Effect of Katuk Leaf Extract (Sauropus Anddrogynus) on Production and Quality of Frisiand Holstain Peranakan Cow Milk in Enrekang Regency, Indonesia

Sutomo, S[*]., Sjamsuddin Garantjang[**], Asmuddin Natsir[**]., Ambo Ako[**]

[*]Doctoral Program in Agricultural Sciences, Hasanuddin University, Makassar.
[**]Lecturer at the Faculty of Animal Sciences, University of Hasanuddin Makassar

DOI: 10.29322/IJSRP.9.08.2019.p92150
http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92150

Abstract- This study aims to determine the effect of giving katuk and gamal leaves to the production and quality of cow's milk at the beginning of lactation. This research was conducted in Enrekang District Dairy Farm using Randomized Block Design (RBD) with 4 treatments and 4 replications for each treatment combination. The total unit experiment is 16. The material used consists of forages (80%, 75%, 70%, 65%); concentrate (20% per treatment); gamal leaves (5%, 10%, 15%) and katuk leaves (130 g, 150 gr, 170 g). The tools used are cage equipment, milk measuring instruments (liters). The results showed that giving katuk leaves significantly affected milk production, crude protein, crude fat, potassium and phosphorus. Forage 65% + 20% concentrate + 15% gamal leaves + katuk leaves 170 gr / head increase milk production 10.92%, crude protein 3.89%, crude fat 3.69% calcium 0.42 and phosphor 0, 68% compared to other treatments. The results showed that katuk leaves in feed gave a good response to increase the production and quality of milk in dairy cows.

Index Terms- katuk leaves, production and quality, FH dairy cattle

I. Introduction

Milk is an important food ingredient in meeting nutritional needs. Besides being a high source of protein, milk also contains calcium which is important for bone formation ingredients. In cow's milk also contains essential amino acids which are important for the body's metabolic processes. Protein from cow's milk has an important role in the body as a regulator of metabolic processes, because proteins will be synthesized into various types of enzymes that function to regulate cell activity.

The level of production of cow's milk is strongly effectd by the quality of feed given to cattle. The higher the quality of feed given, the higher the milk production from the cow. Cow milk production in smallholder farmers in Indonesia averages only 10-15 liters / day / head. The production level is still relatively low compared to the production of Frisiand Holstain cow milk in the Netherlands which reaches 30-40 liters / day / head. This difference can be effectd by the different genities between breeders in Indonesia and those in the Netherlands. other factors that also effect milk yields, namely climate and management. It is known that in the European Continent has a cold climate, it affects the living needs of Frisiand Holstain cattle which are very suitable in cold climates. Besides the effect of climate, cow milk production is also effectd by good management levels. The management includes feed management, home management, time management and so on. The need for nutrition of Holstein Friesiand breeders is very much supported by the quality of the feed provided. Feed quality will also affect the level of production and the quality that will be produced. In addition to the quality of feed, the level of milk production can also be affected by the presence of hormones. Hormones that affect the level of milk production, namely the hormone lactogen. The lactogen hormone will be secreted and produced when the dairy cow has undergone the birth process. And the number of lactogen hormones can also decrease when cows have long experienced the lactation process.
It should be noted that katuk leaves (Sauropus Anddrogynus) have become the trust of the general public to increase and facilitate the production of ASI (Mother's Milk). In katuk leaves there is a substance called Laktagagum which functions as an enhancer and facilitator of ASI production. According to Selvi & Basker (2012) katuk leaves contain tannins, saponins, alkaloids, flavonoids, glycosides and phenols. Saponin compounds, flavonoids and alkaloids have a working mechanism to increase testosterone levels so that katuk leaves have the potential to be used as aphrodisiacs, which are sexual stimulants and increase libido low (Andini 2014). High prolactin levels will increase, accelerate and facilitate breast milk production. Inspired by the content in the katuk leaves which can increase milk production, the idea was to provide katuk leaf extract to the Friesiand Holstain breeders. The results of the study by experts also said that the administration of katuk leaves in the Frisiand Holstein breeders was able to provide a positive response to the increase in milk production. Levels of provitamin A carotene, vitamins B, C, protein and katuk leaf minerals are also high (Selvi and Basker 2012). The high content of provitamin A (β carotene) is one of the factors that play a role in increasing milk production, presumably because β carotene can improve antioxidant status in milk udder so that the function of epithelial aveolar cells is well preserved (Aréchiga et al. 1998).

