The Evaluation of Wafer Feed Supplement Containing Leucaena Leaf on Pasundan Calves

[1]Y. Retnani, [1]S. Suharti, [1]L. Khotijah, [1]I. Prihantoro, [1]Taryati, [2]Herni, [1]D. Argadyasto
[1]Department of Nutrition Science and Feed Technnolgy, Faculty of Animal Science, Bogor Agicultural University, Jl. Agatis, Kampus IPB Darmaga, Bogor 16680, Indonesia
[2]Graduate Student of Nutrition and Feed Science, Graduate School of Bogor Agricultural University
Corresponding email: yuli.retnani@yahoo.com

ABSTRACT

Beef imports began to be restricted, resulting in increased production of local calves beef encouraged to be improved. As an example of the development of local livestock is Pasundan Cattle as an indigenous cattle in West Java. Livestock productivity required a variety of factors, one of which is the quality of feed. Limitation of livestock productivity in several areas in Indonesia are low quality of feed, restricted of forage especially in dry season. A feed processing technology that might be adopted by to farmers the feed of wafers. Feed wafer processing technology is easy and cheap, and easily to stored, and easily given to livestock. The aim of this research to assess the effect of wafer feed supplement containing Leucaena leaf on the production of Pasundan calves. The research was conducted at Laboratory of Feed Industry, Faculty of Animal Science, Bogor Agricultural University and animal conducted on Ciamis, West Java, Indonesia. The average body weight in range 99 ± 20 kg. The design used was a randomized block design with 4 treatments and 5 blocks as replication consisting of T0 = control, T1 = conventional feed + 5% wafer feed supplement, T2 = conventional feed + 10% wafer feed supplement and T3 = conventional feed + 15% wafer feed supplement. Parameters were consumption of dry matter and protein, average body weight, final body weight and blood haematology profile. The average daily weight gain by giving 10% of wafer feed supplement to pasundan calves is 58% most highest than other treatment. Final body weight of local calves by giving 10% of wafer supplement most higest than other treatment. The final body weight by giving 10% of wafer supplement around 14% higher than giving conventional feed.

Keywords: Feed supplement, Local calves, Productivity, Wafer

INTRODUCTION

Beef requirement in Indonesia continued to increase every year. Beef requirement continues to increase it was not in line with the local production, for temporary solution by goverment is import. Beef import value in 2014 almost US$ 700 million (Ministry of Agriculture of Indonesia 2017). To lower the value of imports started in 2016, beef imports began to be restricted, resulting in increased production of local beef encouraged to be improved.

As an example of the development of local livestock is Pasundan Cattle as an indigenous cattle in West Java. Pasundan Cattle is a specified genetic resource from Indonesia, that widely cultivated in buffer zone of teak forest in several district of West Java such as Ciamis, Pangandaran, Tasikmalaya, Cianjur, Sukabumi, Garut, Purwakarta, Kuningan

and Majalengka. Pasundan cattles is able to live in poor quality of feed but can produce good quality of meat, resistant to heat stress, can be applied to extensive breeding pattern and resistant to parasite (Wartini 2002). Body size of Pasundan cattle are shoulder height 115 cm in males and 109 cm in females. Body length of bulls an average 120 cm and 110 cm in females. Chest size bulls average 150 cm and 138 cm in females (Lembang Insemination Center 2017). Pasundan cattle had been adaptive to weather and environtment conditions in West Java. With this potential, so that it can be developed as livestock to fullfil the demand for beef, especially in the region of West Java.

To support livestock productivity, required a variety of factors, one of which is the quality of feed. In several areas in Indonesia, to produce high quality of forage for cattle is not easy. In addition, in dry season, quantity of forage descreased. This conditions causes the efforts to increase livestock production is difficult to achieve. The farmers in Indonesia not usual to collect and store while feed quantity is an increase in rainy season. There has been no effort to collect and store forage in the rainy season for use as feed in the dry season. In the rainy season bring their animals to the land is overgrown with grass naturally, bind his livestock in these locations in some region the livestock may be moved outdoor during night, the livestock may be moved and only shifted his position, if the grass is almost gone consumed by livestock.

