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Influence of Concentrate Levels on Nutrient Utilization in Ongole Crossbreed Cattle Fed with Sorghum-Moringa Silage

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ABSTRACT

Research objectives are to evaluate the influence of concentrate levels on nutrient utilization in Ongole Crossbreed fed with sorghum-moringa silage. The experimental design applied is Latin Square comprises four treatments and four replications. The research is conducted in three stages. First, plant the sorghum and moringa. Second, harvest those plants and processed them as silage. Third, the silage is fed as basal feed added with concentrate in different levels. The concentrate levels are 0%, 10%, 20%, and 30% of dry matter required by the cattle. Variables measured are nutrient consumption, nutrient digestion, rumen fermentation, blood metabolic and blood chemical. The result shows that the higher the concentrate levels, the higher the levels of nutrient consumption, nutrient digestion, rumen fermentation, blood metabolic, and blood chemical, which is caused by sufficient nutrients for the development of rumen microbes which ultimately produce fermentation products that are useful for cattle. Nevertheless, the concentrate levels have very significant effect on nutrient consumption, but it has no significant effect on the others variables. In conclusion, the concentrate can be used to increase the nutrient utilization of sorghum-moringa in Ongole Crossbreed until 20% and needs to be widely used in Ongole cattle cultivation by farmers.

1. INTRODUCTION

There are two kinds of plants that have broader adaptability and resistance in drought, namely sorghum and moringa. Sorghum is a cereal crop as a source of carbohydrate, while moringa is a plant as a source of protein. Therefore, these two kinds of plants can be cultivated and processed to overcome food and feed shortages especially in dry land with dry climates such as in the province of East Nusa Tenggara.

Regarding feed shortages, those plants can be used for feed, since they can produce a high level of forage, both stems and leaves. The grain production of sorghum plants is 3 tons/ha with a ratio of rice: husks of 3:1, while forage production, especially leaves, is 3 tons/ha and stems is 4 tons/ha [1]. Then, moringa can produce forage 27 tons/ha [2].

Moringa leaves has high nutrient content especial crude protein and amino acid either essential nor non essential [3] and some meinerals content such as Fe, Zn, Ca, P, Mn [4]. Beside its used as vegetable, it can be used to increase production of other plant such as corn and tomato by extract of the leaves doe to its nutrient content [5, 6].

Problem faced that those plants, particularly the forages, are perishable post harvest. Therefore, it is urgent to process as silage. The silage can be stored longer so that it can overcome food shortages during the long dry season which generally occurs on dry land. On the other hand, the using of silage for feed should be added with concentrate in order to increase the utilization value of silage using for feed. Actually, concentrate is rare used by the farmers in raising cattle.

The using of silage as feed for ruminants will be more effective if the feed is added with the feed that easier to be digest in form of concentrate. The concentrate will be used by rumen microbes in order to increase the microbes' population and their activities. The higher the population and activities of the rumen microbes, the higher the fermented fiber feed mainly the silage of sorghum-moringa. Product of fermented feed can be measured by nutrient consumption and digestibility, rumen fermentation and biochemical of blood. These described nutrient utilization. Therefore, it is necessary to add concentrate in raising the ruminants such as Ongole Crossbreed cattle.

2. MATERIALS AND METHODS

Materials of the research are 4 heads of Ongole Crossbreed bull at age range of 8 – 12 months due to their growing period and adapted with dry climate, sorghum-moringa silage, concentrate, and drinking water. The sorghum-moringa silage is harvested from previous planted at the first step of the research. The moringa are planted in lines with the plant density 10 cm × 10 cm consist of three lines. Distance among the moringa lines is 7m. Then, sorghum are planted two weeks later after planting the moringa. The sorghum is planted among the lines of moringa with the distance is 40cm × 40cm. The width of the planting area of those plants is 560m^2.

Seeds of sorghum and moringa are taken from local seeds which always used by local community. Those plants are planted on altisol soil. Moringa is planted in large rows with a distance between plants of 10 × 10 cm consisting of 3 small rows and a distance between large rows of 7 m. Between the 7 m rows of moringa, sorghum is planted with 40 × 40 cm between plants. Urea fertilizer is used for all plants at a dose of 300 kg/ha.

