2021). DM : Dry matter; OM: Organic Matter; CP: Crude Protein; CFt : Crude Fat; CF: Crude Fiber ; CHO: Carbohydrat; FEN: Free Extract Nitrogen; GE: Gross Energi.

**Research procedure**

**Cage Preparation**

The available cages were 15 plots using wooden planks of the same size, namely with a length of 200 cm, a width of 150 cm, and a height of 200 cm. The cages are individual cages that are made permanently and are equipped with feed and drinking containers, which are located in the stables of the Faculty of Agriculture, University of Timor.

**Feed Preparation**

The natural grass obtained in the field is cut using a cutting machine and then dried in the sun and then ground using a milling machine and then fed to fattened male Bali cattle. The concentrate feed that was prepared consisted of a combination of milled corn, rice bran, pollard bran, and fish meal obtained from the community and commercial shops after which it was mixed according to the treatment.

**Feeding**

Complete feed or complete feed was given twice a day, in the morning at 08.00 WITA and in the afternoon at 16.00 WITA and was given according to the body weight of each animal, namely 3% BK by weighing. Provision of drinking water ad libitum.

**Blood Drawing**

The process of taking blood was carried out at the end of the study. The process of taking blood from the neck of the cattle through the jugular vein, using a needle and a 3 ml blood tube containing lithium heparin. Sampling of cow blood was 4 times/head, with a time of 0 hours before feeding and 2 hours, 4 hours, 6 hours after feeding. Bali cattle blood samples that have been taken are stored in a coolbox. Prior to the process of taking blood samples from Bali cattle, the cattle were fasted.

**Research variable**

**Blood Glucose Level**

The procedure for analyzing blood glucose at the Laboratory of Bio Reproductive and Animal Health, Faculty of Animal Husbandry, Nusa Cendana University, is to check blood glucose using a spectrophotometer according to the instructions for blood glucose analysis. Prepare tubes according to many samples, then fill with 5 ml glucose reagent and 1 tube containing standard reagents. Adding 0.02 blood plasma samples into a tube containing glucose reagent then let stand for 20 minutes. Entering standard reagents into the spectrophotometer that has been connected to the monitor screen. Then the absorbance of the standard solution will be read at a wave length of 546 nm. The same thing was also

done on samples that had been allowed to stand for 20 minutes and then the absorbance of the standard solution would be read at the same wave length.

Calculation of blood glucose levels with the formula: (Abs. Sample/Abs. Standard) X 100 Mg/dl.

**Blood Urea Analysis Procedure**

Examination of blood urea with a spectrophotometer in accordance with the instructions for blood urea analysis. Prepare the tube according to the number of samples, then fill it with 5 ml urea reagent and 1 tube containing standard reagent. Added 0.02 ml of blood plasma sample into a tube containing reagents and then allowed to stand for 20 minutes. Entering standard reagents into the spectrophotometer that has been connected to the monitor screen. The absorbance of the standard solution will be read at a wavelength of 546 nm. The same thing was also done on samples that had been allowed to stand for 20 minutes and then the absorbance of the standard solution would be read at the same wavelength.

Calculation of blood urea levels with the formula: (Abs. Sample/Abs. Standard) X 50 Mg/dl.

**Data analysis**

The data obtained were tabulated and then analyzed by Analysis of Variance (ANOVA) according to a completely randomized design procedure (CRD) using SPSS version 19.0.

## Results and Discussion

**Blood Glucose Level**

The results of the laboratory analysis of the blood glucose content of male Bali cattle fattened with complete feed containing fish meal as a protein source can be seen in Table 2.

Table 2. Blood glucose content of male Bali cattle fattened with complete feed containing fish meal as a protein source

| Blood Glucose (mg/dl) | Treatment | | |
|---|---|---|---|
| | T1 | T2 | T3 |
| 0 h | 73.83± 4.80 | 72.05± 2.50 | 71.20± 1.06 |
| 2 h | 71.78± 4.73 | 79.19± 11.27 | 70.77± 3.15 |
| 4 h | 77.26± 3.34 | 80.07± 8.44 | 74.67± 3.55 |
| 6 h | 70.04± 1.11 | 73.64± 2.63 | 71.13± 2.39 |
| Average | 73.23± 3.50 | 76.24± 6.21 | 71.94± 2.54 |

Note : T1: natural grass 30% + corn 42% + rice bran 13% + bran pollard 11% + fish meal 4%; T2: natural grass 30% + corn 42% + rice bran 9% + bran pollard 11% + fish meal 8%; T3: natural grass 30% + corn 42% + rice bran 5% + bran pollard 11% + fish meal 12%.