One way to overcome the limitations of forage mainly by using alternative feed resources. As an example of using the leaves of Leucaena. In several area in Indonesia, Leucaena peas already consumed as food. So that leaves of Leucaena not used for a human. Leucaena leaf can be used as a feed for livestock. But there is a should be considered in use Leucaena leaf is the content of antinutritive agent as a mimosine (Askar 1997). Mimosine is non-protein amino acid complex by a structure similar to tyrosine (Kumar 1991). Protein content of pea and leaf of Leucaena are 34% and 31% respectively. Mimosine level containing in pea and leaf of Leucaena are more than 10% can decreased the productivity of livestock (Ter Meulen et al., 1979). Previous research by the wafer feed supplement containing Leucaena leaf can decreased the mimosine level more than 30% and protein only for 0,6% (Argadyasto et al., 2015). So that wafer feed supplement can be used as a supplement for livestock to optimalization of Leucaena leaf and increased livestock productivity.

Feed wafer processing is a technology using heat and pressure that could be disseminated to farmers is feed in the wafer form. Feed wafer processing technology is easy and inexpensive, and can be used transform waste into an easy stored and distribute feed (ASAE 1994). Feed wafers made using the aid of heat and pressure. Wafer is a material that has the dimensions (length, width, and height) with a composition consisting of several fibers (ASAE 1994). Composition of product innovation of wafer is made to resemble the composition of the forage that is expected to be palatable and can be supplied with up to and overcome the scarcity of feed in the dry season.

In the previous research, supplementation of wafer containing Leucaena leaf for 10% can increased final body weight 28% more higer than conventional feed only using Bali calves (Retnani et al., 2014). In the other research for processing of Leucaena leaf as supplement in mash, pellet and wafer form, the best result for livestock performance used wafer form (Argadyasto et al., 2015). So that, the negative impact of mimosine to livestock can be minimize by using wafer form.

The aim of this research to assess the effect of wafer feed supplement containing Leucaena leaf on the production of Pasundan calves.

MATERIALS AND METHODS

The 20 female bali calve used were distribute randomely create. The treatment abaout similar average weight. The research was conducted at Laboratory of Feed Industry, Faculty of Animal Science, Bogor Agricultural University and animal conducted on Ciamis, West Java, Indonesia. The average body weight in range 99 ± 20 kg.

Experimental design

The design used was a randomized block design with 4 treatments and 5 blocks as replication consisting of T0 = control (conventional feed), T1 = conventional feed + 5% wafer feed supplement, T2 = conventional feed + 10% wafer feed supplement and T3 = conventional feed + 15% wafer feed supplement.
The variable that would be measured by :

- Average Daily Gain (ADG)
  Average Daily Gain (g head^{-1} day^{-1}) = $\frac{Final\ Body\ Weight\ (g) - Initial\ Body\ Weight\ (g)}{During\ This\ research\ (day)}$
- Blood Haematology Profile:
  Haemoglobin was used sahli tube methode and type of leukocytes observed directly under the microscope.

Parameters were consumption of dry matter and protein, average body weight, final body weight and blood haematology profile.

RESULTS AND DISCUSSION

Consumption of dry matter and protein

Based on the result of reserach showed that the treatment and block significant effect on dry matter intake of local calves ($P < 0.05$). Ability of cattle to consume is very limited. Factors affecting feed intake in ruminants are given dietary factors, animal factors and environmental factors (Parakkasi 1995). Dry matter consumption in this research was 2.3-2.8 kg head^{-1} day^{-1}. The level of dry matter consumption of this study is higher than before research amounted to 1.2 kg day^{-1} in Bali calves who received Leucaena supplements (Jelantik 2001), even more higher than reported by other research is 1.1 kg day^{-1} Bali cattle receiving supplemental feed solid starter with a 16.3% protein content (Fattah 2001). In this research indicates the wafer feed supplements can increased dry matter consumption. The supplementation 15% wafer feed supplement can increase dry matter consumption occurred compared with conventional feed about 19%.

Nutrient requirement of cattle for weight 130 kg head^{-1} are dry matter 3.9 kg with consist of protein 13.6% and TDN 64% (NRC 1996). In this study, protein consumption most highest in T3. Adequacy protein consumption in T3 about 13.3% approched the NRC value. Treatment T3 is the most value for dry matter and protein consumption. This indicates giving higher of the wafer feed supplements can increasing consumption of local calves. Nutrient requirement are met will support the growth of calves in accordance with the genetic potential, that the nutrient content and feed consumption has a great influence on growth (Soeparno 2005).

