

THE EFFECT OF SURGE FEEDING ON REPRODUCTIVE PERFORMANCE OF ONGOLE CROSSBRED (PO) COWS

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ABSTRACT

Long calving interval and high calf mortality, are common in Indonesia. In this study, *surge feeding* was applied in order to improve reproductive performance of *Bos Indicus*. Forty mature cows (pregnant) were divided into 2 groups of 20 cows of either of the group were subjected to *surge feeding* immediately after calving birth for maximum of 90 days. The supplement used was a mixture of tree legume leaves consisting of *Gliricidia*, *Leucaena* and *Calliandra* while chopped Elephant grass was used as the basal diet. Within 90 days *post-partum*, cows returned to normal oestrus were 89% and 29% for treated and control respectively ($P < .01$). First oestrus *post-partum* interval were shorter ($P < .01$) for *surge feeding* group than control group, 67 days and 113 days respectively. Calving intervals shorten ($P < .01$) for *surge feeding* group than control group, 374 days and 491 days respectively. Milk production was increased ($P < .01$) with *surge feeding* than control group, 3.3 kg/head/day and 2.5 kg/head/day respectively. Changes in body weight, body condition, uterus-involution and ovarium activity are discussed.

Key words: *Surge feeding*, Calving interval, Ongole cows

INTRODUCTION

A previous study in Indonesia showed that the average calving rate of Bali (BL) cow ranged from 45%-56% (Hardjosubroto, 1982; Sumadi, 1985; Santoso *et al*, 1993). In another study, involving POs on the island of Java, an average calving rate of 36% was recorded for the breed (Hardjosubroto, 1982). A major reason for the low calving rate generally observed, is the poor nutritional status of breeder cows. This is a consequence of marked seasonal fluctuations in feed supply (quantity and quality) and of the absence of appropriate feeding and management strategies, particularly in the *post-partum* period, for the breeder cows (Putu *et al*, 1992; Komarudin-Ma'sum, *et al*).

It has been shown from studies in Australia that early return to oestrus *post-partum*, can be achieved in cows if their calves were weaned early. Temporary weaning (for periods of up to 72 hours) has

been used with varying successes as a strategy for shortening the *post-partum* anoestrus (PPA) period. Such a strategy or one involving restricted suckling by calves to once or twice a day might be more usefully employed in conjunction with *surge feeding* of breeder cows to stimulate ovulation *post-partum*.

It is possible to shorten the calving interval of cows and the survival rate of their offspring through short-term *surge feeding* of cows' *post-partum* carried out in conjunction with a restricted suckling regimen.

In this study, *surge feeding* by using tree legume leave was applied in order to improve reproductive performance of Ongole-Crossbred (PO) cows.

MATERIALS AND METHODS

Forty PO cows age's 4-5 years (2nd-3rd lactations) and about 4-6 months pregnant were used. The animals were divided

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randomly into three groups of 20 and kept in individual-stalls at night and in group-paddocks during the day. When calved, a total of 20 PO cows were randomly selected for *surge feeding* and 20 PO Cows as Controls. A treatment were continued to be applied on a cow until it was impregnated by a bull or a maximum period of 90 days post-calving were reached.

The cows were fed fresh Elephant grass (approximately 40 kg/head/day) in their group paddocks.

The *surge feeding* group were offered a mix of Gliricidia : Leucaena : Calliandra (60 : 30 : 10) at 30% (i.e. approximately 18 kg) of the total diet (estimated to be approximately 58 kg). The proportion of the legume mix in the diet increased from 30% to up to 50% if the animal can consume the amount. The legume mix fed to the *surge feeding* cows in the kandang at night and in the morning.

Calves had continuous access to their respective dams for the first seven days *post-partum*. Thereafter, the calves were separated from their dams and allowed to suckle twice a day until 30 days of age and than once a day until weaned at 84 days of age.

Calved cows were weighed at 10-day intervals and their body condition scores recorded. During these times, blood samples from each cow also be taken, namely, at 0, 10, 20, 30, 40, 50, 60, 70, 80 and 90 days *post-partum* for the determination of plasma concentrations of progesterone, glucose, urea and FFA.

The uterus and ovaries of each animal was palpated at 10 day intervals, during 90 days *post-partum* to determine the rate of involution of the uterus and the activity of the ovaries respectively.

