Supplementation Effect of Plus Complete Feed Contains $ZnSO_4$ and Zn-Cu Isoleusinateon EffisiencyReproduction Post Partum of Bali CowsRaised in Semi Intensive

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ABSTRACT

An experiment was conducted aiming to apply a formulae technology package of Plus Complete Feed (PCF) containing ZnSO4 and Zn-Cu isoleusinate oneffisiency reproduction in post partum of Balicows raised in a semiintensive system. The PCF technology package was formulated of various local feed consisting of corn meal, rice bran, fish meal, coconut oil and salt. The PCF containing17% crude protein and 78% TDN. The research used 27post partum Bali cows. Randomized block design with three treatments and 9 replicates each was applied in the study. Treatments offered are: basal diet in the pasture without supplementation (R0); Gliricidia leaves supplement with basal diet (R1) and basal diet with CFP supplement containing 150 mg $ZnSO_4$ kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate kg^{-1} DM of ration (R2). The PCF supplement was offered once daily in the morning after the animal consuming dry grass in pasture. Variable studied are plasma glucose, plasma protein, estrous cycles, and weaningweight. The result shows that treatments have significantlyeffect ($P < 0.01$) on all parameters studywhereas that highest effect ($P < 0.05$) is on supplementing 150 mg $ZnSO_4$. kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate kg^{-1} DMof ration

Keyword: ZnSO4, Zn-Cu isoleusinate, Semi-intensive, Bali cows, Reproduction

INTRODUCTION

East Nusa Tenggara (NTT) is an area of cattle producers is taken into account in Indonesia. But the problem that always faced is the lack of feed during the dry season is about 8-9 months which result in low productivity of livestock (and population growth). It is caused by excessive heat stress which affects the work of animal physiological and also the availability of feed.

Even in the dry season grass production is still quite high, but in form of standing hay. In this condition quality of grass is very low with neutral detergent fiber (NDF) is about 88.98%, 2.56% crude protein, and crude fiber 38.75%. The high content of cell walls and low crude protein of standing hay resulted in low palatability and digestibility value with dry matter digestibility value and organic material in vitro are 45.86% and 48.69%, respectively (Hartati and Katipana, 2006). As a result, the supply of nutrients, especially protein and energy cannot meet the needs of livestock. Besides, standing hay also cannot supply enough nutrients, especially protein and energy for growth and activity of rumen microorganisms, so that the supply of nutrients for animals is reduced, because according to McDonald et al. (1988) two-thirds of the needs of livestock nutrients derived from rumen microorganisms.

To overcome this needs is to be done an approach with nutrient adequacy for optimization of fermentation in the rumen, so will be optimize the growth and activity of rumen microorganisms and in turn can increase digestibility. Concrete step that is required is the provision of plus complete feed (PCF) contains ZnSO4 and Zn-Cu isoleusinate to maximize nutrient supply as an important precursor for the synthesis of rumen microorganism,simultanously to meet the nutrient needs for the animal itself. Besides, it is

also to be aware of the presence of nutrients that are very big role in utilizing the undigested nutrients such as fat and minerals in the ration. It is also an obstacle for the fat content and low in minerals, especially zinc. Little (1986) reported that the mineral content of zinc in ruminant feed in Indonesia ranges from 20-38 mg.kg^{-1} dry matter, even on standinghay Kume grass only contain 4,42 mg.kg^{-1}DM (Hartati, et al., 2007). This range is still far from adequate levels between 40-50 mg.kg-1 DM (NRC, 1988). Even in the microorganisms found zinc is high at between 130-220 mg kg^{-1} (Hungate, 1966; Arora, 1989). Hartati et al (2015) concluded that suplementation 150 mg ZnSO4. kg^{-1} DM of NRF with 1.5% lemuru oil could increased intake and digestibility of dry matter, organic matter, crude fiber and curde protein in the last pregnance periode of Bali cows kept under semi intensive system during the dry season.

Previous study Hartati *et al.* (2010; 2011)has produced packagetechnology formula i.e.plus completefeed(PCF)containing150 mg ZnSO4.kg^{-1}DM of PCF and 2% Zn-Cu isoleusinate.kg^{-1} DMof ration and has been apllied to Bali cattle that comsume grass kume ammonization. This formula has been increasedZn and Cu absorbtion, energy and N retention and body weight gain young male Bali cattle. Also, this formulacan be increased dry matter consumption and digestibility, and birth weight of calves Bali cattlein the last pregnance periode of Bali cows kept under semi intensive system during the dry season (Hartati *et al.,* 2013).