The results of the study in Table 2 show that the glucose levels of male Bali cattle fattened with complete feed containing fish meal as a protein source, respectively at 0, 2, 4, 6 hours for T1 treatment were 73.83 ± 4.80. ; 71.78±4.73; 77.26±3.34; and 70.04 ± 1.11 Mg/dl or with an average of 73.23 ± 3.50 mg/dl. The blood glucose content for the

T2 treatment at 0 hours before eating to 6 hours after eating was 72.05 ± 2.50; 79.19± 11.27; 80.07±8.44; and 73.64 ± 2.63 mg/dl or with an average of 76.24 ± 6.21 mg/dl, and the T3 treatment at the time of observation 0 hours before eating to 6 hours after eating was 71.20 ± 1, 06; 70.77±3.15; 74.67±3.55; and 71.13 ± 2.39 mg/dl or with a mean of 71.94 ± 2.54 mg/dl.

The results of statistical analysis showed that glucose levels in male Bali cattle fattened with complete feed containing fish meal as a protein source had no significant effect. Blood glucose levels of each male Bali cattle in each treatment in this study fluctuated quite a bit. The average blood glucose of male Bali cattle in each treatment showed the highest concentration at 0 hours before feeding (fasting) then decreased at 2 hours after feeding and again increased at 4 hours after feeding and then decreased again at 6 hours. hours after feeding.

In Table 2 it can be seen that the high blood glucose at 0 hours before feeding (fasting) in this study is thought to be due to the increased glucose formation process from glycogen, in addition it is suspected that the forage used in this study is field grass which has high crude fiber (SK). This results in slower digestion in the rumen. This will have an impact on the production of flying fatty acids (VFA), especially propinic acid continuously for glucose synthesis. Increased blood glucose levels from before feeding and after feeding due to stimulation of insulin release, and 2 hours after feeding blood glucose decreased (Purbowati et al. 2004). In contrast, it increased at 4 hours after feeding and then decreased again at 6 hours after complete feeding. This is presumably because the digestibility of complete feed is optimal. In addition to digestibility, factors that affect blood glucose are the amount of ration consumed by livestock (Rahayu et al., 2017). Blood glucose values are closely related to energy consumption, if energy consumption is low then blood glucose is also low, and vice versa if energy consumption is high, blood glucose is also high (Bondi, 1987; Church and Pond, 1988).

The results of this study are lower when compared to the report of the results of the study of Tahuk et al. (2017) regarding the blood glucose and urea profile of male Bali cattle fattened with forage on smallholder farms, male Bali cattle with blood glucose levels o-hours of 59,070 mg/dL, 2 hours 57,286 mg/dL, 4 hours 56,944 mg/dL and 6 hours is 61.198 mg/dL. The difference in the results of the study is thought to be more influenced by the feed factor used. Feed factors, especially energy consumption, will determine the level of blood glucose levels. In the report above, blood glucose levels are lower because they use crude protein and energy levels that only come from forage, while in this study, fish meal concentrates with sufficient protein and energy content were used. If the feed given is in accordance with the needs it will produce normal metabolic content, but if the feed given is insufficient, the blood metabolic value will be low (Ogata, 2010).

The impact of blood glucose on livestock such as livestock drastically lack of glucose in the blood can cause a disease condition called hypoglycemia. Hypoglycemia or ketosis can be sub-clinical and may progress to clinical. Cows who experience hypoglycemia will have a decreased appetite, and if it lasts a long time it will cause permanent liver damage and experience chronic ketosis. If the animal has enough blood glucose, the animal will have normal growth, such as increasing appetite, free from hypoglycemia (Ayuningsih, 2007).

**Effect of Treatment on Blood Urea Content of Fattened Male Bali Cattle**

Blood urea is a function of the absorption of ammonia from the rumen and the efficiency of protein utilization at the tissue level (Rusdi, 2006). The results of the laboratory analysis of the blood urea content of Bali bulls fattened with complete feed containing fish meal as a protein source can be seen in Table 3.

