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Supplementation ZN Organik and lemuru oil quality of milk Etawah crossbred goats

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Abstract

Goats is one of the cattle that are sensitive to mineral deficiencies than other livestock purpose of this study was to know the effect of the use of organic Zn and oil lemuru to water quality goat milk. the composition of the ration is prepared according to the NRC (1988) with a ratio of concentrates and forages 60% - 40% with supplementation Mineral S, Zn organic and oil lemuru supplementation mineral sulfur implanted at 3%, fish oil by 2%, 4% and 6%, while The organic Zn 6%, 8% and 10% of the feed animals used 16 Etawah goats weighing 25 kg with an average milk production of 1.2 liters / head / day. Variables measured in the study are: physical quality, quality microbiological milk, milk production (l / head / day) is measured with a measuring cup scale, fat and protein and fatty acids (EPA, DHA, EPA, omega 3, 6 and omega 9). The results show the feed in supplemental Zn organic and fish oil significantly (P> 0.05) of the physical quality and milk production but did not significantly affect fatty acids (EPA, DHA, AHA, both omega 3, 6 and omega 9). . conclusion that the use of organic Zn and oils lemuru can improve the quality of goat milk.

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Introduction

Etawah crossbred goats (PE) other than milk producer is also a producer of meat. the quality of milk and meat produced relatively low, especially in terms of the content of unsaturated fatty acids EPA (eicosapentaenoic acid), DHA (decosahexaenoat acid), Omega three and mineral Zn. This fact shows cattle raising goats is still relatively farm people, feed given not comply with the rules of the science of nutrition, so that the probable lack of energy ready to use, functional proteins, and fats (Sutardi, 1995), as well as mineral S and Zn (Little , 1986). Goats are one of the cattle that are sensitive to sulfur deficiency than other livestock. The bad influence of the ration less sulfur indicated to some reproductive phenomena ranging from the beginning of oestrus, the conception to the production of milk and offspring poor performance.

Improvements made through the natural food of the constraints of farmers because of a protein functional and ready energy and fat, very limited on forage based leaves, and agricultural wastes that have a negative impact on the growth of rumen microbes (Rostini *et al*, 2016).

This resulted in a product of the digestive process have not been able to meet the needs of the goat would nutrient. Besides, the content of EPA, DHA and omega three in milk and mutton with traditional maintenance system is relatively very low, but the substance is needed for growth and development toddler brain Alternatives can be done to improve nutrition forage is the improvement of feed quality using complete feed (forage and concentrates supplemented 50 mg/kg of sulfur and 1.3% corn oil addition can increase birth weight and pre-weaning calf growth Bali cattle, can also be improve the quality of milk production (Brodfard and Allen, 2004). the results Bouatour *et al.,* (2008), states that lemuru fish oil containing 27.1% EPA and 34% DHA, whereas according Hartati (1999) merger giving 75 mg/kg ZnSo4 with 1.5% lemuru fish oil can increase absorption of Zn (20 to 30 mg/day) compared to control diet, including EPA and DHA can be fused to the meat respectively 17.33% and 6:43 and can improve the physiological condition and body weight gain FH male calves.

The purpose of this study was to know the effect of the use of organic Zn and oil lemuru to quality goat milk.

Materials and methods

This research was conducted in the stable production of livestock Faperta Uniska for 3 months, analysis of feed ingredients performed in the laboratory of nutrition science and technology results IPB feed and milk quality analysis performed in the laboratory of post-harvest Cimanggu Bogor.

Materials research

Materials Research is a local feed ingredients were scattered in the region of South Kalimantan, namely: Waste sago, corn waste, rice straw, reed grass, Setaria grass, field grass, rice bran, tofu, corn and shrimp waste. the composition of the ration is prepared according to the NRC (1988) with a ratio of concentrates and forages 60% - 40% with supplementation Mineral S, Zn organic and oil lemuru supplementation of minerals is based on the results of in vitro assays is the provision of sulfur implanted at 3%, fish oil by 2%, 4% and 6%, while organic Zn 6%, 8% and 10% of cattle feed. As used 16 Etawah goats weighing 25 kg with an average milk production of 1.2 liters/head/day. Goats are kept for three months in a cage trial and randomly allocated to four kinds of ration treatment.