Climate condition of the area is dry tropical (*semiarid*), with long dry season (8 – 9 months) and short rainy season (3 - 4 months). The rainy season occurs in November to Maret, while the dry season occurs in April – October. Further, the average of rainfall is 51 mm – 150 mm therefore the location of planting is categorized as medium rainfall area. The average temperature of the planting location is 27.8°C and on the range of 25.8°C – 28.8°C [7].

Sorghum forage are harvested at generative phase, particularly before blooming and at the age of ± 3 months old. The sorghum forage is harvested by cutting at 10cm distance of the soil surface. Moringa forage is harvested at the same time as sorghum.

Processing of sorghum-moringa silage is described as follow. First, the forages of sorghum and moringa are aired overnight. Second, the forages are chopped using chopper machine. The chopped biomass size is 1cm – 3 cm in order to be kept easier in silo. Third, the chopped biomass is mixed with 5% (w/w) of rice bean, then the chopped biomass is filled into silo and pressured to it to get an aerob condition. The silo is plastic drum. The fermentation process of the forages in the silo lasting in three weeks. At last, after 3 weeks of the ensiling process, the silage is taken and aired in 1-2 hours before fed the cattle.

Furthermore, processing the concentrate. The concentrate composition and its proportion are shown on Table 1.

Table 1. Proportion of feed concentrate ingredient

Feed Ingredients	Proportion (%)
Ground corn	23.125
Sorghum bran	23.125
Rice bran	20.5
Coconut meal	23
Fish meal	8
Urea	0.4
Oil	1.5
Salt	0.25
Premix	0.1
Total	100
Crude protein content (%)	17.95

Each ingredient of concentrate is weighted based on their proportion. Then, the ingredients are mixed as follow: firstly, the lowest proportion materials are mixed and followed by the higher proportion of the ingredients, respectively. The concentrate, then, is filled into plastic sacks, and it kept in room temperature during period of data collecting. There are no chemical additive ingredients used in processing of making concentrate to avoid spoilage.

Technique of feeding concentrate based on the research treatments. Concentrate is fed previously. After consuming the concentrate, the cattle will be fed with the silage of sorghum-moringa ad libitum. Actually, the sorghum-moringa silage in this research is a novelty since the silage has not been used for feed by local community.

The research method applied is an experimental method using a 4 × 4 Latin square design consist of 4 treatments and 4 periods as replications. The length of time for each period is 15 days consisting of 10 days of adaptation period and 5 days of data collection. The length of time for each period is carried out with the consideration that the effect of the previously given feed has disappeared and the results obtained are the effect of the treatment given.

The treatments used is K0 = using sorghum-moringa silage without concentrate; K10 = using sorghum-moringa silage + 10% concentrate; K20 = using sorghum-moringa silage + 20% concentrate, and K30 = using sorghum – moringa silage + 30% concentrate. The amount of concentrate is calculated based on the dry matter required for cattle, namely 3% of body weight. Concentrate ingredients proportion is determined refers to the research conducted by Kleden et al. [8] with a crude protein content of 17.9% and proportions as listed on Table 1.

Variables of the research are:

1. Quality of sorghum-moringa silage and concentrate. Samples are analyzed in Laboratory in order to investigate their nutrient content namely dry matter (DM), organic matter (OM), crude protein (CP), Extract ether (EE), Crude fiber (CF), Nitrogen free extract (NFE) and ash [9].
2. Consumption of nutrient: DM, OM, CP, CF and energy.
3. Nutrient utilization: (quantity of feed consumed times nutrient content) minus (quantity of nutrient excreted) times 100 based on method of study [10].
4. Total Digestible Nutrient (TDN) is calculated based on the following formulation: digestible CP+ digestible CF + digestible NFE + 2.25(Digestible EE) [11].
5. Condition of rumen fermentation obtained by partition profile of VFA and total VFA, and NH_3 using spectrophotometer and pH of rumen liquid.
6. Blood biochemistry that describes condition of body metabolism covers level of blood glucose, total protein plasm, total cholesterol, Hb, and erythrocite.

