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ISBN 979-97243-9-2

REPRODUCTIVE CHARACTERISTICS OF GRAZING BIBOS BALI SUPPLEMENTED WITH CONCENTRATE

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ABSTRACT

The influence of concentrate during three estrous cycles and early pregnancy on reproductive characteristics were evaluated. Twenty one calf-rearing cows were divided randomly into groups, group A (n=11) were grazed on natural pasture as basal diet, whereas group B (n=10) received an additional 2.4 kg of concentrate (1.2 kg cornmeal; 0.6 kg rice bran; 0.6 kg coconut cake). Animals from each group were closely observed for estrous characteristics, i.e. estrus detection two times a day by two experienced technicians. Blood samples taken from jugular vein were used for assessing plasma progesterone concentrations using RIA procedure. The mean length of the estrous cycle were determined to be 22.3 and 21.1 for cows grazing on natural pasture and cows receiving additional concentrate, respectively. Correspondingly, the length of estrus of the two groups was 18.7 and 20.8. Both groups exhibited good intensity of estrus, with scores 2.6 and 2.9 respectively showing no significant differences. Plasma progesterone concentrations during the estrous cycle were not influenced by concentrate supplementation. There was no significant difference in the progesterone levels of the two groups at the beginning of the luteal phase of the cycle which were 1.64 and 1.38 ng/mL for cows fed concentrate and not fed concentrate, respectively. Also, the mean concentration of progesterone at peak secretion on day 11 was similar for the two groups, i.e. 5.40 and 5.10 ng/mL for cows either offered concentrate or no concentrate. First-service conception rates were similar for both groups (60% vs 64%) of cows offered concentrate and not offered concentrate, respectively, whereas the pregnancy rates of the two groups (90% and 82%) were not affected by concentrate nor were the number of services per-conception (1.3 and 1.2).

Key Words : Bali Bibos, Reproductive Traits, Estrus

INTRODUCTION

Bibos Bali performance in West Timor is very much reliant on the herbage available on native pasture. Results by Jelantik (2001) indicates that grass availability and particularly quality fluctuates with season. Reasonable quality grass is only available for a short period during the early rainy season. Even in this period, due to the shooting pattern of growth (McDowell, 1993) and more efficient photosynthesis as characterized by C4 type resulting from ambient temperature (Wilson, 1994), tropical forage matures quickly, it is generally much lower in protein content than C3 (temperate season) plants, which have a higher cell wall content, a higher degree of signification, where lignin together with cell walls, termed as lignified cell walls (Cornu et al., 1995). The crude protein content of these falls under 4% of the dry matter (Riwu Kaho, 1993), and also contain very low amounts of soluble carbohydrate in a mature state.

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Furthermore, the fast reduction of natural pasture and further reduction in forage production with the invasion of pasture weeds (McFadyen, 1999) necessitates supplementation to provide better utilization of the mature tropical grasses, thus improving cows' performance.

Reproductive activity of the cow can be monitored roughly by the observation of external heat signs or any other sign indicating a normal or abnormal reproductive event (Opsomer et al., 1999). Because the activity of the bovine ovary is generally reflected by the alternating presence and absence of a corpus luteum (CL), several investigators have paid attention to the possibility of measuring progesterone. Cattle exhibiting regular estrous cycling show characteristic periodic fluctuations in progesterone concentration with a 2-week period of high levels followed by 1 week of low levels (Bulman and Wood, 1980). The estrous cycle results from an intricate orchestration of neurochemical and endocrine events acting on the central nervous system, the anterior pituitary and the ovary (Freeman, 1994). The presence of ovarian hormones in bovine blood has been determined in a number of reproductive states (Corah, 1974). The experiment was conducted to examine the effects of supplementation with concentrates on the characteristics of reproductive i.e. estrous characteristics, progesterone profiles, and reproductive traits in Bali cows on native pasture.

