3rd AINI INTERNATIONAL SEMINAR
In conjunction to 50th Anniversary Faculty of Animal Science
Andalas University
THE ROLE OF NUTRITION AND FEED IN SUPPORTING SELF SUFFICIENT
IN ANIMAL PRODUCTS, FOOD SAFETY AND HUMAN WELFARE
Padang, 24 – 25 September 2013

PROCEEDING
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3rd International Seminar and 9th Biennial Meeting of AINI
"The Role of Nutrition and Feed in Supporting Self Sufficiency in Animal Products, Food Safety and Human Welfare"
in conjunction with
the 50th Anniversary of the Faculty of Animal Science
University of Andalas, Padang West Sumatera
Grand Inna Muara Hotel, Padang 24-25 September 2013

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FOREWORD
President AINI

Assalamu 'alaikum Wr. Wb.,
The Honourable Rector of The University of Andalas,
The Dean Faculty of Animal Science, University of Andalas
Distinguish guests, participants, ladies and gentlemen,

First of all, on behalf of the Indonesian Animal Nutritionist and Feed Sciecnetist Association (AINI), I would like to extend our warmest welcome, and indeed it is a great pleasure to see you all in this room, participating in the 3rd International Seminar and 9th Biennial Meeting of AINI in conjunction with the 50th anniversary of the Faculty of Animal Science University of Andalas, Padang West Sumatera. AINI that was firstly established in 1996 with the objective to gather all of the animal nutrition and feed scientists in Indonesia permitting to the exchange of knowledge and experiences under spirit of brotherhood, to stimulate the advancement of science and technology in nutrition and feed science, thus benefiting to the competitiveness of livestock agribusiness.

Since its establishment 1996, AINI has been conducting regularly the biennial scientific meeting. From 2007, the scientific meeting was upgraded to the International level and the first International seminar was conducted at Jenderal Sudirman University, Purwokerto Central Java and then the second International seminar was held in Padjajaran University, Bandung West Java, while this third event is conducting here with the theme "THE ROLE OF NUTRITION AND FEED IN SUPPORTING SELF SUFFICIENCY IN ANIMAL PRODUCTS, FOOD SAFETY AND HUMAN WELFARE"

Distinguish guests, participants, ladies and gentleman,

The role of feed and nutrition is primordial in the livestock agribusiness, not only due to the fact that more than 70% of production cost is coming from the feed cost, but also the feed safety that affect the food safety is becoming the great issues in recent years and become a great concern by many countries in the world. Animal products such as egg, meat and milk are subjected to the government policy to reach the self sufficiency. Indonesian government has payed attention and put high priority especially in meat self sufficiency for 2014. Unfortunately, effort made by the government ie. Ministry of Agriculture since many years has facing now the difficulty to succeed, due to some raisons such as the meat price volatility, and also the low exchange rate of rupiah to the US dollar at this time being. Indeed, the demands on the animal products will be increasingly in the future as the population and income per capita are growing. We should take a part and do our best to support the government policy in fulfilling the food of animal products, quantitative and qualitatively. In this regards, role of nutrition and also Nutritionist and Feed Scientist are very important.

I would like also to take this opportunity to share the idea with all you, that AINI as the organization of scientist, to have a international scientific journal is a must. The jurnal deals with all aspects of nutrition and feed issues in tropical conditions. The Management board of AINI has taken the decision for revitalizing the AINI Journal to become the Journal of Nutrition and Feed Science, internationally recognized, by involving the International committee of lecture as the reviewers. To this end, we need
fully your support and encourage the scientists especially the young scientists to publish their work in English. The accomplishment of this task will bring the association be more respected in national and international level.