Method of Data Analysis:

The collected data in this research are analyzed by applying analysis of variance (ANOVA) and continued with test of least significance difference [12] using a software of SPSS version 23 for windows.

3. RESULT AND DISCUSSION

3.1 Content of feed nutrient

Materials of feed used in this research are silage of sorghum-moringa mixed and concentrate. The quality of sorghum-moringa mixed silage is determined by nutrient content mainly crude protein content and crude fiber content. Commonly, the higher the crude protein content, the higher the feed quality; in contrast, the higher the crude fiber content, the lower the feed quality. The decreasing of quality occurred due to the increasing of the crude fiber content that can be absorbed by the body therefore most of the feed will be excreted from the body.

The research data showed that the quality of silage relatively high based on protein content. This condition occurs due the existence of the moringa leaves contribution used in ensilage process. However, the existence quality still very possible to be increased. The moringa quantity produced by a mixed farming of sorghum – moringa is relatively small which reached only 29 kg, while total production of sorghum forage reached 1.3 t. Actually, the description of protein content in the silage is contribute by sorghum forage.

The content of crude fiber in silage is relatively high reached 34.62%. The value of the crude fiber content existed will influence the value of nutrient utilization when the cattle is fed with the silage. Data of the quality of sorghum-moringa silage and concentrate is written on Table 2.

Table 2. The content of feed nutrient

Items	Kinds of Feed	
	Silage	Concentrate
DM (%)	35.87	97.41
OM (%DM)	85.36	90.35
CP (%DM)	9.27	17.38
CF (%DM)	34.62	6.62
EE (%DM)	4.00	8.39
NFE (% DM)	37.47	57.95
CHO (% DM)	72.09	64.58
Energy (Kcal/kg)	3,829.27	4,344.78

Data on Table 2 shows that there is a relatively significance difference between the feed of sorghum – moringa silage and concentrate. Based on the crude protein content, the concentrate has higher protein content than that of silage. A high content of crude protein occurs since the concentrate contains of feed materials both as source of protein and energy. This fact also describes the reason that the concentrate must be used as feed additive for ruminants.

DM content of sorghum-moringa silage obtained in this research is higher than that of either grass silage or corn silage as reported by Lawrence et al. [13] which contains 21.1% and 26.9%. In addition, the concentrate also has higher content of DM that reached 97.41% vs 85.9%. The differences are existed might be affected by the difference of the forages harvested age include the concentrate components. There is a very close correlation between the harvest age and dry matter content, particularly TDN and NFE. Actually, the younger the harvest age, the lower the content of DM, TDN and NFE, and the older the harvest age, the higher the content of DM, TDN and BETN [14, 15].

Low content of crude fiber in concentrate also describes that the feed is easier degraded in rumen. Rumen microbes will use both protein and energy in concentrate, therefore mechanism of fermented feed consist of fiber will increase. Commonly, the increasing of fiber content ration will be followed by the decreasing of nutrient digested value, especially dry matter, crude protein, and energy [16].

3.2 Influence of feed concentrate on consumption and digestibility of nutrient

The using of concentrate as supplement for ruminants is expected to increase Total Digestible Nutrient which cause the increasing of rumen fermentation product. Data refers to the utilization of concentrate on Ongole Crossbreed (OC) consume basal feed namely sorghum – moringa silage are shown on Table 3.

