Effect of Organic Basic Multinutrient Block Supplementation on Total Mixed Ratio of Kacang Goat in Feedlot System

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**Abstract.** The research was managed to assess organic basic multi-nutrient block supplementation on the performance of Kacang goat that fed by total mixed ratio in feedlot system. This research was carried out for 3 months, used 15 goats with the average body weight of 13.40 ± 1.97 kg. The study was arranged in a completely randomized design with 3 treatments and 5 replications. Goats were divided and fed with one of the treatments as follows: P0: only forage, according to the farmer’s way; P1: total mixed ratio; P2: total mixed ratio + 15g multinutrient block/head/day. Variables of initial body weight, final body weight, body weight gain, and feed consumption were observed. The study indicated that goats of P1 and P2 had a significantly higher final body weight in average of 29,32 and 32,38 kg (P < 0.05) compared with P0 (27,45 kg), respectively. Body weight gain of goat P2 was significantly higher (P < 0.05) than P1 Kacang goat. This study suggests that treatment P2 resulted in the highest body weight gain.

**Keywords:** multinutrient block, organic supplement, TMR, Kacang goat

1. **Introduction**

Goat livestock are considered to be prospectively developed at the farm level. This is based on several factors, for example, the price is affordable for farmers, the maturity time is relatively fast, the reproductive cycle is short with the average of litter size at 2. The population of goats in Central Java Province was 4,066,654 in 2016 and increased in 2017 to 4,134,034[1]. Almost all of the goat livestock population is in the hands of farmers with traditional maintenance systems. This means that the scale of small livestock business has not been managed by profit calculating.

In general breeders intentionally sell goats during Eid al-Adha because the selling price is expensive with a short feedlot. Feedlot fattening is a fattening system carried out in a short time in a cage with high concentrated feed components (80 - 100%). Efforts are made so that the forage and concentrate balance in the feedlot feed is exactly as expected, then the feed must be in the form of complete feed [2]. High-grain diet is widely used for the ruminant feedlot to saturate the energy and protein needs for the maintenance and growth of the animals [3].

The main food of ruminants is often in the form of leftover food crops plus the provision of grass of varying quality. The high degree of lignification and forage silica in the tropics due to rapid changes in plant cell components, causing an influence on the quality of the low forage produced. These conditions
result in nutritional value (specifically the composition of protein, minerals, vitamins) and low forage digestibility [4].

The low quality of feed causes low productivity of livestock and increases mortality. Feed processing to improve feed quality needs to be done. If livestock had been given feed if that meets their needs, both quality and quantity, it will provide optimal production. One solution that can be applied is by making Multinutrient Blocks (MNB).

Multinutrient Block or also called MNB is the development of multinutrient block (UMMB) urea molasses. MNB functions as a complementary feed with organic ingredients for ruminants with the right nutritional content [5]. Multinutrient Blocks (MNB) are supplementary feeds that provide a source of nutrition for livestock, such as protein, energy and minerals [6]. The main purpose of multinutrient block treatment as a supplementary feed made from organic ingredients is to catalyze more efficient use of poor quality food. Ruminants who consume forage-based foods need to be provided with supplementary feed to save forage, improve animal performance, and increase economic benefits [3]. The research was done to assess organic basic multi-nutrient block supplementation on the performance of Kacang goat that fed by total mixed ratio in feedlot system.

2. Methodology
The research material used was the raw material of multinutrient block, Kacang goat and basal feed ingredients. The multinutrient blocks consist of 30% corn fodder, 4% urea, 3% blood clamshells, 3% eggshells, 50% molasses, 7% bentonite and 3% salt (% DM).

This research was carried out for 3 months, used 15 goats with the average body weight of 13.40 ± 1.97 kg. Corn fodder (30%) and concentrate was fed as total mixed ratio with composition of forage : concentrate = 20 : 80. Concentrates are prepared from feed ingredients in the form of 25% rice bran, 50% pollard, 2% coffee hulls, 3% molasses (%DM).

The research was conducted in three stages. The first stage was preparation, including the making of multinutrient blocks and adaptation of feed to test animals. The second stage was data collection and the third stage was followed by data analysis.

Preparation
The preparation phase of the research starts from the adaptation of the livestock, preparation of tools and materials needed for research and the making of multinutrient blocks. Adaptation of goats to feeding treatment was carried out for 1 month. MNB was made after the collection of blood clamshells and eggshells from seafood sellers in the Tembalang area of Semarang. Blood clamshells and eggshells were then washed and dried in the sun before they were minced to facilitate the grinding process. Corn fodder was cut into smaller sizes to facilitate the grinding process using a grinder.

The multinutrient block composition feedstuffs refer to the recommendations from the last researches [7][8]. The heat method Salem and Nefzaoui [8] was used to mix the raw material of multinutrient block to homogeneous (heating temperature molasses at 40–500°C for 10 minutes). After a homogeneous multinutrient block was compacted in a mold made from paralon then aerated for 3 days until the texture hardens.