This study has been conducted ZnSO4 and Zn-Cu isoleusinat supplementation of PCF on postpartum of Bali cows raised in a semi-intensive system and is expected to provide an optimal response to effisiency reproductioni.e. estrous cycle and weaning weight of Bali calves.

MATERIALS AND METHODS

Twenty seven bali cows postpartum were use in this research. The feed material consists of dry grass that is consumed directly in the pasture and Gliricidia leaves as feed supplement commonly given farmers and PCF contains 150 mg ZnSO4.kg^{-1}DMof PCF and 2% Zn-Cuisoleusinate.kg $^{-1}$ DM of ration. Concrentrate on PCF composed of local feed ingredients consisting of cornmeal, coconut cake, rice bran, fish flour, coconut oil and salt with 17% crude protein and TDN 78% (Table 1).

Table1. Composition of formula concentrate(%)

Feed Material	Concentrate Composition	Feed Material		Concentrate	
		Crude Potein	TDN	Crude Potein	TDN
Yellow corn	46.25	10,00	91,00	4,63	42,09
Rice bran	20,50	10,89	66,00	2,23	13,53
Cocconut cake	23,00	23,10	74,00	5,31	17,02
Fish meal	8,00	61,20	69,00	4,90	5,52
Cocconut oil	1,50	-	-	-	-
Salt	0,25	-	-	-	-
Premix	0,50	-	-	-	-
Total				17,07	78,16

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

Plus complete feed 40% of the needs of dry matter, while the needs of dry matter is determined by 3% of body weight.

Randomized block design with three treatments and 9 replicates each was applied in the study. Treatments offered are: basal diet in the pasture without supplementation (R0); Gliricidia leaves supplement with basal diet (R1) and basal diet with PCF supplement containing 150 mg ZnSO4 kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate kg-^{1} DM of ration (R2). The PCF administration was offered once daily in the morning after the animal consuming dry grass in pasture. Rumen fluid and blood fluidare taken three hours after eating.Variable studied are plasma glucose, plasma protein, estrous cycles,and weaning weight.The data obtained were analyzed by analysis of variance (ANOVA) followed by Duncan Multiple Range Test using SPSS release 19.

RESULTS AND DISCUSSION

Average weaning weight and estrous cycle of postpartum cows reared semi-intensively presented in Table 2.

Table 2. Average weaningweight, estrous cycle of postpartum cows reared semi-intensive

Treatment	Weaning Weight (kg)	Estrous cycle (day)
R0	44,98 ± 2,45[a]	22,5 ± 0,50[a]
R1	63,27 ± 2,17[b]	21,0 ± 0,0[b]
R2	85,51 ± 5,72[c]	21,0 ± 0,0[b]

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

Based on Table 2 above it can be seen that the calf is born from the cows who maintained a semi-intensive and fed concentrates have the highest weaning weight and the lowest weight of the calf from the cows without giving legume forages and concentrates. Similarly, post-partum estrous cycle was compared with those have additional feed with concentrate feed or forage legume.

Statistical analysis showed that the treatment were highly significant effect (P <0.01) to increase weaning weight and estrus cycle accelerate. It can be understood that with supplementary feeding in both forage legume Gliricidia leaves in this case as well as concentrates, the nutrient needs for calf acquired through its mother's milk can be fulfilled even beyond the basic necessities of life. Duncan test results indicate that calf weaning weight between treatments R0-R1; R0-R2 and R1-R2 were highly significant different (P <0.01). The highest weaning weight was observed in a semi-intensive reared cows were administratedconcentrates. The increase in weaning weight of the parent who rearedsemi-intensively by administering concentrates and legumes are 90.10% and 40.66%,respectively compared with cows without giving concentrates or legume. This is due to the holding of lactation were given concentrates the nutrients in the milk is good enough that in addition to carbohydrates ready and proteins are also available micro-minerals Zn served to increase the digestibility and absorption of amino acids and Cu to increase the role of growth hormone.Similarly, in the cow after giving birth the basic living needs nutrients was provided even still be used for milk production and to the development of reproductive organ reflected on estrous cycle

Results Duncan analysis showed that increasing weaning weight of calves, between the treatment R0-R1, R0-R2 are significantly different (P <0.05), while the estrous cycle between treatment R0-R1 and R0-R2 were significantly different (P <0.05) but between the treatments R1-R2 were not significantly different. By administering a legume forage or concentrate PCFaccelerates time estrous cycle Appropriate estrous cycle in Bali cows with sufficient nutrients is between 17-24 days or inthe average of 21 days postpartum.The highest weaning weight mentioned above is also supported by high glucose levels (Table 3).