Table 3. Influence of fed concentrate in different levels on consumption and digestibility of nutrient

Variables	Treatments				P-value
	K0	K10	K20	K30	
Nutrient consumption (kg/t/d)					
Consumtion of DM	3.13±0.50^{a}	3.54±0.49^{b}	3.74±0.34^{bc}	4.05±0.38^{c}	0.005
Consumtion of OM	2.67±0.43^{a}	3.04±0.42^{b}	3.23±0.29^{bc}	3.51±0.52^{c}	0.004
Consumtion of CP	0.29±0.05^{a}	0.36±0.04^{b}	0.41±0.03^{c}	0.47±0.04^{d}	0.000
Consumtion EE	0.13±0.020^{a}	0.16±0.018^{b}	0.21±0.165^{c}	0.21±0.165^{d}	0.000
Consumption of CF	1.08±0.17	1.12±0.18	1.08±0.12	1.08±0.13	0.804
Consumtion of CHO	2.56±0.36^{a}	2.52±0.36^{b}	2.64±0.25^{bc}	2.83±0.27^{c}	0.010
Consumtion of NFE	1.81±0.29^{a}	2.05±0.29^{b}	2.16±0.20^{bc}	2.35±0.22^{c}	0.005
Consumtion of energy	11.97±1.92	12.08±1.98	11.39±1.39	11.08±1.39	0.236
Nutrient digestibility (%)					
Digestibility of DM	62.27±8.84	63.43±2.33	64.31±6.55	66.05±3.56	0.830
Digestibility of OM	63.64±8.26	65.64±3.51	66.54±6.08	68.25±3.29	0.762
Digestibility of CP	66.33±6.26	66.87±1.62	72.09±6.17	74.08±5.07	0.231
Digestibility of EE	69.72±9.63	71.59±10.94	71.14±7.73	81.34±3.89	0.132
Digestibility of CF	68.34±8.73	66.29±4.52	65.24±7.69	64.16±5.35	0.770
Digestibility of CHO	62.74±8.28	65.06±6.65	65.36±6.65	66.29±3.87	0.894
Digestibility of NFE	72.56±5.26	75.34±3.73	75.09±4.99	75.72±3.42	0.845
DE (MCal)	7.70±1.67	7.44±1.72	6.55±1.42	6.43±1.16	0.205
TDN (%)	78.13±7.16	78.61±2.94	78.09±5.41	79.19±2.92	0.986

Note: Values bearing different superscript in the same row differ significantly at P<0.05.

Consumption of DM is one of indicator the quantity of nutrient consumption. The higher the level of concentrate fed, the higher the consumption of DM ration. Actually, concentrate has an important role in nutrient provision needed to develop population of rumen's microbes. The increasing level of concentrate influences directly on the consumption of DM and energy balancing [14].

Commonly, average of dry matter total consumption obtained in this research is influenced by the addition of concentrate at 3.78 kg/head/day or equals to 2.86% of body weight. Total consumption of dry matter shows that all of the consumptions have already fulfil the cattle maintenance's need. There are many factors that also influence total consumption of ration's DM, such as body weight and production status (lactation, pregnant, and milking). Data on Table 3 shows that the higher the level of concentrate, the higher the increasing of consumption DM's ration. Comparing with the treatment without concentrate, it is found that the total consumption of DM increases to 20.66%. This fact proves that concentrate plays an important role in providing nutrients for the OC cattle.

The concentrate fed will influence trend of microbes growth that influences providing of fermentation product to fulfill energy needs of ruminant. The higher the increasing of fermentation trend, the higher the increasing of feed movement trend that left the rumen, therefore it will increase the quantity of feed consumption.

Result of ANOVA shows that the treatments influence very significant ($P<0.01$) on the increasing DM consumption. The higher the increasing of the concentrate level, the higher the increasing of DM's total consumption. The increasing of DM's consumption has direct influence on the fulfillment of the ruminant's nutrient needs, therefore, it will influence rumen fermentation and ruminant growth.

In common, the result obtained is different from reported by Yantika et al. [17] which shows consumption of DM reached 11.74 kg/head/day. The existence of the difference occurs due to the difference of previous body weight of the OC cattle used (132 kg vs 424-551 kg). The difference existed is not only influenced by the difference of animal body weight used, but also kinds of supplement fed. However, the result obtained figures the important of supplement fed in form of concentrate. The value of DM consumption obtained in this research is lower than reported by Tulung et al. [18] that influences either the difference of previous body weight or kinds of ration used.