Distinguish guests, participants, ladies and gentleman,

For this opportunity, I should express my sincere thanks to the Dean of the Faculty of Animal Science, University of Andalas, the organizing committee, sponsors, and all party that cannot be listed since we are deeply in debt to all of your effort and sacrifice to the success of this seminar. Our sincere thanks must go to the Directorate General for Higher Education Department of National Education for the grant awarded. For our invited speakers, Prof. Tamo Fukamizo (Kinki University, Japan), Dr. Robert L. Payne (Evonik-US), Dr. Yuwates Ruangpanit (Thailand), Prof. Abdul Razak Alimon (UPM Malaysia), Prof. Yose Rizal (University of Andalas, Indonesia), Prof. Ali Agus (University of Gajah Mada, Indonesia), Prof. Suhubdy (Mataram University, NTB) we are indebted to your effort and your participation in this event. Your views will enlighten and inspire how to empower our local feed resources in sustaining the feed security for the future. Also, on behalf of the AINI, I must express my deepest gratitude to the Director General of Livestock Services Department of Agriculture for his willingness to give the keynote speech to this seminar.

Distinguish guests, participants, ladies and gentleman,

I hope you will have the fruitful meeting and gaining many new ideas and perspectives to be developed in the future. I do hope also, we will see you again in the 4th International seminar and Xth Biannual meeting 2015 that will be hosted by AINI member and colleagues from Sam Ratulangi University, Manado, North Sulawesi as the organizing committee.

Finally and surely, please enjoy your stay with west Sumatera culture and nature, tradition and hospitality, in addition to your scientific activities. Thank you,

Wassalamu 'alaikum Wr. Wb.

Padang, September 24th, 2013

President AINI

Prof. Ali Agus
FOREWORD
ORGANIZING COMMITTEE

Assalamu'alaikum Wr. Wb.,
The Honourable Rector of The University of Andalas,
The Dean Faculty of Animal Science, University of Andalas
Distinguish Guests, Seminar Participants, Ladies And Gentlemen,

First of all, we are very grateful for Allah the Almighty, who has allowed us to get together in the pretigious 3rd AINI International Seminar which is held by the Faculty of Animal Science, University of Andalas in conjunction to celebrate the 50th Anniversary of the Faculty of Animal Science, collaborated with Indonesian Association of Nutritionist and Feed Scientist (AINI). We would like to welcome all participants who have come from different provinces in Indonesia, and especially to our distinguished guests and participant from overseas (USA, Japan, Thailand, Malaysia, Philippine and Australia).

The animal protein consumption of the people in Indonesia and other developing countries around the world as well is still low. The Indonesian Government has performed many efforts to increase this animal protein consumption. One of them is through the launching of a program called the self sufficient in beef (program swasembada daging sapi = PSDS), that has been targeted to be achieved in 2014. Besides, other attempts are also to develop poultry and other animal industries that have contributed to the fulfillment of animal protein requirement. However, based on the animal industry condition nowadays it would be rather complicated to achieve it, due to the low in farm animal productivity in Indonesia. Among the problems of low in animal productivity are the nutrition and feed they obtain during their life cycles. Besides, the price of feed for animal industries could reach 60 to 70% of the total cost of animal production. Indonesia has very limited range land for cattle grazing and limited feed sources for poultry feeding. The cattle feeding are very dependent on the utilization of agriculture waste/by-product as the source of feed. Most of these available feedstuffs are low in quality, so that they require further processing before feeding them to cattle. Meanwhile, the poultry and other farm animal feeding are depending on imported feeds. The other problem is the concern in utilization of in-organic feedstuffs or feed additives for growing farm animals.

The theme of this seminar is very relevance to the nowadays national as well as international issues of feeding safety feed for livestock and poultry, and conserving nutritious, safety and hygienic food for human health. This nutritious, safety, hygienic and healthy food of animal origin will be obtained from the high quality of feed that is fed to animals. The feed and food processing technology will support the high quality of feed and food. This 3rd AINI International Seminar on nutrition and feed is held to collect the information and to share the ideas from nutritionists, scientist and practitioners on the nutrition, feed processing technology and its utilization for producing high quality of feed and food which are available in other part of the world to contribute to the human welfare.