Table3. Average blood glucose,plasma protein and blood Hb cows research maintained semi intensive (mg/dl)

Treatments	Blood Glucose	Plasma Protein	Blood Hb
R0	83,98 ± 0,56 [a]	7,58 ± 0,67 [a]	13,06 ± 0,46 [a]
R1	85,16 ± 0,49 [b]	8,04 ± 0,54[ab]	13,66 ± 0,52 [b]
R2	86,79 ± 0,56 [c]	8,46 ± 0,32 [b]	14,78 ± 0,69 [c]

Description: different superscripts in the same column indicate significant difference (P <0.05)

The high weaning weight of calves from cows that were given a concentrate containing 150 mg ZnSO4.kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate.kg^{-1}DM of ration can be explained by several parameters previously that granting PCF in ration have very significant influence (P <0.01) in increasing the absorption of zinc.This is because the diet containing 1.5% coconut oil may increase serum concentrations of PGE2 (Hartati, 1998 and 2008). Further stated in addition that beside affected by the concentration of serum PGE2, increasing absorption of zinc is also influenced by the consumption of zinc, so that with the addition of zinc, zinc absorption is increasing and in turn can increase the range of activity of the enzyme such as carboxy peptidase.

Besides, the results showed that the treatment was highly significant (P <0.01) on blood glucose levels of cows. Availability of blood glucose in cows will flow into the breast milk and in turn used as a source of energy for the calf. Duncan test results showed that the parent glucose levels was higher in cattle fed concentrate PCF, compared with other treatments. Glucose is used as an energy source for metabolism of nutrients in the cells of 80% of its flow into the breast milk and in turn a higher weaning weight resulted. Allegedly it can also affect the increase carboxy peptidase enzymeactivity that play a role in the synthesis and protein digestion and absorption of amino acids. which is manifested in increased plasma protein that highly significant (P <0.01). In other words, accumulation of protein or amino acids and energy that impact on weaning weight gain. The results of the study supplementation of PCF contains 150 mg ZnSO4.kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate.kg^{-1} DM of ration in Bali cows postpartum reared semi-intensively can toincreased weaning weight was 90% in calves from the parent who got the provision of concentrate PCF compared to those without the PCF and increased 35% from the parent who gets granting leaves of Gliricidia. The results of this study confirm the results of the study Hartati (1998 and 2008), Hartati, et al., (2009; 2012)and Telupere et al., (2015) that the absorption of amino acid influenced the consumption of protein, the amount of rumen microorganisms, and the absorption of zinc which is manifested in body weight gain and birth weight.

Also, base on the experiments suggestion that supplementation of PCF contains 150 mg ZnSO4.kg^{-1} DM PCF and 2% Zn-Cu isoleusinate.kg^{-1} DM of ration in Bali cows postpartum reared semi-intensively can toacceleratesof estrous cycle by 7% from 22.5 days to 21 days which is a normal condition for Bali cattle.The overall can improve reproductive efficiency in postpartum of Bali cowsthat are kept semi-intensive system.

CONCLUSION

Based on the results of this study concluded that supplementation of plus complete feed(PCF) contains 150 mg ZnSO4.kg^{-1} DM of PCF and 2% Zn-Cu isoleusinate.kg^{-1} DM of ration in Bali cows postpartum reared semi-intensively can to optimize response to plasma glucosa and protein, increased weaning weight by 90 % compared to those without PCF and increased 35 % from the parent were intake leaves of Glicidia, andaccelerates estrous cycle by 7 % from 22,5 days to 21 days which is a normal codition for Bali cattle. The overall can

improve efficiency reproduction in postpartum of Bali cowsthat are kept semi-intensive system.

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