The increasing of DM consumption is followed by the increasing of organic matter's consumption. Data on Table 2 shows that the higher the increasing of concentrate level, the higher the increasing of organic matter's consumption. The increasing of organic matter consumption has a close relation to the increasing of fermentation trend and speed of feed movement. The increasing of concentrate level is followed by the increasing of protein and energy quantity which influence consumption of DM and organic matter of the ration. The result obtained in this research as same as reported by de Oliveira Franco et al. [19] stated that the feeding of nitrogen and energy supplement followed by the increasing of DM and organic matter consumption on cattle fed with low quality of feed in the tropics region.

The result of ANOVA shows that the treatments have very significant influence ($P<0.01$) on the increasing of organic matter consumption. The organic matter plays important role in providing nutrition of OC cattle. Before utilizing by the cattle, source of organic matter also as a source of nutrition for rumen microbes. The microbes will utilize the existing nutrients in growth and develop mainly nitrogen and energy. The increasing of quantity and activities of rumen microbes will support in fermentation of fiber feed, therefore it will fulfil the cattle needs in protein and energy.

Average of organic matter consumption in this research is 3.11 kg/head/day. This result is different from report of Steel and Torrie [12] where the average consumption of organic matter of OC cattle shepherd in move tethering system is 8.71 kg/head/day. Variation occurs due to the different kinds of forages used and the cattle body weight. Commonly, the body score condition will correlate to the total protein consumption. The feed is fed based on life body weight and production expected. This condition will gain profit in feed utilization efficiency. It means, based on this way of feeding, there will be no feed will be fed more than cattle needs [20].

The result shows that the increasing of DM consumption obtained is followed by the increasing of crude protein consumption. The crude protein has important role in providing N needed for synthesis amino acids and microbes' protein as well as in providing amino acids for OC cattle. A high consumption of protein shows that the utilization of sorghum – moringa silage added with concentrate is able to produce value added in increasing total consumption of protein. The increasing of total protein consumption is one of indicator in relation to the fulfilment of protein need of cattle. Protein content in feed will be degraded by rumen's microbes. The rumen's microbes will grow optimally, if nutrients are available, mainly carbohydrate and protein. Degradation of protein will produce peptides which accumulated in rumen, then it will hydrolyze to be amino acids and a part of it will be deaminated to formulate ammonia [21].

The balancing of providing carbohydrate and protein contributes in increasing animal performance and feed efficiency include reducing environmental pollution [22]. This equalization will impact on speed of feed digestion, however, commonly, the speed of digestion depends very much on some factors such as size of feed particles and levels of consumption [21]. Moreover, it is stated that the rumen's microbes will degrade carbohydrate compound to be VFA, while protein degradation and Non Protein Nitrogen (NPN) will produce amino acids and ammonia, further, it will formulate microbes' protein.

The result of this research shows that concentrate is needed to be fed in raising cattle. In fact, the using of concentrate is rare on farmers' level, it is not only the concentrate's price is expensive, but also the have less information in relation to the physiological role of concentrate in cattle's body.

3.3 Influence of treatments on rumen's fermentation

The speed of feed consumed by the cattle can be figured by production of fermentation product. Data regard to rumen's fermentation are presented on Table 4.

Table 4. Influence of treatments on rumen's fermentation

Variables	Treatments				P-value
	K0	K10	K20	K30	
VFA (Mm)	87.78±6.59	92.18±8.35	94.35±11.25	91.69±10.33	0.339
NH_3 (mM)	8.32±1.26	9.05±1.02	8.93±1.08	9.17±1.08	0.244
pH	7.0±0.33	6.8±0.22	7.0±0.08	6.73±0.02	0.149

Rumen's fermentation describes about easy or difficulties of feed hydrolyzed in rumen. There are some products that produced due to the availability of rumen's fermentation namely VFA, NH_3, and pH value of rumen's liquid. VFA is a product obtained from rumen's fermentation on compounds of feed carbohydrate. The sorghum-moringa silage used produces VFA with its concentration tends to increase in along with the increasing of concentrate's level fed. This fact indicates that the increasing of concentrate will be followed by the increasing of providing carbon and energy to support the growth of rumen's microbes. Further, the increasing will increase quantity and activities of the microbes, so the fermentation speed on fiber feed namely sorghum – moringa silage also increase.