The calved cows ran with a bull in the paddock during the day and observed daily for signs of oestrus and mounting by the bull. These cows have Kamar heat-mount detectors to assist in the detection of mountings.

The milk production of each cow was estimated weekly by weighing its calf before and after suckling in a 24-hour period. Feed intake for each cow, have been measured for seven consecutive days at intervals of 21 days during the period of 90 days *post-partum*.

RESULT AND DISCUSSION

Feed Consumption

The amount and types of feed consumption after calving to 90 days *post-partum* are show in Table 1.

The PO cows fed 40 kg/head/day fresh Elephant grass. Average feed consumption for PO cows *surge feeding* were 37.6 kg/head/day of Elephant grass and mix fresh tree legium leaves were 11 kg Gliricidia, 5 kg Leucena and 2 kg Calliandra per head per day. Average consumption for control were 37.7 kg/head/day of Elephant grass.

Table 1. The feed consumption of PO cows after calving to 90 days *post-partum*

Consumption (kg/head/day)	<i>Surge Feeding</i>	Control
1. Elephant grass	37.60 1.7 a	37.70 1.6 a
2. Gliricidea	11	0
3. Leucena	5	0
4. Calliandra	2	0
5. Dry matter	10.91 ± 0.25 a	6.67 ± 0.29 b
6. Organic matter	9.60 ± 0.22 a	5.76 ± 0.25 b
7. Crude protein	1.69 ± 0.02 a	0.74 ± 0.03 b

Means with same letter in the same line are not significantly different

Table 2. Bodies weight and body condition of PO cows at calving to 90 days *post-partum*

Parameter	Surge Feeding	Control
Body weight (kg/head):		
- Calving BW	270.8 ± 23.9a	268.8 ± 18.5a
- At 90 days PP	273.2 ± 20.6b	243.1 ± 15.6a
Body Condition :		
- Calving BC	5.3 ± 0.6a	5.3 ± 0.4a
- At 90 days PP	6.2 ± 0.4b	4.6 ± 0.6a

Means with same letter in the same line are not significantly different

BW.PO.SF= Body weight - PO cow - *Surge feeding*
 BW.PO.Co= Body weight - PO cow - Control
 BC.PO.SF = Body condition - PO cow - *Surge feeding*
 BC.PO.Co = Body condition - PO cow - Control

Average consumption of Dray Matter, Organic Matter and Crude Protein for *surge feeding* was higher ($P<.01$) than control groups.

Cattle Performance

Cow's Body Weight and Condition.
 The body weight (BW) and the body condition (BC) of PO cows at calving to 90 days *post-partum* (PP) are shown in Table 2 and Figure 1.

The means of calving body weight of the *surge feeding* and control PO groups are

not significantly different (270.8 ± 23.9 kg vs. 268.8 ± 18.5 kg respectively).

Body weight for *surge feeding* and control at calving are not different because *surge feeding* treatment starting at calving. The effect of *surge feeding* on body weight at 90 days *post-partum* showed highly significant difference ($P<.01$) (273.2 ± 20.6 kg vs. 243.1 ± 15.6 kg respectively). Body weight differences at 90 days *post-partum* are caused by difference of nutrient intake (see at Table 1).