The content of β carotene is an important factor for animal reproduction and has a specific function that cannot be replaced

by vitamin A (Vienna, 2008). The vitamin E content of katuk leaves is 426 mg / kg, besides the katuk leaf vitamin C is also quite high, which is 136 mg / 100 g dried (Petrus, 2013). Katuk leaves contain isoflavonoids of 143 mg / g which resemble estrogen and can slow down the reduction of bone mass. Katuk leaves also contain saponins which are efficacious as anticancer, antimicrobial and enhance the body's immune system. Katuk leaves are rich in chlorophyll which is equal to 8% of dry matter (Andarwulan et al., 2010; Andini, 2014). This research is expected to give responsibility to the treatment being tested.

II. MATERIAL AND METHOD

A. Research Sites

The study was conducted in Enrekang Regency. This study lasted 240 days. Measurement of samples for milk production is carried out in the field and analysis of the quality of milk is carried out in the Livestock Chemistry Laboratory, Faculty of Animal Science, Hasanuddin University, Makassar.

B. Research Material

The material used is forage consisting of forages (80%, 75%, 70%, 65%); concentrate (20% per treatment); gamal leaves (5%, 10%, 15%) and katuk leaves (130 grams, 150 grams, 170 grams). use 16 dairy cows, with a body weight of 300-400 kg, with lactation of 1-6 months. The equipment used by salther scales to measure the amount of feed consumption, measuring cup for measuring milk production in liters, buckets for storing milk during milking and plastic bottles to take milk samples and other equipment.

C. Research Design

The study used a Randomized Block Design (RBD) with 4 treatments and 4 replications (Gomez and Gomez, 2015) consisting of, Treatment P1 = Forage 80% + 20% concentrate, P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 grams of katuk P3 leaves = Forage 70% + 20% concentrate + 10% gamal leaves + 150 g katuk leaves, P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 gram leaves katuk.

D. Method of Collecting Data

The research cows were given forage, gamal leaves, concentrates and katuk leaves for one month continuously for adjustment and data collection carried out for 14 days. Each cow is placed in an individual cage randomly and given an estrak katuk leaf that has been mixed with elephant grass (Pennisetum purpureum), gamal and concentrate. The changes observed were: a) Milk production (measured by liters) milking twice a day (milk amount milking results in the morning and evening), b) At the end of the study each treatment was taken 0.25 liters of milk each in the morning and evening milking to analyze the quality of milk, fat content, protein content and minerals (calcium, phosphorus,) The data obtained was processed and analyzed by variance analysis according to the Randomized Block Design (RAK) pattern, (AOAC, 1984).

E. Data Analysis

Data were analyzed using SPSS 16 Software Program based on Randomized Block Design and Repeated by 3 times.

III. RESULT AND DISCUSSION

Milk Production

The results of the study regarding the effect of katuk leaves on the production and quality of FH dairy cow milk can be seen in Table 1 as follows:

Table 1. Average Milk Production (l / tail / day) in Holstein Fries (FH) Dairy with supplementation, forage, gamal leaves and katuk leaves (Sauropus androgynus) at different levels.

Deuteronomy	Treatment			
	P1	P2	P3	P4
1	5,44	5,60	9,25	10,88
2	6,65	7,12	10,45	11,06
3	6,99	7,18	9,89	11,43
4	7,81	9,10	10,05	10,34
Total	26,89	29,00	39,64	43,71
Average	6,72±0,25[a]	7,25±0,36[b]	9,91±0,64[c]	10,92±0,59[d]

Description: Different superscripts on the same line show a significant effect (P <0.05)
P1 = Forage 80% + 20% concentrate P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 gram katuk leaves P3 = Forage 70% + 20% concentrate + 10% gamal leaf + 150 gram katuk leaves P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 grams of katuk leaves

