The Supplementation of $ZnSO_4$ and Zn-Cu Isoleusinate in the Local Feed Based at Last Gestation Period on Dry Matter Consumption and Digestibility and Calf Birth Weight of Bali Cattle

FMS Telupere, E Hartati , and A. Saleh

Department of Animal Science, Faculty of Animal Science, Nusa Cendana University
Jl.Adisucipto, Penfui, Kupang. 8500, (0380) 881 084
Email: kupangph@yahoo.com

ABSTRACT: An experiment has been conducted to investigate the effect of supplemented ZnSO4 and Zn-Cu Isoleusinate in the local feed based locally at last gestation period on the dry matter consumption and digestibility and calf birth weight of Bali Cattle. Twenty seven of Bali cows with aged of gestation of 7-9 months were use in this expepriment. The feed was fed local feedstuffs substituted with organic minerals of $ZnSO_4$ and Zn-Cu Isoleusinate mixed with concentrate. Randomized Block Design with three treatments and nine replicates was use in the experiment. The three treatments were: R0 = freed cows in the pasture; R1 = R0 + legume; and R2 = R0 + concentrate contained 150 mg $ZnSO_4$/kg dry matter and 200 mg Zn-Cu Isoleusinate/kg dry matter concentrate. Parameters measured were dry matter consumption, dry matter digestibility, and calf birth weight of Bali Cattle. The results of this experiment showed that the treatments significantly affected ($P < 0.05$) on the dry matter consumption, dry matter digestibility, and calf birth weight of Bali Cattle. The treatment R2 produce an optimal response on the three treatments. It could be concluded that supplemented $ZnSO_4$ and Zn-Cu Isoleusinate added in the concentrate increased dry matter consumption and the dry matter digestibility so they were able to increase of calf birth weight of Bali cattle.

Keywords: Supplementation, Dry Matter Consumption, Dry Matter Digestibility, Calf Birth Weight, and Bali Cattle.

INTRODUCTION

Background

A feed shortage in the dry season is a crucial issue in the maintenance of Bali cattle in East Nusa Tenggara. Wirdahayati (1994) stated that the main factors causing low productivity of Bali cattle grazing in this province is due to lack of feed, evidenced from the decrease in gestation rate from 75% to 52.2 to 61%, birth rate from 80% to 64%, calf mortality from 30% to 35%.

Feed, beside is required to meet the basic necessities of life and productivity of Bali cattle, but also to meet the nutritional needs of the female during pregnant. Hafez (1993) stated that at the end of gestation period occur rapid growths of fetus and reached a peak at the end of two months. Therefore, the provision of good quality rations at the end of gestation period can affect the increase in birth weight, and can reduce the mortality rate.

Ranjhan (1980) stated that in order to improve the condition of the parent body weight before and during gestation, the cattle need to get additional feed. A feed additive such as zinc (Zn) is an essential element for animals. The addition of Zn in the rations served to accelerate the synthesis of protein by microbes through activation of enzymes as well as microbial and enzyme activator especially DNA polymerase enzyme, and as a component metaloenzyme needed for

protein digestion and absorbtion in the intestine. Besides Zn, micro mineral copper (Cu) is also needed to increase the activity of bacteria in digesting crude fiber (Talib *et al*., 2000). Subsequently also reported that the addition of Zn and Cu can increase the production of VFA.

To optimize the growth and activity of microorganisms in the rumen at the end of gestation period has done research entitle "the supplementation of $ZnSO_4$ and Zn-Cu Isoleusinate in the local feed based at last gestation period on dry matter consumption and digestibility and calf birth weight of Bali cattle".

MATERIALS AND METHODS

Twenty seven of female Bali cattle at the age of gestation 7 to 9 months that are still productive and have been partum one or two times that are kept in semi-intensive system were used in this research. The composition of concentrate and treatment rations are presented in Table 1 and Table 2.

Table 1. Dry matter composition of concentrate

Types of Feed materials	Composition (Kg/DM)	CP (%)	TDN (%)	Concentrate (%)	TDN Concentrate (%)
Yellow Corn	46.25	10,00	91.00	4.63	42.09
Rice bran	20,50	10.89	66.00	2,23	13.53
Coconut oil cake	23.00	23.10	74.00	5.31	17.02
Fish meal	8.00	61.20	69.00	4.90	5.52
Coconut oil	1.50	-	-	-	-
Salt	0.25	-	-	-	-
Premix	0.50	-	-	-	-
Total	100			17.07	78.16

Source: (Hartati *et al*., 2009)

Table 2. Composition of feed ingredients and treatment rations type tested

Composition of nutrient	Type of Feed			Treatments		
	Grass field	Gamal Leaf	Concentrate	R0	R1	R2
Dry matter (%)	65.72	86.67	90.96	91.12	74.10	75.82
Organic materials (%)	79.58	89.82	93.43	86.13	83.68	85.12
Crude protein (%)	4.80	17.99	17.40	3.05	10.08	9.84
Crude fat (%)	1.34	3.50	8.4	1.90	2.20	4.16
Coarse fiber (%)	30.86	22.95	5.28	29.55	27.70	20.63
BETN (%)	42.58	45.38	63.36	51.63	43.70	50.49
GE (kcal / kg)	3410.87	4137	18.78	5326.9	3701.32	3835.38
Zinc (mg / kg)	4.42	11.60	18.51	4.42	7.29	7.28
Copper (mg / kg)	8.20	5.90	6.0	8.20	10.06	7.32

Description: Chemical and Feed Laboratory Animal Husbandry Undana (2013)

Research Methods

This study uses a randomized complete block design (RCBD) with 3 treatments and 9 replications. The treatments tested were:
R0 = Cow released in paddocks during the day and housed in the night without supplemental feeding.
R1 = R0 + 2 to 4 kg legume leaves tree
R2 = R0 + concentrate containing 150 mg $ZnSO_4$ / kg and 200 mg Zn-Cu Isoleusinate/kg DM.