Prof. Dr. Novirman Jamarun
Chairman of the Organizing Committee
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Abstract
The study aimed to investigate the effect of substitution forage with leaves pellet on goat milk composition. Calliandra and Cassava leaves pellet were used in this study. Pellet substituted 12.25% of forage dry matter in the ration. The study used 9 lactating Etawah Crossed Bred goats, divided into 3 groups (Control, Treatment I and Treatment II). Feed in Control group consisted of grass, Calliandra and concentrate (21:49:30) of dry matter. In Treatment I and II the goat was given the similar ration, but 25% of Calliandra was substituted with Calliandra pellets and Cassava leaf pellets. Data were collected for 60 days, consisted of feed and nutrient consumption, milk composition (total solid, fat and protein content). The result showed there was a significant effect of substitution of forage with leave pellets on dry matter, crude protein, crude fiber and energy consumption (P< 0.05). Milk production, fat and protein was not affected by substitution. The study concluded there was no effect of feeding leaves pellets as forages substitution on the composition of goat milk.

Key words: leaves pellet, milk composition, goat

INTRODUCTION
In smallholder condition Etawah Crossbred goat was commonly depends on forages. Calliandra, Gliricidia and Cassava leaves composed the main feed. Those types of leaves are known to be nutritious for goats. The protein content is 22.29% in Calliandra (Matara, 2001) and 23.42% in Cassava leaves (Purwanti, 2005). Problem commonly occurs in the dry season, that was the condider when forages production decreased, so that the availability of good quality forage was low. In this situation there was need an effort to preservate forage in order to overcome the problem of feed shortage. The effort should be expectable to maintain the availability of high quality forages such as Calliandra, Gliricidia and Cassava leaves, therefore significance to the sustainability of goat farming systems, depending on natural vegetation.

Pelleting is one of the methods of feed preservation. The process was a combine of mixing of the raw material, forming and a thermal treatment to hard the pellet. To produce forage pellet there was need to add concentrate and filler such as gelatin and sor of flour (Anonim, 2000). According to Parakkasi (1999) there are advantages of pellets. It can be stored in small area and there is no waste. Anonomous (2013) stated that animal fed pellets is free to eat at different times or several times a day and therefore can increase milk production. Sanz Sampelayo et al. (1998) reported the advantageous of feeding alfalfa pellet in compared with alfalfa hay, such as increased casein milk protein, improved the utilization of nitrogen and metabolizable energy for milk production. It was also indicated that amount of fat and protein in the milk depended on energy intake.

Milk composition of is one of the major factors determining its nutritive value (Morand-Fehr et al. 2007). Some factors including feed have been known to determine milk production and composition. In this recent situation where goat milk being
promoted to consume, there is need to investigate the composition. An evaluation on Calliandra and Cassava leaves pellets for forage substitution was necessary to be done, since those type of forage were majority produced by farmers.

**MATERIAL AND METHODS**

**Materials:**

**Goat and feed.** The study carried out with 9 lactating Etawah Crossbred goats in the village of Sukorejo, Turi, Yogyakarta. The goats were in the second lactation with body weight around 40 to 46 kg. The goats were separated from their kid 7 days after kidding. Feed consisted of grass (Pennisetum purpureum), Calliandra calothyrsus, concentrates and leaves pellets (Calliandra and Cassava leaf pellets). Concentrates composed of rice bran (30%), wheat pollard (40%) and soy bean hull (30%) of dry matter. The component of leaves pellets are Calliandra or Cassava leaves mill (80%), rice bran (20%) of dry matter and filler component (tapioca flour and molasses).

**Equipment.** Individual slatted goat houses completed with feed trough and bucket for water feeding. Goat scale, equipments for processing leaves pellets and chemical analyses of feed and goat milk.