Based on Table 1 shows that giving katuk leaves (Sauropus androgynus) at different treatment levels significantly affected FH dairy cow milk production. The highest average milk production (liters / head / day) during the study on treatments P4, P3, P2, and P1. This production average shows an increase in milk production, where the increase from P1 to P2 is 0.53%, P1 to P3 is 3.19%, and P1 to P4 is 4.2%. Dairy cow milk production in this study is classified as low, because the age range of 2-3 year dairy cows is young and is in the lactation period I and II. The results of Marwah's research (2010) state that the nutrients present in katuk leaves in the form of proteins and other active substances can effect the increase in milk production. This means that by giving katuk leaves to dairy cows, it can increase milk production and can meet the nutritional adequacy needed both in basic living needs, milk production and the need for growth for young livestock. However, the results of this study did not show a significant effect on the increase in milk production of FH dairy cows, this was due to the low level of katuk leaf administration.

Suprayogi A. et al. (2013) said that the dose of IPB-3 product with a dose (dose) was given per consecutive day in each group of 100g (P-100), 150g (P-150), 200g (P-200), in cattle milk approximately 10 days before birth until approximately 2 months the results show a good response to milk production parameters. It also strongly supports his research that was conducted in 2000 that the efficacy of katuk leaves on milk production in lactating sheep, although the study still used 70% crude alcohol extract and the

suspension of katuk leaves dried but gave a good response. Another study also using the katuk leaf hexane fraction also showed signs of increasing milk production compared to the control group in experimental lactation mice. (suprayogi. 2015) Until now it has been known that the active compounds in hexane (nonpolar) solvents are active compounds that play a role in increasing milk production.

Quality of Milk

The results of the study on the effect of katuk leaf supplementation (Sauropus androgynus) on the milk quality of Holstein Friesian (FH) dairy cows in Enrekang Regency can be seen in Table 2.

Table 2. Coarse Protein and Coarse Fat, Calcium, and Phosphorus of FH Dairy Cow milk by giving different leaf levels of katuk.

Variable	Treatment			
	P1	P2	P3	P4
Crute protein (%)	3,08 ± 0,13[a]	3,48± 0,35[b]	3,65 ± 0,33[c]	3,89 ± 0,72[d]
Fat Grade (%)	2,31 ± 0,28[a]	3,12 ± 0,17[b]	3,19 ± 0,48[c]	3,69 ± 0,35[d]
Calcium	0,11± 0,18	0,12 ± 0,15	0,13 ± 0,38	0,14 ± 0,46
Phospor	0,14± 0,18	0,15 ± 0,27	0,15 ± 0,58	0,19 ± 0,45

Description: Different superscripts on the same line show a significant effect (P <0.05)
P1 = Forage 80% + 20% concentrate P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 gram katuk leaves P3 = Forage 70% + 20% concentrate + 10% gamal leaf + 150 gram katuk leaves P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 grams of katuk leaves

Crude protein

Based on the results of the study (Table 2) showed that the treatment with katuk leaf administration had a significant effect (P <0.05) on crude protein, crude fat. The results of this study indicate that there is an increase in the quality of milk, especially in crude protein content. It can be assumed that katuk leaves can maintain milk protein content even though it has not shown a higher number. Increased levels of protein in milk depends on the intake of protein in animal feed which forms amino acids and is absorbed by the body through blood (Mugen, 1987). The value of milk protein is effectd by the administration of concentrate. The higher the concentration, the higher the level of milk protein (Sukarni 2006). In addition, the results of the Garantjang and Mide (2011) study state that katuk leaves added to feed can increase milk protein for dairy cattle. The addition of katuk leaves gives a positive response to the quality of milk.

Milk protein is determined by the nutritional content of food intake during the period before and after childbirth. The content of milk protein levels is positively correlated to feed energy, especially soluble carbohydrates. Its availability facilitates the formation of propionate so that it reduces the need for amino acids for gluconeogenesis which makes amino acids more available in the small intestine and protein synthesis in milk cells (Dwicipto, 2008).