Result of statistical analysis showed that the concentrate level produces VFA in relatively same concentrations. The VFA produced has an important role in supporting the availability of energy for cattle that needed for growth and production. There are many factors influence VFA production, such as ratio of utilization of inoculum and substrate, methane blocked, oxygen availability, and pH [23].

Concerning those three kinds of VFA produced, propionate acid is one of the sources used to formulate glucose. Glukosa plays important roles to provide energy for cattle. The pH of rumen also plays an important role to provide energy. The higher the concentrate's level, the lower the pH value, insignificantly. In common, the increasing of concentrate quantity will impact to the reduction of pH value and ratio of acetate-propionate [24]. However, the concentration of NH_3 obtained in this research shows the contrast, since the increasing of concentrate's level will be followed by the increasing of ammonia concentration's level. The result of this research is different from the result as reported by de Oliveira Franco et al. [19]. The difference figured the difference of nutrient content in concentrate. Actually, concentrate used in this research has crude protein content reached 17.38% (Table 1).

3.4 Influence of treatments on hematologist and blood biochemical

Test of hematologist roles are to describe clinical condition and metabolite existence include the other constituents in cattle's body. The hematologist test also plays a vital role to describe condition of physiology, nutrition, and status of cattle pathologist. The transformation of blood constituent relates to the physiologist status of the animal [25].

Hematologist and blood biochemical are variables needed in diagnose, prognoses, and curative of animal [26]. The blood biochemical covers: total protein of plasma, lipid acid, urea, and triglycerides as important indicators in metabolic activities. Value of blood chemical influenced by breed, age, malnutrition, fetus growth, and season. Commonly, there are two factors influence hematologist and biochemical serum namely genetic and non-genetic factors [27, 28]. Genetic factors consist of breed and animal genotype, while non-genetic factors consist of age, sex, curative, health status, and environmental aspects such as nutrition, hormone, and climate [23].

Total protein plasm and creatine depend very much on feed quality [29] and the using of cassava leaves increases significantly the total protein of plasma [30]. Total protein of plasma comprises albumin, globulin, fibrinogen, and lipoprotein and each component has a specific role. Albumin plays a role in formulating osmotic pressure in plasma that prevent the loss of the plasma in capiller. Further, the globulin plays a role in doing enzymatic function in plasma and body's immunity. Then, fibrinogen plays a role in blood clotting. Moreover, glycoprotein roles in proliferation as response towards tissue damage. Furthermore, haptoglobuline plays roles in formulating complex protein bonds in order to prevent the loss of iron substance and to protect the kidney from damage that can be caused by hemoglobin sedimentation. At last, lipoprotein plays a role in distributing steroid hormone, and fat-soluble vitamins [25]. The influence of treatments on Blood biochemical variables are shown on Table 5.

Table 5. The influence of treatments on blood biochemical variables

Variables	Treatments				P-value
	K0	K10	K20	K30	
Cholesterol (g/L)	1.6829±0.054	1.6584±0.051	1.7054±0.112	1.6769±0.028	0.846
Urea (g/L)	0.4046±0.008	0.4058±0.015	0.4108±0.013	0.4208±0.015	0.231
Glucosa (g/L)	0.7389±0.036	0.7659±0.039	0.7799±0.013	0.7650±0.017	0.367
TPP (g/L)	71.3±2.60	72.5±4.0	73.3±3.6	70.5±1.3	0.243
HB (g/L)	113.7±0.43	113.5±9.4	112.3±5.5	114.5±2.7	0.953
PCV (%)	34.10±1.29	34.04±2.82	33.69±1.66	34.35±0.81	0.951
Erythrocyte (10^6/µl)	11.7±0.69	11.95±0.53	11.80±0.55	12.68±0.61	0.231
Leucocyte (10^3/µl)	12.68±0.85	13.63±1.42	12.28±0.49	13.15±1.26	0.211

Data on Table 5 shows that the increasing of concentrate levels fed produce concentration of cholesterol, blood urea, glucose, and total protein plasma. Result analysis of variance (ANOVA) shows that the treatments of concentrate fed have no significant effect ($P>0.05$) on the components of blood biochemical.

