The Influence of Soybean Groat Protected Used in The Consumption and Digestibility of Dry Matter, Organic Matter and Crude Protein on The Bligon Goats

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Abstract. This study aims to determine the effect of formaldehyde-protected soybean groat on the consumption and digestibility of dry matter, organic matter and crude protein in Bligon Goat. The study used 15 head male Bligon Goats with an average body weight of 20 kg with 3 treatments and 5 groups arranged in a randomized block design (RBD). The diet consists of elephant grass (EG), basal concentrate (BC), soybean groat (SG) and soybean groat protected (SGP). Treatments include P0 = 30% EG + 70% BC, P1 = 30% EG + 60% BC + 10% SG and P2 = 30% EG + 60% BC + 10% SGP. The results showed that the consumption of dry matter and organic matter not significant, but highly significant on crude protein consumption. Consumption of crude protein in the treatment without the addition of soybean groat showed lower results than consumption of crude protein in feed containing soybean groat. Digestion of dry matter, organic matter and crude protein were not influenced by differences in feed treatment in Bligon Goats. Concluded that supplementation of soybean groats protected or not in the diet can increase the consumption of crude protein and produce the same consumption on parameters of dry matter and organic materials intake. Dry matter, organic matter and crude protein have the same digestibility of feed Bligon Goat.

Keywords: Soybeans groat, protection, consumption, digestibility, The Bligon Goat

1. Introduction

Bligon Goat is a cross between Ettawa Goat and Kacang Goat. The performance of this goat is similar to that of the Etawa goat and Kacang goat and is included in the Ettawa breed group [1]. Many Bligon goats are spread on the north coast of Java and in the Gunungkidul area, Yogyakarta [2].

Goats that are being fattened require feed containing energy and protein to meet energy and protein. Bligon Goat Feed consists of forage and concentrate. In general, the forage source for Bligon...
Goats come from elephant grass. The concentrate for Bligon Goat consists of protein and energy source feed ingredients. Concentrated raw materials can come from local feed ingredients including from soybean groat meal. Soybeans are smaller fragments of whole soybeans, flat and broken from the results of whole soybean grading containing protein above 35% [3]. It is necessary to protect soybean protein so that it is not degraded by rumen microbes [4].

Formaldehyde is chosen because it is easy to make and relatively harmless because it can be quickly detoxified [5]. The basic principle of the treatment of proteins with formaldehyde is to form chemical bonds with proteins that are stable at neutral pH as in rumen pH, but become labile at pH abomasum [6] [7]. The use of formaldehyde does not affect the metabolism of rumen microbes so that it can be used to produce microbial proteins and absorption of protein digestion results in the intestine [4].

Based on the description above, it is necessary to conduct a study on the effect of the use of protected soybeans using formaldehyde in the ration in terms of the level of consumption and digestibility of dry matter, organic matter and crude protein in the Bligon Goat.

2. Materials and Methods
In vivo consumption and digestibility, tests were carried out in goat pens belonging to goat farmer groups in Simo, Boyolali and nutrient quality tests of rations at the Laboratory of Nutrition and Animal Feed, Sebelas Maret University, Surakarta.

This research was carried out using 15 Bligon male goats with an average body weight of 20 kg. The cage used is 15 individual stables with a length of 110 cm, a width of 60 cm, the height of 100 cm from the floor of the cage and height of the floor 100 cm from the ground. The cage is equipped with a place to store faeces from paranet placed under the cage. The ration used in this study consisted of elephant grass, basal concentrate, and soybean meal. The basal concentrate consists of palm cake, coffee bark, Pollard, bran, minerals and molasses. The amount of feed given is 4% of dry matter from body weight. Comparison between elephant grass, basal concentrate and protected soybean meal is 30:60:10. Soybeans are protected using formaldehyde 37% of the 1% dry matter of soybeans and mixed with water with a ratio of formaldehyde and water is 1:5 [3]. Drinking water is given ad libitum. The composition and chemical content of the treated feed see Table 1.

The diet consists of elephant grass (EG), basal concentrate (BC), soybean groat (SG) and soybean groat protected (SGP). Treatments include P0 = 30% EG + 70% BC, P1 = 30% EG + 60% BC + 10% SG and P2 = 30% EG + 60% BC + 10% SGP. Each has been carried out three stages, namely ration adaptation, data collection and data analysis. The stage of feed adaptation has been carried out for two weeks according to the procedure. The adaptation stage lasts a minimum of 7 days. The feed is given twice a day, that is morning at 08.00 WIB and afternoon at 16.00 WIB. The concentrate is first given then elephant grass with an interval of 1 hour.