Fat Grade

The average crude fat content of milk in each treatment is shown in Table 2. Milk Fat Grades in each treatment showed values above SNI where SNI standards were 3.00 (SNI, 2011). This is because the nutrient consumption of feed in the ration is sufficient for the needs of FH dairy cows, because milk Fat Grades are effectd by the nutrients contained in the feed. If the amount of feed given has a low quality, it will affect the quality of FH dairy cows. Dwiyanto (2011) reports that milk Fat Grades are different, effectd by several factors such as nation, individual, lactation stage, season, nutritional status, feed type, health and age of livestock. Foods with low crude fiber content can reduce milk Fat Grades and also reduce milk production slightly.

Milk Fat Grades are effectd by various factors including the availability of milk fat forming precursors, where the main precursors are acetic acid and beta-hydroxy butyrate. Ghani (2010) continued, which states that milk Fat Grades are effectd by feed because most of the milk components are synthesized in the udder from simple substrates derived from feed. Forage feed is closely related to the fat content of milk, because the fat content of milk is effectd by the production of acetic acid in cattle rations derived from high-fiber, crude fibrous feed ingredients.

Calcium and phosphorus levels The results of the variance analysis showed that katuk leaves at levels that were not significantly different (p> 0.05) on calcium and phosphorus. The highest mineral (Ca, and P) content in treatments P4, P3, P2 and P1. The results obtained indicate that the levels of Ca and P in milk are still normal or still in accordance with the standard, in accordance with the opinion of Rahman et al. (1992) that mineral elements in milk are relatively present in a fairly high concentration of Ca: 0.112% , P: 0.095%, K: 0.138%, Mg: 0.013%, Na: 0.095%, CI: 0.109% and S: 0.01%. This is reinforced by Anonim (2002) that milk for dairy cows is rich in minerals Ca, P, K, Cl and Zn, but low in minerals Mg, Fe, Cu and Mn. Mineral element Ca is not found in the katuk leaf supplement composition used . Even so, the mineral content of Ca obtained from the supplementation of sweet potato leaves in milk is still less than the control treatment with a difference of 14% and 13% at levels 3 kg and 6 kg, respectively. The low mineral content of Ca in katuk leaf supplementation may be caused by Ca content in animal feed such as legumes in this case gamal and grasses which are supplemented with katuk leaves have been fulfilled or sufficient. In accordance with the opinion of Anonim (2002) that legumes are usually rich in minerals Ca.k, Mg, Fe, Cu, Zn, Co, Ni and S, then the grass contains a lot of minerals Ca, Mg, Fe, Zn, Mn, Mo and Si. This is then reinforced by the opinion of Hadiwiyoto (1994) that the Ca content in milk is constant. Efforts to increase the Ca content in milk by providing foods that contain a lot of Ca salt cannot have a real effect.

In the supply of dairy cow feed ingredients must consider the factor of palatability, nutritional value, availability and not compete with human needs and affordable prices. Dairy cow feed should consist of two feed groups, namely forage feed and concentrate feed. Forage is the main food for ruminants because

through fermentation in the rumen by microbes, and can provide energy to meet basic life needs. While feed concentrate is a mixture of feed ingredients that are rich in energy and protein, which is useful for increasing the quantity and quality of lactating dairy cows. The composition of milk can change at each level of lactation where very large changes occur at the beginning and end of lactation (Saleh, 2004).

IV. CONCLUSION

Based on the results of the study it can be concluded that giving katuk leaves to the level of 170 grams / head / day increases milk production to 45% and the quality of FH dairy cows especially protein levels and milk fat levels. But it did not significantly affect the mineral content of calcium and phosphorus. The use of katuk leaves as a supplement in the dairy ration at levels above 170 grams / head / day will probably show more significant results, but further research is needed to determine the maximum leaf level of katuk on improving the quality of milk in FH dairy cows.

REFERENCES

[1] [2] Andarwulan N, Batari R, Sandrasari DA, Bolling B, Wijaya H.2010. Flavonoid content and antioxidant activity of vegetables from Indonesia. Food Chem. 121:1231-1235.

[2] [2] Andini D. 2014. Potential of katuk leaves (Sauropus androgynus L Merr) as aphrodisiac. J Major. 3:17-22.