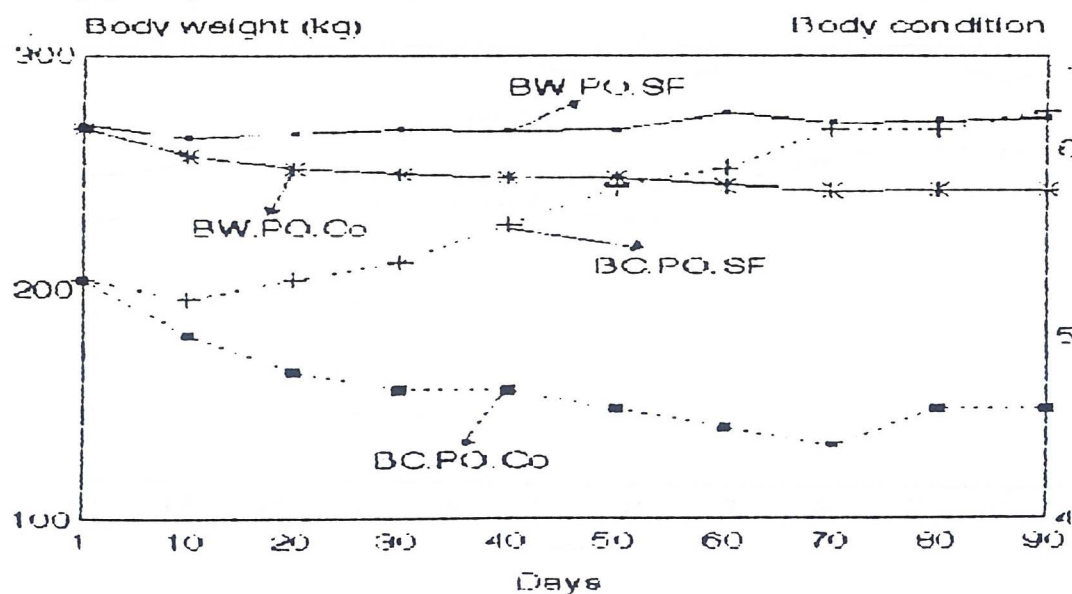


Figure 1. Body weight and body condition of PO cows (*surge feeding* and control) at calving to 90 days *post-partum*.

Table 3. The average of birth weight and milk production of PO cows after calving

Parameter	Surge Feeding	Control
Birth weight (kg)	21.8 ± 2.6a	21.9 ± 3.0a
Milk production (kg/head/day):		
- At 1 st week	3.7 ± 0.6b	2.8 ± 0.6a
- At 12 th week	2.6 ± 0.4b	2.2 ± 0.3a
- Average	3.3 ± 0.5b	2.5 ± 0.4a

Means with same letter in the same line are not significantly different

The effects of *surge feeding* on body condition at calving are not significantly different (see at Table 2). But at 90 days *post-partum* the effect of *surge feeding* were highly significant difference ($P > .01$). Body condition *surge feeding* better than control cows.

Birth Weight and Milk Production. The average of Birth Weight and Milk Production of PO cows after calving to 12 weeks *post-partum* are shown in Table 3 and Figure 2.

The means birth weight of the PO's calves for *surge feeding* and control groups are not significantly different (21.8 ± 2.6 kg

and 21.9 ± 3.0 kg respectively). The average milk production for *surge feeding* showed highly significant difference ($P < .01$) compare with control group (3.3 ± 0.5 kg, 2.5 ± 0.4 kg/head/day respectively).

Uterus Involution and Ovaries Activity. The result for the rate of uterus involution (UI) and ovaries activity (OA) after calving to 90 days *post-partum* are shown in Table 4 and Figure 3.

Uterus involution of PO cows of *surge feeding* were faster than PO control. At 40 days after calving all the cows from *surge feeding* (100%) became normal, but for control at 60 days after calving .

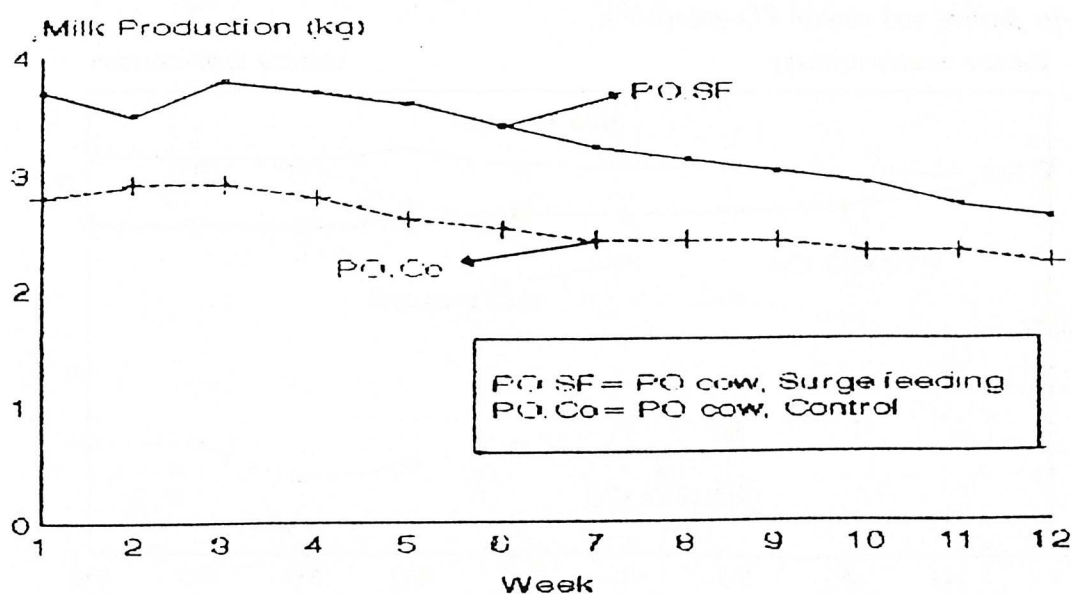


Figure 2. Milk production of PO cows.