MATERIALS AND METHODS

Twenty one calf-rearing cows between 4-8 years of age were selected from more than 100 available multiparous Bali cows. The animals were divided randomly into groups A (n=11) and group B (n=10), and were grazed on the available native pasture (approximately 15 ha) near the village. The cows in group A received no additional feed, whereas those of Group B received an additional 2.4 kg of concentrate (1.2 kg cornmeal; 0.6 kg rice bran; 0.6 kg coconut cake). Animals from each group were closely observed for reproductive performance, i.e. estrus detection took place twice a day for about 1 hr at 6 a.m. and 6 p.m. by two experienced technicians. They recorded estrous intensity as well as length of estrus and estrous cycles.

Blood samples collected from the jugular vein were collected twice weekly (Tuesday and Saturday) for assessing plasma progesterone concentrations by using the 125-I progesterone double-antibody radioimmunoassay (RIA) method as described by FAO/IAEA (International Atomic Energy Agency) in the Laboratory of the Reproduction of Animal Science Faculty, Hasanuddin University, Makassar, South Sulawesi.

A Bali bull with proven semen quality was kept with the cows around the clock for two months. From 5 a.m. to 7 p.m. of each day, two trained technicians recorded any estrous activity in the herd. According to their observation, every cow was mated at least once or twice per estrus period.

Pregnancy was verified via rectal palpation at 45-60 days after breeding. Level of progesterone also served as an indicator to support this observation. The day of conception was verified by the calving date. Reproductive traits that were recorded at this stage, were as follows : conception rate at first mating, services per conception, pregnancy rate, and calving rate. The chemical composition of native grass and concentrate particularly the CP (%) and energy (MJ/kg) are in order : 7.8 and 13.7 and 13.7 and 16.4.

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RESULTS AND DISCUSSION

Estrous characteristics

The length of the estrous cycle, the length and intensity of estrous are presented in Table 1

Table 1. Mean length of the estrous cycle, length and intensity of estrous in Bali cows grazing on natural pasture with or without supplementation

Item	Concentrate (10)		No concentrate (11)		Total (21)	
	Mean	SEM	Mean	SEM	Mean	SEM
Estrous cycle, d	21.1	0.5	22.3	0.5	21.7	0.5
Length of estrus, h	20.8	0.6	18.7	0.6	19.8	0.6
Intensity of estrus (1-3)	2.9	0.2	2.6	0.2	2.8	0.2

The mean length of the estrous cycles were determined to be 22.3 and 21.1 for cows grazing on natural pasture and cows receiving additional concentrate, respectively. Correspondingly, the length of estrus of the two groups was 18.7 and 20.8. Both groups exhibited good intensity of estrus, with scores 2.6 and 2.9 respectively. None of these differences was significant. Meanwhile the mean length of the estrous cycle recorded in the present study is similar to that reported by Pane (1991) of 20 and 21 days for estrous cycles of Bali heifers and cows in Sumbawa, and Asa et al. (1993) of 20 ± 0.68 days. The length of estrus in Bali cows in the present study (20.8 vs 18.7 hours for supplemented and non-supplemented cows, respectively), was in agreement with the results of Adifa (1990), who also failed to alter estrus length by improving feed quality with rice bran

The intensity of estrus in Bali cows offered concentrate as a supplement showed a similar point on the scale for supplemented and non-supplemented cows respectively (2.9 vs 2.6). Unlike other tropical breeds, Bali cows display fairly intensive estrous behaviour. Jelantik (1990), who intensively observed the behavioural estrus signs of Bali cows reared semi-intensively, reported that 33 (58.93%) out of 56 cows experienced overt estrus, exhibiting "standing-when-ridden" signs.

Progesterone profile

The mean concentrations of progesterone during the estrous cycle in supplemented and non supplemented groups are presented in Fig 1.