The variables measured

The variables were observed in this study are:
a. Dry matter in feces = (amount of Cr_2O_3 consumption per day)/(amount of Cr2O3 per gram feces)
b. Dry matter consumption = dry matter given – dry matter remind
c. Dry matter digestibility of feed = 100 – (100 (% indikator in ration)/(%indikator in feces) x (% dry matter in feses)/(% dry matter in ration))
d. Birth weight = the weight of a newborn calf before 24 hours

Data Analysis

The data obtained in this study were analyzed using analysis of variance and followed by Duncan's multiple range test to determine differences between treatments using Release 19 program SPSS.

RESULTS AND DISCUSSION

Dry Matter Consumption

Results of statistical analysis showed significantly affected (P<0.05) on dry matter consumption and dry matter digestibility and birth weight of calves Bali cattle as shown at Table 3.

Table 3. The effect of treatment of dry matter consumption, dry matter digestibility and calf birth weight

Parameter	Treatments		
	R0	R1	R2
Dry matter consumption (kg)	4.22 ± 0.48[a]	4.63 ± 0.25[b]	5.90 ± 0.09[c]
Dry matter digestibility (%)	60.17 ± 2.05[a]	65.20 ± 0.99[b]	73.33 ± 1.14[c]
Calf birth weight (kg)	11.12 ± 1.17[a]	12.05 ± 0.76[b]	14.00 ± 1.08[c]

Description: different superscripts in the same row indicate significant differences (P <0.05)

These results indicate that supplementation of 150 mg $ZnSO_4$/ kg DM and 200 mg Zn-Cu Isoleusinate/kg DM based on local feed ration can improve dry matter intake (R2) compare to R1 and R0 treatments.

Talib *et al*., (2000) stated that the addition of Zn in the ration aimed to accelerate the protein synthesis by microbes through activation microbial enzymes as well as enzyme activator especially DNA polymerase enzyme, and as a component metaloenzim needed for protein digestion and absorption in the intestine. The addition of copper (Cu) which can increase the activity of bacteria

in digesting crude fiber and the addition of Zn and Cu also can increase the production of VFA. Theoretically, the level of dry matter intake was strongly influenced by the energy needs for livestock and rumen capacity while also determined by the content of nutrients from feed given (Sentana, 2005).

Dry Matter Digestibility

The data in Table 3 shows that the effect of the treatment on dry matter digestibility are significant differences ($P < 0.05$) and the traetment R2 is the highest. This phenomenon indicates that the presence of organic micro-mineral $ZnSO_4$ and Zn-Cu Isoleusinate in R2 treatment have been able to activate digestive enzymes and accelerate the synthesis of microbial protein. This is consistent with that proposed by Underwood (1977) in Hartati *et al*, (2009) that Zn was play a role in accelerating the microbial protein synthesis through activation of microbial enzymes.

Besides Zn, ruminants also requires Cu because being involved in a number of functions such enzymes for the synthesis of normal hemoglobin. Hartati *et al*., (2010) stated that supplementation of 150 mg $ZnSO_4$/kg DM and 200 mg Zn-Cu Isoleusinate/kg DM ration can improve the consumption and digestibility of dry matter Bali cattle heifer males.

Calves Birth weight

Table 3 shows that the treatment have significant effect on calf birth weight, where R2 was the highest while R0 was the lowest. A real impact on consumption and digestibility of dry matter can give significant difference ($P < 0.05$) for calves birth weight. Statistical analysis showed that R2 treatment was significantly differences than R1 and R0 treatments and R1 treatment showed significant different than R0 treatment. This finding indicated that additional of $ZnSO_4$ and Zn-Cu Isoleusinate in ration have significant effect to increase calves birth weight.

Results of this study prove that the cattle are given additional feed supplementation in the form of concentrate containing 150 mg $ZnSO_4$/kg DM and 200 mg Zn-Cu Isoleusinate/ kg DM of concentrate (R2) will be able to increase the consumption and digestibility of dry matter, which in turn helped increase body weight fetus. This finding also prove that cows that are pregnant that administrated to R2 treatment was quite enough fed because Tillman *et al*., (1989) stated that cows that are pregnant will prioritize the utilization of nutrients in the body for the fetus and will undertake demolition of existing nutrients in the body fetus to the mother's body needs when deprived of nutrients.

CONCLUSIONS

Based on the results of this research and discussion of the observed variables can be concluded that the administration of concentrates and supplementation of 150 mg $ZnSO_4$ / kg DM and 200 mg Zn-Cu Isoleusinate/kg DM of concentrate in the diet based on local feed can increase dry matter consumption and dry matter digestibility and birth weight of calves Bali cattle.

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