Table 4. Rate of uterus involution and ovaries activity of PO cows

Palpating (day)	UI		OA	
	SF	C	SF	C
	----- (%) -----			
1	0	0	0	0
10	5	0	0	0
20	74	33	5	0
30	95	76	21	0
40	100	88	76	0
50		94	94	12
60		100	100	18
70				41
80				53
90				100

Ovaries activity of cows of *surge feeding* at 60 days *post-partum* were 100% active, more faster ($P < .05$) than control at 90 days *post-partum*.

Rate of First Oestrus. The result of the first oestrus of PO cows of *surge feeding* (SF) and control (C) after calving to 90 days *post-partum* presented in Table 5 and Fig. 4.

Rate of first oestrus of PO *surge feeding* group are better ($P < .01$) than control (at 90 days *post-partum* 89% and 29% respectively).

First Oestrus and Calving Interval. First oestrus *post-partum* and calving interval of *surge feeding* and control groups of PO cows are presented in Table 6.

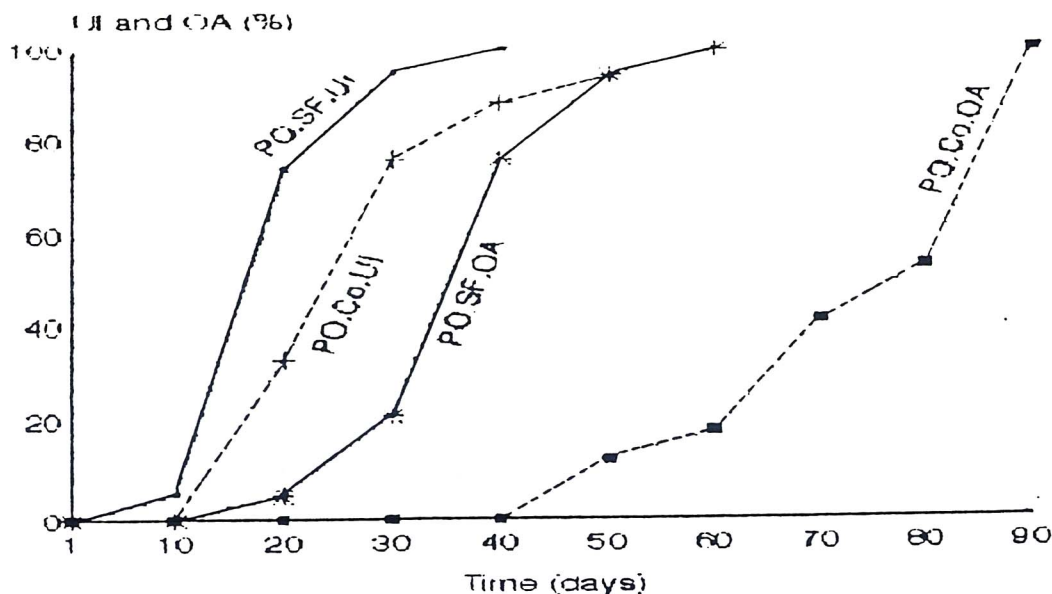


Figure 3. Rate of uterus involution and ovaries activity of PO cows after calving to 90 days *post-partum*.