The tools used in the study consisted of a plastic bucket, measuring cups, strainers, and wipe clean. The chemicals used were 0.1 NaOH, concentrated sulfuric acid (H2SO4), phenolphtalin 1% and 2%, potassium, oxalate saturation, 40% formalin solution and 70% alcohol.

Experimental design

The design used in this study is completely randomized design (CRD) with 4 treatment was repeated 3 times so that there are 12 experimental unit. The variables measured were: physical quality, microbiological quality of milk, milk production (l^{-1} $head^{-1}$ day^{-1}), fat content, protein and fatty acids (EPA, DHA, EPA, omega 3, 6 and omega 9).

Data analysis

Data were analyzed by analysis of variance, and if there are differences among the treatments. Followed by Duncan multiple range test (Duncans multiple range test) by steel and Torrie (1997).

Results and discusion

Physical and microbiological quality of goat's milk

Physical quality of goat's milk which is viewed by Color, Smell, Taste, Consistency, Cleanliness, test students, mastitis and microbiological tests showed good quality. For more details can be seen in Table 3.

The color of milk in this study did not show significant differences among treatments, the average color of the milk produced is white rather cream, it shows the color of milk of good quality, it is the possibility of white milk, because of the spread of droplets of colloidal fat, calcium caseinate and calcium phosphate, and the main ingredient that gives color to yellowish milk is carotene and riboflavin.

Table 1. Composition of ration treatment.

Feedstuffs (%)	Ration treatment			
	PO	P1	P2	P3
concerate	40.00	37.08	35.28	33.48
Forage	60.00	54.62	52.42	50.22
Mineral				
Sulfur	-	0.30	0.30	0.30
Organik Zn	-	6.00	8.00	10.00
Fish oil	-.	2.00	4.00	6.00
Total	100	100	100	100

This is in accordance with the opinion of Sudono *et al* (2003) stated that the color of the fat in milk is influenced by substances dissolved in fat, in addition to the substances dissolved in the water contained in the milk. Sulistyowati *et al*. (2010). The color of milk due to the color of casein in milk, casein is a colloidal dispersion of opaque so as to form a white color. Somewhat yellowish color of milk caused by substances dissolved in the fats in addition to the substances dissolved in the water contained in the milk Wright *et al*., (2003).

Table 2. Nutritional content of constituents of ration.

Nutrient	Treatment			
	Po	P1	P2	P3
Dry Matter (%)	73.68	71.53	70.26	69.83
TDN (%)	58.21	59.87	60.12	61.42
Crude Protein (%)	17.24	17.82	18.04	17.87
Crude fiber (%)	15.76	15.82	15.74	16.02
Fat(%)	3.00	3.88	4.98	5.78

The white color of milk is the result of the reflection of light by the dispersion of fat globules and particles kolodial of casein and calcium phosphate. The yellow color is due to fat and soluble carotenoids. When the fat is taken from the milk, the milk will show a bluish color (Singh and Ludri, 2009).

The smell of milk by Table 2 shows the characteristic odor of goat milk, from four treatment has aromatic smell, this is due to an overhaul of proteins into amino acids. This is similar to Brodfurd and Allen, (2004) fatten that smell of milk due to the overhaul of protein and lactose content of high and low chloride content is thought to cause the milk smelled like salt

A taste of milk in each treatment showed no significant difference in each treatment it shows administration lemuru Zn and oil until the level of 4% does not affect the taste of goat's milk. Slightly salty taste due to the fat content of milk and at least the levels of lactose in milk. This is in accordance with Bouatfour *et al.,* (2008) taste of milk varies as a bland, slightly sweet, sweet, sour, salty or bitter. Changes in color, odor and flavor that occur in the milk are caused by microbes that contaminate milk, either contaminated during the handling of milk (from milking to packaging) and milk from cattle that are not healthy.

Table 3. Physical Quality of Fres Goat Milk.