**Methods:**

The goats were divided into 3 groups (Control, Treatment I and Treatment II). Feed of goats in the Control group consisted of grass (21%), Calliandra (49%) and concentrates (30%) of dry matter. Similar feed was given to goats in Treatment I and Treatment II, but 25% of Calliandra was substituted with Calliandra pellets or Cassava leaf pellets, respectively. The quantity of substituted pellet corresponded to 12.25% of Calliandra (DM). Total dry matter of feed given to all groups was 4% of body weight. Feed was offered twice a day in the morning and the afternoon. Pellets was given after feeding concentrates.

Feed consumption was measured by weighting feed offered subtracted by feed refused after 24 hours. Samples of feed, feed refused and milk were taken every 3 days during 60 days then dried and composited for determination of nutrient content. Milk samples were taken for analyses of specific gravity (lactodensimeter), total solid, milk fat (Babcock tests) and milk protein (Kjehldahl). Body weight of goats was measured by weighing at the beginning and the end of study period. Data of feed and nutrient consumption, body weight change, milk production and composition were collected during the study and statistically analysed by SPSS Statistical Package Programme 17 followed Completed Randomised Design.

**RESULT AND DISCUSSION**

**Feed and nutrient consumption**

Composition of feed and nutrient content were presented in Table 1 and 2. Table 3 showed the average of nutrient consumption by goats. Dry matter intake (DMI) in Treatment I and Treatment was higher than that in the Control (85.78 and 96.40 g/kg BW0.75 compared with 70.41 g/kg BW0.75). Those value corresponded to 3.35 and 3.74% compared with 2.77% of body weight. The data indicated an effect of substitution of Calliandra (25% DM) with Calliandra or Cassava leaves pellets.
(P<0.05). The highest DMI found in Treatment I (substitution with Calliandra pellets). Leaves pellets in this study considered to be palatable. It was proved by no refused pellets. This condition contributed to maintain DMI. The level of DMI of goats in this study was higher than average DMI of goats fed forage in free range as 43.6 g/kg BW^{0.75} corresponded to 2% of body weight (Njoroge, 1996) and 2.8 to 4.9% of bodyweight for tropical goats (Atabany, 2002). The level of DMI in Treatment I and Treatment II was slightly under the capacity of DMI of goats as about 4 to 7% of body weight (Harris and Springer, 2013). Based on the palatability, pelleting Calliandra and Cassava leaves is expectable preservative method for forage. In the dry season it might be helpful for farmer to solve the problem of feed shortage.

There as an effect of substitution fresh Calliandra with leaves pellets on nutrient intake (P<0.05). The highest intake of crude protein (CP), crude fiber (CF) and total digestible nutrient (TDN) was found in the Treatment I where the goats received Calliandra pellets. According to Muńga et al. (1995) cited by Kato et al. (2006) and Mpairwe et al. (2003) supplementation with adequate CP to ruminants has promoted dry matter intake (DMI), rumen degradation and nutrient flow to the small intestine and culminated in higher animal performance. In this study, 20% of pellets components also concentrates (rice bran, flour and mollases) in small amount. Therefore apart from substituting fresh Calliandra, leaves pellets in this study also supplemented the ration in a small amount. Those materials took part in increasing DM and nutrient intake for goats in the Treatment groups.

In this study, the purpose of pelleting was to reduce tannin content, apart from preserve. Calliandra calothyrsus has been identified and recommended as the most suitable species feed. However, it contains antinutritional factors, which could be reduced by ensiling (Sabiti, 2001; Bareeba and Aluma, 2000 cited by Kato et al., 2006). According to NRC (1981) high water content in forage could restrict energy availability for goat. In this study, the form of leaves pellets was solid and high density. Dry matter content (58.60% and 58.40%) was higher than fresh leaves. According to Carvalho et al. (2006) cited by Rufino et al. (2012) forages have low energy density and slow rate of degradation and passage, which limit the forage intake. In this study, the density of pellet probably increased degradation and passage in the rumen. There was not bulky in the rumen and therefore contribute to increase dry matter and nutrient intake. The increasing of CP and CF consumption as a result of pellets substitution possibly affected milk production and composition, especially on milk fat and milk protein.