The remaining food and faeces data collection were carried out for 10 days. Feed consumption is calculated by weighing the difference between the feed given and the remaining feed. The faeces collection is carried out every day at the same time at 08.00 WIB (1x24 hours). The collection of faeces was carried out for 10 days. Faeces collected each defecated animal, then weighed and recorded the weight. Faecal samples were taken 10% of the total faeces to be dried in the sun. Feed and faeces were analyzed proximally in the laboratory to determine the content of dry matter, organic matter and crude protein.
Table 1. Chemical composition and content of feed treatment

| Feed ingredients                      | Treatment (%) |
|---------------------------------------|---------------|
|                                       | P0 | P1 | P2 |
| Elephant grass (EG)                   | 30 | 30 | 30 |
| Basal concentrate (BC)                | 70 | 60 | 60 |
| Soybean groat unprotected (SG)        | 0  | 10 | 0  |
| Soybeans groat protected (SGP)        | 0  | 0  | 10 |
| Number                                | 100| 100| 100|
| Nutrien (%)                          |    |    |    |
| Crude protein                         | 9.93| 11.98| 12.01|
| Crude fat                             | 4.81| 5.78 | 5.74 |
| Crude fiber                           | 25.44| 23.72| 23.92|
| Ash                                   | 12.10| 11.96| 12.02|
| Ingredients extract without nitrogen  | 47.72| 46.56| 46.31|
| Organic ingredients                   | 87.90| 88.04| 87.98|
| Total digestible nutrient             | 58.37| 61.51| 61.19|

The observed research variables included dry matter consumption (gram) (gram/ head/ day), organic matter consumption (gram) (gram/ head/ day), crude protein consumption (gram/ head/ day), dry matter digestibility (%), Organic Material digestibility (%), and crude Protein digestibility (%) [5].

Data obtained from this study were analyzed by Analysis of Variance with Microsoft Excel. If the results of the analysis of variance have an effect on the treatment then it is followed by orthogonal contrast tests to determine the differences between treatments.

3. Result and Discussion

The average consumption and digestibility of dry matter, organic matter, and crude protein in the Bligon Goat feed are the results of the research, see Table 2.

Table 2. Average consumption and digestibility of dry matter, organic matter, and crude protein in male Bligon Goats

| Variable                        | Treatment       | Significance |
|---------------------------------|-----------------|--------------|
|                                 | P0              | P1            | P2            |
| Feed consumption (gr/ head/ day)|                |              |              |
| Dry ingredients                 | 789.29±116.89   | 789.05±56.23  | 744.66±132.91 | NS            |
| Organic matter                  | 703.03±103.82   | 703.91±51.33  | 663.65±119.35 | NS            |
| Crude protein                    | 78.38±11.62     | 95.06±7.21    | 89.79±16.37   | **            |
| Feed digestibility (%)           |                |              |              |
| Dry ingredients                 | 54.77±1.81      | 56.51±3.38    | 55.14±2.25    | NS            |
| Organic matter                  | 58.01±1.84      | 60.46±3.52    | 58.76±1.9     | NS            |
| Crude protein                    | 55.56±4.34      | 63.67±5.77    | 58.54±4.61    | NS            |

P0 = 30% EG + 70% BC, P1 = 30% EG + 60% BC + 10% SG and P2 = 30% EG + 60% BC + 10% SGP **= P<0.01; NS= non significant.
Orthogonal contrast test results influence the difference in treatment of crude protein consumption see Table 3.

Table 3. Results of the Orthogonal Contrast Test on the treatment of the crude protein consumption of Bligon Goat

| Treatment | Significance |
|-----------|--------------|
| P0 VS P1P2 | **           |
| P1 VS P2   | NS           |

P0 = 30% EG + 70% BC, P1 = 30% EG + 60% BC + 10% SG and P2 = 30% EG + 60% BC + 10% SGP **= P<0.01; NS= non significant

The consumption of dry matter P0 and P1 is almost the same compared to P2 which tends to decrease in insignificant value. Protection of formaldehyde in P2 treatment is thought to reduce the consumption of dry matter due to the odour caused by formaldehyde. The statement Riyanto et al. [8] that feed palatability is qualitatively influenced by the physical properties of feed which include shape, smell, taste and texture. Palatability is the main factor that explains the difference in consumption of dry matter between feed and low-producing livestock [9].