	Treatment			
Analysis	P 0	P 1	P 2	P 3
Colour	White slightly cream	White slightly cream	White slightly cream	White slightly cream
Odor	Aromatic	Aromatic	Aromatic	Aromatic
Flavor	salsuginous	salsuginous	salsuginous	salsuginous
Test consistency	Thick	Thick	Thick	Thick
Boiling test	splitless	splitless	splitless	splitless
alcohol test	splitless	splitless	splitless	splitless
Test mastitis	Negative	negatif	negatif	negatif
test Microbiology	1.64 x 10 4	1.74 x 10 4	1,70 x 10⁴	1.72 x 10 4

Description: P0 = forages and concentrates made from local raw \P1 = P1 + sulfur
P2 = P1 + sulfur and Zn organic
P3 = P2 + oil lemuru.

The sweet taste found in milk because the lactose. Casein is found in milk actually does not have a specific taste/distinctive. A taste of milk can vary, perhaps bland, slightly sweet, sour, salty or bitter. Slightly sweet taste caused by the presence of lactose in milk. However, if too sweet is likely to have occurred with the addition of glucose with glucose others. Sour or bitter taste in the milk can be suspected to be contaminated with bacteria or other germs, while the salty taste that arise due to the influence of some mineral salts such as chloride and citrate salts (Chilliard *et al*., 2006).

Consistency milk Table 2 shows each treatment was not significantly different among treatment, fresh goat milk produced consistency is good, it is apparent there is no granules on the walls of the tube after the tube is shaken, the milk is good will wet the walls of the tube by not showing scars in the form mucus or granules which traces long disappeared. Mozzon *et al.,* (2002) states that milk is a good consistency no traces on the wall of the tube, while the consistency is not normal (slimy) is caused by the enzyme activity or the addition of an acid, usually kind of microbial species *E. coli* from water and waste food.

As BJ then the viscosity of milk is higher than the water. Viscosity milk typically ranges from 1.5 to 2.0 cP. At a temperature of 20 0C 1.2 cP viscosity of whey, skim milk viscosity of 1.5 cP and 2.0 cP fresh milk. Solids and milk fat affect the viscosity. Temperature also determines the viscosity of milk. (Patton *et al*., 2002)

Microbiological analysis of milk in each treatment showed no significant differences in which dairy microbiology test lows of 1.64 x 10 4 and the highest 1, 74 x 104. The number of bacteria present on the results of this study are still low and almost equal to the results of research Singh and Ludri, (2009) mengemukkan counted the number of bacteria that are as much as 1.69 x 104 bacteria/ml of milk to 1.71 x 10 4 bacteria/ml milk dairy show results which is still in good category where standards microbial amount of milk in Indonesia is 1:06/ml milk. Based on the examination of the number of germs, milk quality is classified into three levels, namely; A milk quality (good no.1) if the number of bacteria in the milk of not more than 106 bacteria/ml of milk and the bacteria *E. coli* <10/ml of milk.

Milk quality B (medium/no.2) if the number of bacteria did not exceed 106 bacteria/ml of milk and the amount of *E. coli* ± 10/ml of milk. Milk quality C (ugly/no.3) if the number of bacteria> 106 bacteria/ml of milk (Sudono *et al*., 2003).

Milk is a very suitable medium for microbial growth (Mozzon *et al,* 2002). Milk began to be contaminated with microbes start time of milking up to the time of packaging. Good milk is milk that a low number of microbes (Sulityowati *et al.,* 2010).

Table 4. Production and nutrition composition of tthe Etawah goats.

Variable	Treatment			
	P0	P1	P2	P3
Milk production ($(l^{-1}$ $head^{-1}$ $day^{-1})$	1.200[a]	1.280[b]	1.325[c]	1.270[b]
BJ	1.027	1.027	1.028	1.033
Fat	3.08[a]	3.93[a]	4.23[b]	4.56[b]
Protein	3.42	3.85	3.93	3.67
Faty acid				
-Omega 3	0.88	0.92	0.93	0.98
-Omega 6	3.18	3.25	3.37	3.21
-Omega 9	39.72	40.43	40.57	39.50
-DHA	6.01	6.21	6.31	5.93
-EPA	2.74	2.89	2.92	2.82
-AHA	2.31	2.47	2.62	2.43

Description: P0 = forages and concentrates made from local raw
P1 = P1 + sulfur
P2 = P1 + sulfur and Zn organic
P3 = P2 + oil lemuru.

Milk production

The results of the research and the production of goat's milk composition is presented in Table 4.