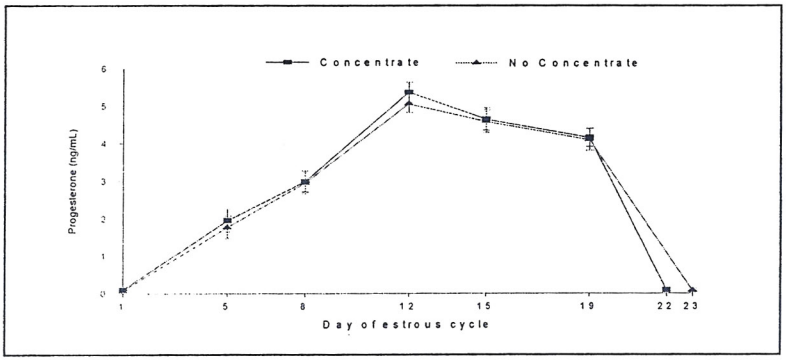

Figure 1. Plasma progesterone profile (Means ± SEM) during the estrous cycle of supplemented and non-supplemented Bali cows (Day 1 = estrus).

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Plasma progesterone concentrations during the estrous cycle were not influenced by concentrate supplementation. In the course of the cycle, the concentrations began to rise on day 4 of the cycle and increased to concentrations as high as 5.4 ng/mL and 5.1 ng/mL for supplemented and non-supplemented cows during the luteal phase before returning to basal levels (<0,5 ng/mL), usually 2-4 days before ovulation. This is in contrast to other reports which concluded that during the luteal phase in cyclic cows, underfeeding decreased progesterone concentrations (Gombe and 973). There was no significant difference in the progesterone levels of the two groups at the beginning of the luteal phase of the cycle which were 1.64 and 1.38 ng/mL for cows fed concentrate and not fed concentrate, respectively. Also, the mean concentration of progesterone at peak secretion on day 11 was similar for the two groups, i.e. 5.40 and 5.10 ng/mL for cows offered concentrate and no concentrate, respectively. The progesterone peaks were lower than reported by Bakry (1994) (8.95 ng/mL), but higher than reported by Mutiara (1997) (3,94 ng/mL) and Syukri (1997) (4.16 ng/mL) for the same breed. Plasma progesterone levels during estrus were 0.11 and 0.06 ng/mL for cows fed or not fed concentrate.

Reproductive traits

The fertility of the cows reflected by conception rate, service per conception and pregnancy rate as monitored by progesterone concentration and rectal examination is presented in Table 2. Seven of the 11 cows (64%) living solely on native pasture and 6 of the 10 cows (60%) offered an additional concentrate conceived to first breeding, whereas none and 2 cows conceived to the second and 2 and 1 cows to the third. The average number of services per conception were 1.2 and 1.3 for cows fed native grass and additional concentrate, respectively. The pregnancy rates of two groups were 82% and 90%, whereas the calving rates were 73 % and 90% for cows only grazing on natural pasture and offered concentrate respectively indicating no effects of concentrate supplementation on the fertility of the cows.

Table 2. Effect of the concentrate on the reproductive traits of Bali cows grazing on natural pasture during the two months of the breeding period

Item	Concentrate	No concentrate	Total
Conception at first service, %	60	64	62
Services per conception (mean ± SEM)	1.3 ± 0.2	1.2 ± 0.2	1.2 ± 0.2
Pregnancy rate, %	90	82	86
Calving rate, %	90	73	82

First-service conception rates were similar for both groups (60% vs 64%) of cows offered concentrate and not offered concentrate, respectively, whereas the pregnancy rates of the two groups (90% and 82%) were not affected by concentrate nor were the number of services per-conception (1.3 and 1.2). One cow from the non-concentrate group died with a condition score of 1 meaning that the calving rate was 90% and 73% for cows in concentrate and no concentrate group respectively. These calving rates are apparently similar to the 'breed' potential calving rate of over 80% as reported by Bank (1976) in Timor, between 83.4% (Pastika and Darmadja, 1979)in Bali and between 90 to 100% in northern Australia (Kirby, 1980). However, these present results were higher than 61% by Belli (1991) and 64% by Bakry (1994).

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CONCLUSION

Supplementation with concentrate (1.2 kg cornmeal + 0.6 kg rice bran + 0.6 kg coconut cake) in Bali cows grazing on natural pasture was not reproductive characteristics i.e. estrous characteristic, progesterone profile, and reproductive traits.

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