Table 3. Blood urea content of male Bali cattle fattened with complete feed containing fish meal as a protein source

| Blood Urea (mg/dl) | Treatment | | |
|---|---|---|---|
| | T1 | T2 | T3 |
| 0 h | 37.03±2.04 | 38.69±0.34 | 36.40±0.61 |
| 2 h | 39.14±3.70 | 41.36±3.68 | 39.24±4.00 |
| 4 h | 42.39±3.83 | 41.11±2.69 | 43.25±1.35 |
| 6 h | 42.34±4.47 | 42.65±1.44 | 39.79±1.34 |
| Average | 40.23±3.51 | 40.95±2.04 | 39.67±1.83 |

Note : T1: natural grass 30% + corn 42% + rice bran 13% + bran pollard 11% + fish meal 4%; T2: natural grass 30% + corn 42% + rice bran 9% + bran pollard 11% + fish meal 8%; T3: natural grass 30% + corn 42% + rice bran 5% + bran pollard 11% + fish meal 12%.

In Table 3 it can be seen that the blood urea content of male Bali cattle fattened with complete feed containing fish meal as a protein source, respectively from 0 hours before feeding (fasting) and 2, 4, 6 hours after feeding in T1 treatment was 37.03±2.04; 39.14±3.70; 42.39±3.83; and 42.34±4.47 mg/dl or with a mean of 40.23±3.51 mg/dl. For treatment T2 at the same observation time, starting from 0 hours before feeding (fasting) and 2, 4, 6 hours after feeding was 38.69±0.34; 41.36±3.68; 41.11±2.69; and 42.65 ± 1.44 mg/dl or with an average of 40.95 ± 2.04 mg/dl, and for the T3 treatment at 0 hours before feeding and 2, 4, 6 hours after feeding were 36.40±0.61; 39.24±4.00; 43.25±1.35; and 39.79±1.34 mg/dl or with an average of 39.67±1.83 mg/dl.

The results of statistical analysis showed that blood urea levels in male Bali cattle fattened with complete feed containing fish meal as a protein source had no significant effect. Blood urea levels in each fattened bali cattle in T1 and T3 treatments tended to increase starting from 0 hours before feeding (fasting) and reaching the highest peak at 4 hours after feeding and decreasing again at 6 hours after feeding. . For the T2 treatment, the blood urea level of each male Bali cattle was quite fluctuating, namely the highest concentration at 0 hours before feeding and reaching the highest peak at 2 hours after feeding. 6 hours after feeding.

Blood urea levels from treatment T1, T2 and T3 were in the normal range. According to Hungate (1966), the normal range of blood urea for cattle is between 26.6-56.7mg/dL. If blood urea is higher than the normal range, then the absorption of ammonia carried to the liver will be excessive so that the breakdown into urea is less rapid. Thus, the levels of urea and ammonia in the peripheral blood circulation increase and livestock show symptoms of poisoning which can eventually lead to death (Ranjhan, 1981). On the other hand, if blood urea is low, livestock will experience slow growth. Low blood urea levels are beneficial when viewed from the efficiency of energy use.

The high level of urea in this study is thought to be related to the source of the feed given. This is in accordance with the opinion of Riis (1983), that blood urea is affected

by feed because most of the urea is obtained from the breakdown of protein from feed. In livestock that have high protein intake, most of the protein will undergo fermentation in the rumen, resulting in an increase in blood urea levels above normal.

Blood urea levels in this study were lower than the results of the study of Tahuk et al. (2017) about the glucose and blood urea profile of Bali bulls fattened with complete feed containing different levels of crude protein, which obtained blood urea levels of 23.65 mg/dL-24.81 mg/dL, respectively. The difference in this study is thought to be in the difference in the use of the feed being tested. In this study, fish meal was used as a source of protein with a higher protein content compared to using forage on smallholder farms.

According to Soeparno (2005), proteins that enter the body will experience three possibilities, namely digested by rumen microbes, degraded, and absorbed through the rumen wall and then transported to the liver, converted into urea and another possibility is protein through the rumen without degradation. In young livestock, the absorbed protein is utilized by the animal's body for growth, replacing damaged cells and under certain conditions will be converted into energy.

## Conclusion

Based on the results of the research that has been done, it can be concluded that giving a complete feed containing fish meal as a protein source gave the same effect for all treatments and resulted in blood glucose and urea levels of fattened bali cattle in the normal range.

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