Table 5. Rate of first oestrus *post-partum* of surge feeding and control group of PO cows

Time (day)	Surge Feeding	Control
	----- (%) -----	
1	0	0
10	0	0
20	0	0
30	5	0
40	11	0
50	22	0
60	50	6
70	67	12
80	83	24
90	89	29

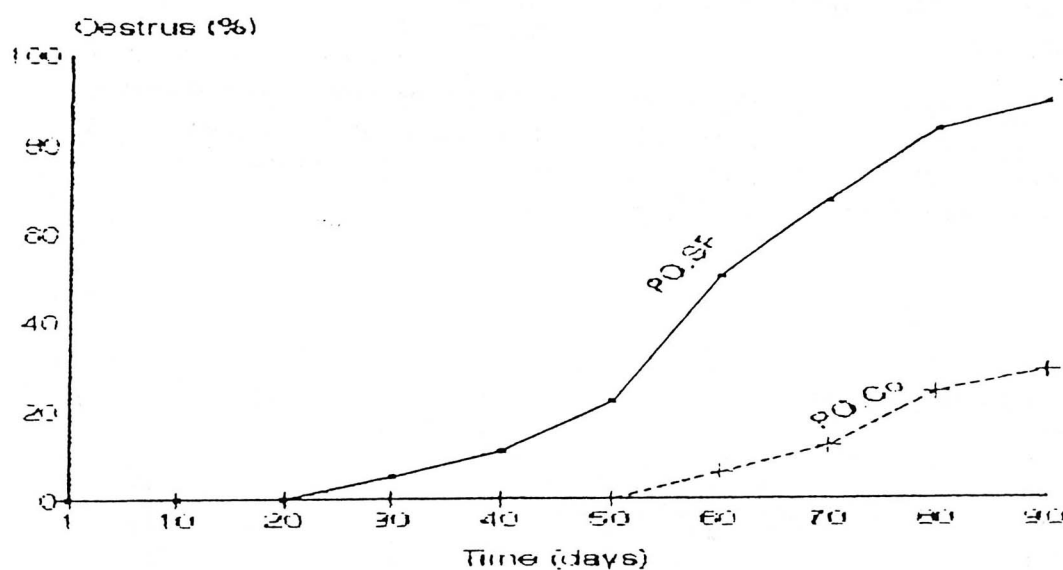


Figure 4. Rate of oestrus *post-partum* of PO cows.

Table 6. First oestrus *post-partum* and calving interval of surge feeding and control groups of PO cows

Parameter	Surge Feeding	Control
	----- (%) -----	
First oestrus PP	67 ± 21a	113 ± 27b
Calving interval	374 ± 32a	491 ± 12b

Means with the same letter in the same line are not significantly different.

Table 7. Concentration of progesterone of *surge feeding* and control groups of PO

Day test	Surge Feeding	Control
	----- (ng/ml) -----	
1	0.19	0.96
10	0.22	0.44
20	0.19	0.10
30	0.16	0.38
40	0.32	0.65
50	0.63	0.95
60	0.69	0.72
70	0.67	0.57
80	0.96	1.41
90	1.46	1.15

Means with the same letter in the same line are not significantly different.

Average oestrus *post-partum* and calving interval of the PO's *surge feeding* group was highly significant difference ($P < .01$) compared with PO control group. First oestrus *post-partum* interval of PO *surge feeding*, Po control were 67 ± 21 days and 113 ± 27 days respectively. Calving interval of PO *surge feeding* and Po control cows were 374 ± 32 days and 491 ± 12 days

respectively. This result indicates that *surge feeding* strategy could shorten calving interval, so one calf could be produced by one cow every one year.

Plasma Concentration of Progesterone. The results for the determination of plasma concentration of progesterone of *surge feeding* and control groups of PO cows presented in Table 7 and Figure 5.