There are many factors influence on concentration of blood biochemical such as the difference source of protein and energy. Result of the research as reported by Xuan et al. [31] shows that the difference source of protein and energy fed has significant influence on concentration of blood glucose and total protein plasma. The highest blood glucose reached when urea is used as protein source; while the highest total protein plasma reached when soy bean is fed as protein source at the level of 720 g/head/day. Basal feed used is the mixed of grass namely *Hymenachne acutiglum,* rice straw, and rice bean. These description shows that the feed fermentation and nutrient metabolism in body produces different blood biochemical. In relation to the result of this research, which use different quantity of concentrate with a constant source of concentrate, it tends to produce a relatively same of blood biochemical components.

The result of this research is different and higher than that of Astuti et al. [32] reported. The difference occurred due to the difference of animal used, physiological phase, and feed used. Commonly, the blood biochemical obtained in this research, particularly protein plasma is 7.05 mg/dl – 7.33 mg/dl and its range are normal, because the normal level of total protein plasma for cattle is 6.7mg/dl-7.5 mg/dl [33].

Blood glucose is the main product of carbohydrate metabolism in animal body. Principally, type of cells and tissues as brain, leucocyte, kidney, and mammary gland need glucose as substrate [34]. Therefore, glucose is basically needed by all organisms and it always available in sufficient quantity in blood and it is used as precursor in formulating fructose in dairy cattle [35].

Glucose in the body is obtained from feed, then, from liver that kept in form of glycogen and fermented product of rumen's microbes from compounds of cellulose and hemicellulose in form of fatty acids which synthesized in liver together with amino acids and glycerol through gluconeogenesis process. Concerning ruminants, the gluconeogenesis is very important because it provides 75% and 90% of total glucose needed by calves, cows and bulls and adult cattle [36].

The increasing of concentrate level is followed by the increasing of dry matter total consumption. The sufficient of nutrition for the growth of microbes in rumen that impacts on the increasing of feed fermentation speed of silage fiber. The fermentation product namely volatile fatty acid is utilized as a source of energy for cattle. Besides, the VFA itself, is utilized as a source of carbon in producing bioactive compounds, degraded matters, and energy [37]. VFA in rumen will be absorbed directly through rumen's wall in order to fulfil the energy need of cattle up to ± 75% of total energy metabolism [38]. The higher the increasing of feed fermentation, the higher the increasing of VFA production. Further, comparing with difficult fermented feed, this condition will influence the increasing of milk production [39].

The glucose metabolism, beside undergoing glycolysis, cycle of citrate acid and catabolism of acetyl-CoA, it is also undergoing glycogenesis, glycogenolysis, and gluconeogenesis [40]. The existence process influences parameter of blood metabolite, especially blood glucose to exists in normal concentration which managed by the existence of transporter's group called glucose transporters and encoded by gen SLC2A [35].

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

Based on the discussion, it can be concluded that the higher the level of concentrate utilization, the higher the increasing of nutrient consumption; however, the digestion of nutrient, rumen's fermentation, and blood biochemical are relatively same and existed on a normal range. The increasing of the concentrate levels shows the increasing of metabolism speed. This condition can be seen through the increasing of rumen's fermentation product and blood metabolite which tend to be better and exist in a normal range. This result shows that the utilization of concentrate is necessary to be done broadly by the farmers in order to support the animal growth.

4.2 Recommendation

It is urgent to use concentrate in raising OC cattle up to 20% of dry matter total needs based on the local feed availability doe to more effective based on total consumption of dry matter and other nutrients and are cheaper even though protein consumption is linear as concentrate levels increase. Future research is needed to investigate effect of concentrate as stimulant to support the animal growth by utilizing local feed sources and the frequency of the animal fed since the frequency correlates to the utilization and nutrition availability to stimulate metabolism.

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