Data collection
Variables of initial body weight, final body weight, body weight gain, and feed consumption were observed for 3 months. The study was arranged in a completely randomized design with 3 treatments and 5 replications. Goats were divided and fed with one of the treatments as follows: P0: only forage, according to the farmer’s way; P1: total mixed ratio; P2: total mixed ratio + 15g multinutrient block/head/day. Nutrient’s composition of the treatment was showed on Table 1.
Table 1. Nutrient’s composition of feed treatments

| Nutrient content | P0 (% DM) | P1 (% DM) | P2 (% DM) |
|------------------|-----------|-----------|-----------|
| Water            | 12.47     | 12.47     | 17.21     |
| Ash              | 10.35     | 11.49     | 12.19     |
| Lipid            | 2.17      | 1.50      | 1.53      |
| Crude protein    | 11.00     | 11.02     | 11.55     |
| Crude fiber      | 23.66     | 22.12     | 21.31     |
| NPN              | 52.82     | 53.87     | 53.83     |
| TDN              | 62.89     | 63.50     | 64.28     |

Data analysis
The results of the study data were analyzed using Anova at the level of 5%.

3. Result and Discussion
After 3 months of research, data was showed in Table 2. Feed consumption affects the final body weight and body weight gain significantly. Different body weight gain for each individual animal could be caused by feed and genetic factors [2].

Table 2. Average of initial body weight, final body weight, body weight gain, and feed consumption of Kacang goat

|                      | P0       | P1       | P2       |
|----------------------|----------|----------|----------|
| Initial body weight  | 14.55    | 13.25    | 13.4     |
| Final body weight    | 29.82a   | 29.75a   | 32.38b   |
| Body weight gain     | 0.17a    | 0.18b    | 0.21c    |
| Feed consumption     | 698.55a  | 796.65b  | 857.08c  |

Feed component
The addition of multinutrient block on P2 affects the amount of water content, ash content, crude protein and Total Digestible Nutrient compared to P0 and P1. This causes an increase in feed efficiency due to the addition of organic mineral materials. Inorganic mineral materials can influence the effects of absorption and retention of livestock minerals [9]. Therefore the use of organic ingredients as feed supplements is highly recommended. One way to handle it is through supplementation or feed utilization that has the potential to increase livestock retention [10][4]. Multinutrient blocks (MNB) with the main ingredients of urea and molasses are an excellent combination of energy, protein and minerals [11]. Multinutrient Block is one solution that can be used to meet livestock needs [12].

The high of water content, ash content and crude protein in P2 compared to P0 and P1 are due to the addition of MNB. The nutrient content in feed ingredients is influenced by the formulation of its constituent raw materials [13][14]. In this study, organic materials such as corn fodder were used as fiber sources, molasses as binding agents and preservatives, salt, blood clamshells and eggshells as organic mineral sources. The use of inorganic materials is only urea as a source of protein and bentonite as a filler. Local and inexpensive materials must be used to make multinutrient blocks [8]. The selected materials must be homogeneous in blocks. Feed blocks must include binders, preservatives and other combinations of ingredients, which will provide nutrients (energy, nitrogen, minerals and vitamins) for livestock. Furthermore, composition of the feed block depends on the purpose of production (animal survival, maintenance or production) [8].

Growth performance
P2 produces the best final body weight and body weight gain compared to P0 and P1 (Table 2). Livestock productivity is strongly influenced by genetic, feed and environmental factors [15]. The availability of sustainable and quality feed influences the supply of nutrients needed to be able to express their genetic
potential. The treatment of MNB as feed supplement is thought to have an optimal effect on the efficiency of the total mixed ratio given to goats. MNB supplements commonly used for ruminants contain energy, urea, essential minerals and vitamins, so their use can be a very interesting solution to overcome health problems [12] and malnutrition faced by most animals, especially during the dry season [16].

P2 had a higher TDN compared to P0 and P1. Therefore P2 produces the best final body weight and body weight gain. TDN is the amount of energy from feed and rations that can be digested by livestock. Feed substances that can be used as energy sources, namely protein, crude fiber, fat and BETN. Energy shortages can result in stunted weight gain, a decrease in body weight and a reduction in all production functions and death if long lasting. The high consumption and digestibility of dry matter are not in line with the weight gain, but live weight increases with increasing consumption of TDN [17].

The high protein content in P2 along with the high feed consumption and TDN. Feed containing enough protein can increase microbes in the rumen, so that the digestibility of feed is also increased [18]. The higher the TDN value of feed, the better the quality of feed, because many feed nutrients are utilized by livestock. Table 2 showed the result of final body weight of P0 and P1 did not provide significantly different. But body weight gain of P0 and P1 was significantly different. This happens because in treatment P0, livestock do not get feed which serves to stimulate the activity of microorganisms in the rumen. The total mixed ratio given in treatment P1 combines forages with concentrates as feeds which more quickly stimulate micro activity of organisms in the rumen. The use of concentrates can increase the digestibility of the ration's dry matter, body weight gain and efficiency in the use of rations [19]. The increase in digestibility that occurs in P1 and P2 compared to P0 is the result of giving concentrates to stimulate rumen microbial growth so that fermentative digestive activity is increased, which in turn increases the amount of dry ingredients that can be digested. Increased total digestible nutrient in the treatment ration due to the addition of concentrates that have high digestibility values in the digestive tract of ruminants. Concentrate is a feed ingredient that is rich in food substances, especially protein and energy, has a low crude fiber content so that its digestion in the digestive tract is quite high [19].

4. Conclusion
It can be concluded that feeding of total mixed ratio supplemented with multinutrient block to Kacang Goats was beneficial in augmenting nutrient utilization, growth performance and feed efficiency as compared to animals fed only green grass or only total mixed ratio.

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