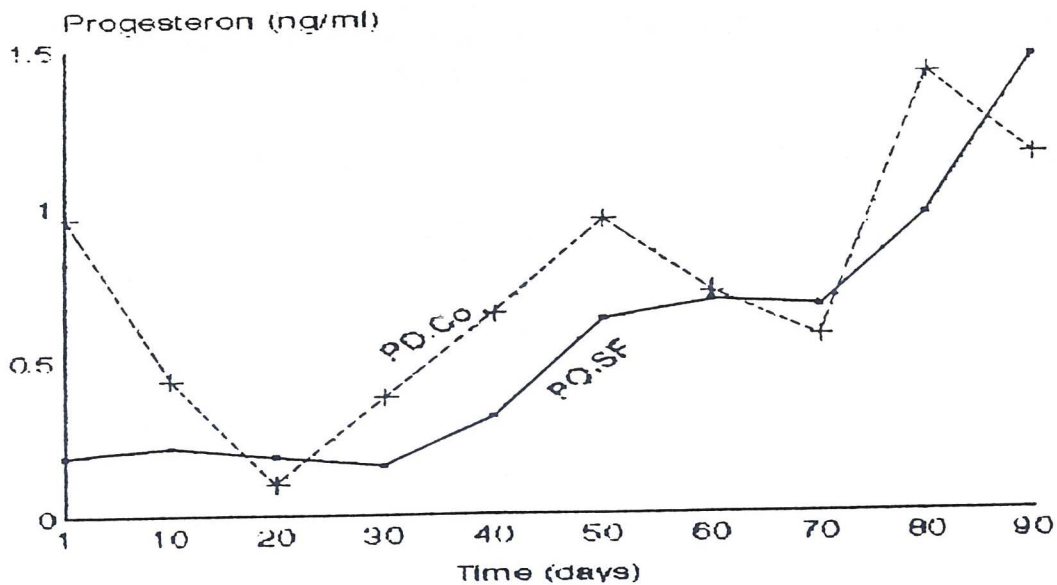


Figure 5. Progesterone concentration at calving to 90 days of PO *surge feeding* (PO.SF), Po controls (PO.C).

Table 8. Blood plasma concentration of glucose of *surge feeding* and control of PO cow

Day test	<i>Surge Feeding</i>	Control
	----- (mg/100ml) -----	
1	49.9	43.5
10	45.4	40.3
20	48.1	42.3
30	53.4	37.6
40	53.5	46.3
50	51.3	43.6
60	49.3	37.7
70	50.6	33.1
80	46.1	36.2
90	53.1	38.9
Average	50.1 ± 2.8b	39.9 ± 3.8a

Means with the same letter in the same line are not significantly different.

The fact shows that in PO *surge feeding* progesterone concentration steadily increased from day 1 up to day 90, while PO cows control the concentration were fluctuating (unstable). In Bali cows progesterone concentration were higher than PO and it is fluctuation. It seems that *surge feeding* can stabilize progesterone concentration.

Plasma Concentration of Glucose. The results for the determination of plasma concentration of glucose of *surge feeding* and

control group of PO cows presented in Table 8.

The average of glucose concentration of PO *surge feeding* was higher ($P < .01$) than PO control (50.1 ± 2.8 and 39.9 ± 3.8 mg/100ml respectively). Passed on average standard error, *surge feeding* produced more stable.

Plasma Concentration of FFA. The results for the determination of plasma concentration of FFA of *surge feeding* and control groups of PO cows presented in Table 9 and Figure 7

Table 9. Blood plasma Concentration of FFA of *surge feeding* and control of PO cows

Day test	<i>Surge Feeding</i>	Control
	----- (umale/ml) -----	
1	0.99	0.95
10	1.00	0.86
20	0.95	0.90
30	0.98	0.93
40	1.01	0.93
50	1.00	0.88
60	1.08	0.92
70	1.00	1.06
80	1.03	1.04
90	1.02	1.19

Means with the same letter in the same line are not significantly different.