Average daily gain and final body weight

Growth generally expressed with increasing body weight as a reflection of the nutrient adequacy consumption to the body metabolism. Body weight gain is influenced by several factors such as the total consumption of protein obtained each day, gender, age, genetic,

environmental, physiological condition of the cattle and management. In general, the growth determined by measurements of weight and height (NRC 1985). In addition to knowing the growth, measurement of body weight can determine the level of consumption, feed efficiency and price (Parakkasi 1995).

The results showed that treatment of wafer feed supplements significantly in body weight gain ($P < 0.05$). The wafer feed supplements treatment had no significant effect ($P > 0.05$) on the block of final body weight. Final body weight gain in this study ranged 330-789 g head^{-1} day^{-1}. Giving of wafer in 10% level had average daily gain (ADG) was higher than the other treatments. The wafer feed supplement was given to the local calves which has a weight of small, medium and large have the same response. Daily weight gain is influenced by several factors, namely the total consumption of protein, gender, age, genetic, environmental, physiological condition and management of livestock (NRC 1985).

Body weight gain by giving of wafer feed supplement T1 (50%), T2 (58%), T3 (46%) higher compared with conventional feed. While previous research daily weight gain of sumba ongol calves giving 15% of wafer feed supplements 42-45% higher compared to body weight daily by the conventional feed (Retnani et al., 2016).

The results showed that treatment of wafer feed supplements significantly ($P < 0.05$) in final body weight of bali calves during the research. The final body weight of calves with the wafer feed supplements at T1, T2, T3 were 138, 142 and 132.16 kg head^{-1} respectively. Giving wafer feed supplements significantly ($P < 0.05$) increased the end of final body weight of local calves. Final body weight by giving 10% of wafer feed supplements 12% higher than conventional feed.

The results of ADG and final body weight, T3 not higher than T2, contrary with dry matter and protein consumption (Table 2). Dry matter and protein consumption of T3 was higher than the other treatment especially T2. This condition caused by limitting factor of mimosine content in Leucaena leaf. The Leucaena mimosine at a certain level in feed can caused loss of body weight of cattle. In treatment T2, mimosin level may still within the limits that can be tolerated by the animals. But in T3, mimosin level has exceeded the threshold of tolerance (Ghosh and Samiran 2007).

Blood haematology profile

Value hematocrit of calves in this study are in the range of 29.33 to 36.00%. The value is still within the same range as those reported 28.14 to 30.32% (Ghosh and Samiran 2007) and which is 25.89 to 36.01% (Mirzadeh et al., 2010). Heat stress can lead to increased hematocrit value, it is caused by the increased production of erythrocytes and a decrease in blood plasma (Santosa et al. 2012). In this study showed that cows pasundang in this study is not under stress that can reduce performance.

Haemoglobin levels in this study were in the range of 10.13 to 12.37 g dL^{-1}, this value is in the same range as those reported before, which is about 9.95 to 11.81 g dL^{-1} (Ghosh and Samiran 2007) and also which is about 8.25 to 11.97 g dL^{-1} (Mirzadeh et al., 2010). Oxygen (O_2) requirements when cattle are stressed, so the impact on the increase in hemoglobin. The conditions resulted in an increased rate of metabolism of the body during heat stress. In addition O_2 levels were thin in the air as a result of the relatively high humidity can also increase the levels of hemoglobin in the blood (Santosa et al., 2012). This study did not show signs of an increase in hemoglobin. The number of leukocytes contained in the blood of local calves in this study is the range 11,100 – 13,167 per mL by another research from 6.5 to 11.50 thousand mL^{-1} (Mirzadeh et al., 2010). In general, leukocytes does not indicate a problem (infection or inflammation) in the calves. This indicates that administration of wafer

feed supplements did not affect the physiological condition of the calves weaning, this indicates that the wafer feed supplements containing mimosin although not toxic.

CONCLUSIONS

Giving wafer 5%, 10%, 15% resulted in the average daily weight gain higher compared with conventional feed. The average daily weight gain by giving 10% of wafer feed supplements reached 789 g head^{-1} day^{-1} or 58% was higher than compared with conventional feeding only reached 330 g head^{-1} day^{-1}. Final body weight of local calves by giving 10% of wafer supplement reach the average 142 kg head^{-1} higher than conventional feeding reaches the average final body weight 125 kg head^{-1}. Giving wafer feed supplements did not affect the physiological condition of the female calves.

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