Where the production of goat milk showed different effects on the level (P> 0.05) from each treatment stage in which the fish oil as much as 4% (P2), but at the level of 6% (P3) was not significantly different from the administration of 2% (P1) but significantly different from those without fish oil (P0), it is made possible fish oil-supplemented sulfur can degrade the fibers so as to improve the digestibility thereby increase production, it is similar to Rostini *et al*., (2014) when the addition of fish oil is not too high can affect beneficial but if levels above 5% of the total ration has a negative effect which can increase polyunsaturated fatty acids.

Gravity (BJ) milk goat treatment showed no significant differences but tend to rise P2 and P3, respectively (1028 and 1033), this possibility BJ milk is strongly influenced by other components of the feed that contains protein and dietary fat tends to be high the treatment of P2 and P3 so that the levels at treatment BJ milk is higher as well, but the addition of fish oil, and sulfur consumed ZN still within tolerance.

BJ composition of milk is influenced by the content of protein, fat, lactose and mineral feed.

The increase in fat in the protein component of milk will affect the overall value of BJ (Hernandes, 2003). While Sukarini (2006) the addition of protein and mineral content of the feed will affect the increase in milk BJ overall.

The content of fat milk showed no significant differences among treatments, Po and P2 and P3 but not significantly different to P1,

the higher the concentration of fish oil in the diet showed higher milk fat content, where it is fat milk is influenced by the content of energy and fat content of constituent feed, energy content of the feed to the treatment of P2 and P3 respectively (60.12 and 61.42) as well as the fat content is (4.98% and 5.78%) so it affects the fat content of milk. Forage and concentrates are a source of acetic acid and acetate is a raw material forming various fatty acids of milk, including fat content of total milk. (Wright *et al.,* 2003) This is in line with the opinion of the Mozzon *et al.,* (2002) that the addition of fat content in the concentrate feed may increase the fat content of milk where in the rumen concentrates will experience the fermentative digestion that produces more acid than acetic acid propionate.

The protein content of milk in Table 4. Shows were not significantly different between treatments (P> 0.05), but tend to show improvement compared to the control, respectively (3.85% and 3.93%), but the P3 treatment showed decreased levels of milk protein. this condition shows even though the protein content of feed on the treatment P3 can not be utilized by glandular udder to be synthesized this is likely the protein consumed more widely used by rumen microbes which with the addition of Zn, sulfur and fish oil in feed more energy is available for the formation of amino acids derived from microbial protein. Increased availability of these amino acids will contribute to an increase in milk protein synthesis. While Rostini and Zakir (2012) suggest that the effect of feed protein to protein content of milk is very small so it does not significantly affect the protein content of milk.

While Patton *et al.,* (2002) increased rumen fluid ammonia concentration will affect the microbial protein synthesis also increases so will contribute to an increase in milk protein synthesis. Sukarini (2006) state constituent protein content variation of feed very little effect on milk protein than fat milk, because milk protein is more influenced by genetic factors rather than environmental factors including feed.

Fish oil up to a level of 6% in the treatment did not show a significantly different effect on the content of omega 3, 6 and 9, but shows an increase in its content of unsaturated fatty acids, namely the treatment of P1 and P2, it's likely the fish oil in the diet can increasing the content of the acetic acid in the rumen, thereby increasing milk fat synthesis.

Although not significantly different from where the addition of micro minerals either sulfur or Zn role is not showing action where Zn is a trait that is antagonistic to the mineral sulfur but the presence of fish oil as a neutralizing it by addition of Zn to 10% and sulfur to the level of 30% did not show differences real on the content of fatty acids.

Hartati (1999), that the merger giving 75 mg / kg with 1.5% $ZnSO_4$ lemuru fish oil can increase the absorption of Zn (211 to 30 mg/day) than the control diet. (Wright, *et al*., 2003). Zn is a cofactor in more than 70 kinds of enzymes (Chilliard *et al,*. 2006), Zn Minerals play a lot in the metabolism of carbohydrates, protein synthesis, and nucleic acid metabolism (NRC, 1988).

Conclusion

Feed in supplemental Zn organic and fish oil significantly (P> 0.05) on milk production but did not significantly affect fatty acids (EPA, DHA, AHA, both omega 3, 6 and omega-9), the higher the usage tends to show improvement the higher the fat content.

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