The results show that there is no influence on the consumption of organic matter in the use of protected soybean meal. This is in accordance with the results obtained from the results of the consumption of dry ingredients. Consumption of organic matter and consumption of dry ingredients show almost the same results. According to Riyanto et al. [3] that the consumption of organic matter of feed organic matter is influenced by total consumption of dry matter because nutrients contained in organic matter are also contained in dry matter. Dry matter consists of organic matter and ash, so the consumption of organic matter is directly proportional to the amount of organic matter contained in dry matter.

Consumption of dry matter and consumption of organic matter are interrelated because feed ingredients based on their chemical composition are divided into organic and inorganic materials (ash). Riyanto and Sudibya [5] states that the amount of consumption of dry matter consumed will affect the nutrients consumed, the higher the consumption of dry ingredients, the higher the consumption of organic matter.

The high consumption of P1 and P2 proteins is due to the higher P1 and P2 content compared to P0, due to the addition of soybean meal in rations that have high protein content. This is in accordance with the opinion Riyanto et al. [4] that soybean meal has a protein content ranging from 35 - 40%. Feed P0 with protein sources without soybeans or protected soybeans has a lower crude protein content when compared between P1 and P2 feeds, causing lower crude protein consumption compared to P1 and P2 feed. Protein consumption is very closely related to consumption of dry matter so that in this study, foods that have a high crude protein content will also be higher in crude protein consumption [5].

The results of the variance analyst showed that the addition of protected soybean meal in the Bligon Goat had no significant effect on the digestibility of dry matter. Riyanto et al. [4] states that the level of feed digestibility is influenced by several components, namely chemical composition, crude fibre, the protein level of ration and the amount of ration consumed.

Based on the value of the results of dry matter digestibility obtained that P1 has a higher value than P0 and P2. This is because the ration on P1 uses soybean meal which has a high protein content and is easily degraded in the digestive system. Oktarina et al. [10] states that increasing protein levels in the feed will increase the breeding rate and population of rumen microbes so that the ability to digest feed becomes greater.
The results of the variance analysis showed that the addition of protected soybean meal in the Bligon Goat had no significant effect on the digestibility of organic matter. There were no significant differences in the digestibility of organic matter from the use of the three rations according to the digestibility of dry matter which was not significantly different. According to Riyanto and Sudibya[5] the digestibility of organic matter is directly proportional to the digestibility of dry matter because organic matter is a constituent of dry matter. The level of consumption of organic material will affect the availability of energy in the rumen for the growth of rumen microbes.

The optimum rumen microbes will affect the digestibility of dry matter and organic matter. The relationship is in accordance with the opinion Riyanto et al. [4] one of the factors that influence digestibility is the amount of feed consumed and the level of feed consumption influences the digestibility of dry matter and digestibility of organic matter. The results showed that the digestibility of organic matter was greater than the digestibility of dry matter because the components of organic matter were easier to digest compared to dry ingredients containing insoluble mineral component residues so that their presence reduced the digestibility of dry matter. According to Riyanto et al. [3] states that organic ingredients consist of nitrogenous compounds, carbohydrates, fats and vitamins. These components are nutrients that are easily digested so that the digestibility of organic matter is higher.

The results showed that the use of protected soybean meal in the ration had no significant effect on crude protein digestibility. Stern et al. [11] stated that protein digestibility in the rumen is a complex process that is influenced by various factors such as protein solubility and structure, proteolytic microbial activity, rumen pH, microbial access to these proteins and length of stay in the rumen. Widyobroto et al. [12] states that protein degradation can be influenced by rumen environmental conditions, digestibility rate and feed length in the rumen.

Based on the highest P1 digestibility value compared to the others. This is due to the treatment of P2 crude protein digestibility influenced by the use of formaldehyde protection method which successfully forms a bond that is stable at neutral pH but is labile at acidic pH. The use of formaldehyde is quite effective in reducing the degradation of soybean meal in the rumen. Protection of soybean meal with 1% formaldehyde has been shown to significantly reduce protein degradation in the rumen by 14.81% [12]. This is supported Riyanto et al. [4] that the basic principle of the treatment of proteins with formaldehyde is the formation of chemical bonds with proteins that are stable at pH near neutral as in rumen pH but become labile at acidic pH as in the pH abomasum.

4. Conclusion

Based on the results of the study, it can be concluded that supplementation of soybeans and formaldehyde-protected soybeans in the ration can be accepted by Bligon Goats which are characterized by not interfering with the consumption and digestibility of dry matter, organic matter and crude protein. This should represent a concise conclusion of the research and must answer the objective of the study.

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