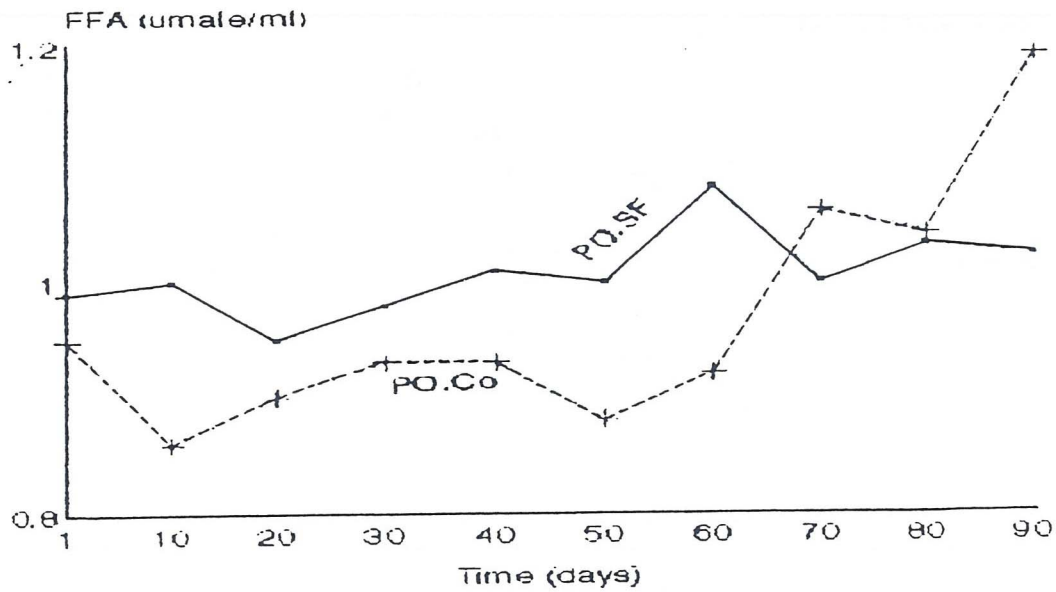


Figure 6. FFA concentration of PO *surge feeding* and control at calving to 90 days.

The average of FFA concentration of PO *surge feeding* and PO control (1.01 ± 0.04 and 0.97 ± 0.10 umale/ml respectively). Again plasma concentration of FFA was more stable in *surge feeding* group if compared to that of control group.

Plasma Concentration of Urea. The results for the determination of plasma concentration of urea of *surge feeding* and

control groups of PO cows presented in Table 10 and Figure 7.

The means of urea concentration of PO *surge feeding* was highly significant difference ($P < .01$) compared with PO control (3.84 ± 0.46 and 3.23 ± 0.30 mg/100ml respectively).

Table 10. Blood plasma concentration of urea of *surge feeding* and control of PO cows

Day test	Surge Feeding	Control
	----- (mg/100ml) -----	
1	3.71	3.80
10	3.64	3.30
20	4.10	3.26
30	3.74	2.75
40	4.25	3.32
50	3.55	3.15
60	4.88	3.60
70	3.98	3.26
80	3.54	2.81
90	3.10	3.04
Average	3.84 ± 0.46^b	3.23 ± 0.30^a

Means with the same letter in the same line are not significantly different.

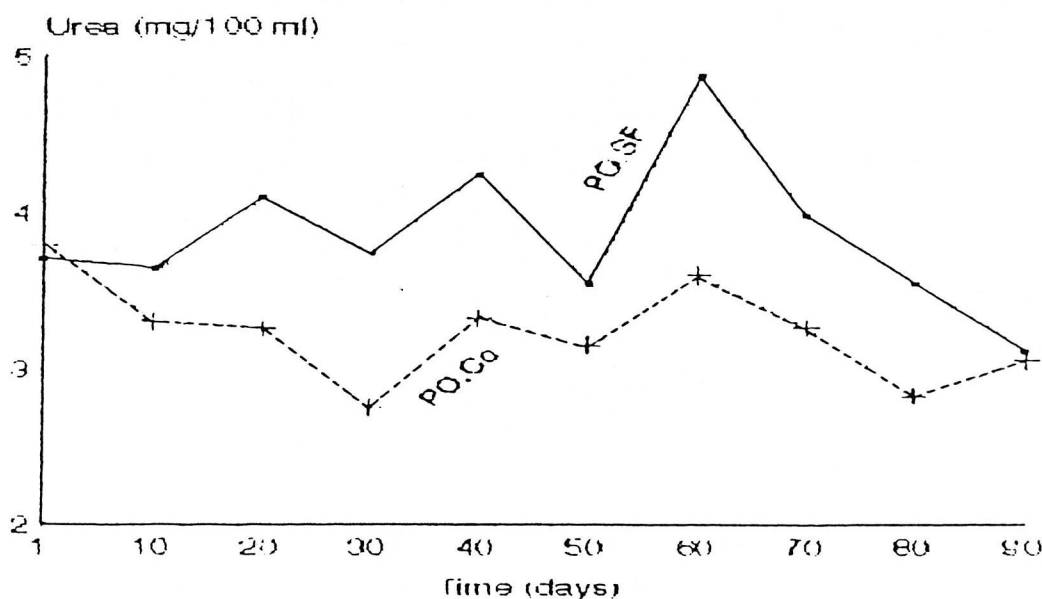


Figure 7. Urea concentration of PO surge feeding and control at calving to 90 days post-partum.

CONCLUSIONS

Body weight and body condition of PO cows after calving until 90 days, in *surge feeding* (treatment) is better than control. *Surge feeding* treatment increased milk production of PO cows.

Ovary activity and oestrus of PO cows after calving in *surge feeding* become faster than control.

The first oestrus and calving interval shorter in *surge feeding* than control group.

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