**Milk composition**

Milk composition of lactating goats (presented in Table 4) was not significantly affected by treatment. Milk gravity varied between 1.026 to 1.029. Milk fat and protein were 4.40%, and 4.55% in Control goats; 4.19% and 5.16% in Treatment I; 3.69% and 4.41% in Treatment II. The concentration of fat and protein of goat milk in this study was similar to the average milk composition. According to Strzalkowska et al. (2009) the concentration of milk fat varied between 3.67 to 3.85% and milk protein 2.98 to 3.66% while other report was 3.3 to 7.7% and 3.1 to 4.5% (Pambu et al., 2011). The characteristic of breed was also reported, such as superiority in milk quantity of dairy goat and quality in indigenous breed. The data showed similarity of milk
composition in Control and Treatment goats. The increased nutrients including CP, CF and energy in the Treatment groups did not show significant effect on the milk composition (fat and protein). Sanz Sampelayo et al. (1998) showed the advantageous of feeding alfalfa pellet, such as increased casein milk protein, improved the utilization of nitrogen and metabolizable energy for milk production in compared with alfalfa hay. It was also indicated that amount of fat and protein in the milk depended on energy intake. According to Morand-Fehr and Sauvant (1980) supplementary concentrates during midlactation increased intakes of dry matter and energy and milk production. Milk protein percentage was increased, but milk fat contents were lower. Increased intakes of energy raised percentages of palmitic acid and decreased carbon-18 acids. In this study, feeding Calliandra pellets resulted the highest energy intake (in the form TDN), however there was no improvement in milk fat and protein content. There were many reasons of those condition. Variation of breed character, which affected milk production and milk composition. There was no record of goat samples origin. Forage quality was also uncertainly and samples were not taken daily. In this study Calliandra, Cassava leaves and grass were provided by farmers, so that very depending on the place and age of plantation. This because energy potential and protein content in forages are inversely related to maturity. The cellulose in young forages is generally more digestible because rumen microbes are able to more quickly break it down and ferment it, which resulted in more volatile fatty acids. Those reason was probably determine the digestibility of feed in rumen and nutrient absorption in the intestine.

The average milk yield was 540 ml/day (Control), 400 ml/day (Treatment I) and 460 ml/day (Treatment II). The result in Table 4 showed the highest milk fat and protein yield were achieved by goats in the Control group because this group produced the most quantity of milk. The yield of fat and protein were 24.49 and 25.39 g/kg BW 0.75 (Control); 17.27 and 21.21 g/kg BW 0.75 (Treatment I); 17.43 and 20.79 g/kg BW 0.75 (Treatment II). The benefit of leaves pellets utilization in this study could be emphasis on its capability to maintain nutrient intake and milk composition. This meant no negative effect of feeding leaves pellets on consumption and the quality of milk. Since the leaves pellets were palatable, pelleting could be considered as preservative method. This point was probably helpfull for farmers to overcome shortage feed problem during the dry season.

CONCLUSION

The study conclusion were (1) Calliandra and Cassava leaves was palatable and good substitution for fresh forages, (2) the effect of substitution 25% of forages dry matter with Calliandra and Cassava leaves pellets increased nutrient consumption significantly, (3) the substitution was not affected goat milk composition.

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Sufficient in Animal Products, Food Safety and Human Welfare

At the 3rd ANI International Seminar "The Role of Nutrition and Feed in Supporting Self

PRESIDENT

AS

IR. YUNI SURANINDAYA, M.S., PH.D.

THIS IS TO CERTIFY THAT

Andalas University
In conjunction to 50th Anniversary Faculty of Animal Science
3rd ANI INTERNATIONAL SEMINAR