[3] [3] Anonim, 2002. Mineral. Course material. Fapet IPB http://www.fapet.ipb.ac.id/pin/Materi/Kuliah%20PDF/06%20PIN%20Mineral.PDF. (10 July 2019).

[4] [4] AOAC, 1984.Official Method of Analysis of AOAC 14th. Ed. AOAC Inc., Arlinton Virginia.

[5] [5] Aréchiga CF, Vázquez-Flores S, Ortíz O, Hernández-Cerón J, Porras A, McDowell LR, Hansen PJ. 1998. Effect of injection of beta-carotene or vitamin E and selenium on fertility of lactating dairy cows. Theriogenology. 50:65-76.

[6] [6] Dwicipto, 2008. Effect of the season on milk production in dairy cows. BPPT. Bandung.

[7] [7] Dwiyanto, 2011. How to increase milk production for dairy cows on people's farms. Ray of hope. Jakarta.

[8] [8] Hadiwiyoto. 1994. Testing the Quality of Milk and Processed Products. Yogyakarta: Liberty. Thing:5

[9] [9] Ghani, 2010. Cow's Milk. http // sapi.com / milk-cow / html //. Accessed May 15, 2019.

[10] [10] Garantjang S and Z. Mide. 2011. Production and quality of dairy cows given katuk leaves at different levels in Enrekang Regency. Prosid. Seminas National Prospects and Potential of Local Livestock Resources in Supporting Animal Food Resilience. General Sudirman Purwokerto University.

[11] [11] Gomez, K.A. and A.A. Gomez, (2015). Statistical Procedures for Agricultural Research. 2nd Edition. Jakarta: UI Press. ISBN 979-456-139 8.

[12] [12] Mugen. W., 1987. Dairy cattle feeding and management. Canada : John Willey and Sons, Inc. USA

[13] [13] Petrus AJA. 2013. Sauropus androgynus (L) merrill-a potentially nutritive functional leafy-vegetable. Asian J Chem. 25:9425-9433.

[14] [14] Saleh, E. 2004. Milk Processing Technology and Animal Science Results. Faculty of Agriculture. University of Northern Sumatra. (on line).http://www.library.Usu.ac.id/modules.Php?op=modload&name=Donloads&file=Index &req=getit&lid=803.htm.(11 July 2019).

[15] [15] Selvi S V, Basker A. 2012. Phytochemical analysis and GC-MS profiling in the leaves of Sauropus androgynus (L) Merr. Int J Drug Dev Res. 4:162-167.

[16] [16] Sukarni. 2006. Production and quality of milk of the Ettawa Peranakan goat given additional block and / or rice bran urea at the beginning of lactation. J Animal Production. 1: 427-441.

[17] [17] Suprayogi, A., H. Latif, Yudi and A.Y. Ruhyana. 2013. Increasing Dairy Cattle Milk Production in People's Livestock Through Provision of Katuk-IPB3 as Feed Additives. Indonesian Journal of Pertania Sciences (JIPI) Vol 18 (3): 140-143.

[18] [18] Suprayogi A. 2015. Katuk Leaves Hexane Faction as a Medication for Improving Milk Production, Parent Appearance, and Rat Children. 16 1: 88-95

[19] [19] Wina E. 2008. Benefits of carotenoid compounds in forage for dairy cows. In: Diwyanto K, Wina E, Priyanti A, Natalia L, Herawati T, Purwandaya B, editor. Proceedings of the Prospect of Dairy Cattle Industry Towards Free Trade 2020. Jakarta, April 21, 2008. Bogor (Indonesia): Research Center for Animal Science and STEKPI. p. 124-129.

AUTHORS

First Author – Sutomo S, Post Doctoral Graduate Student, Hasanuddin University, E-mail: *sutomo.syawal@yahoo.co.id*
Second Author –Sjamsuddin Garantjang, Lecturer of Animal Science Faculty, Hasanuddin University
Third Author –Asmuddin Natsir, Lecturer of Animal Science Faculty, Hasanuddin University
Fourth Author –Ambo Ako, Lecturer of Animal Science Faculty, Hasanuddin University

Correspondence Author– Sutomo Syawal. E-mail:sutomo.syawal@yahoo.co.id, +6281242534576