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# OESTRUS AND OVARIAN ACTIVITY IN LACTATING BEEF COWS TREATED WITH 2-BROMO-α-ERGOCRYPTINE

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**(Key words:** *Oestrus, ovarian activity, lactating cows)*
**(Sleutelwoorde:** *Bronstigheid, eierstokaktiwiteit, lakterende koeie)*

*OPSOMMING:* BRONSTIGHEID EN EIERSTOKAKTIWITEIT BY LAKTERENDE VLEISBEESKOEIE BEHANDEL MET 2-BROMO-α-ERGOKRIPTIEN

By sommige spesies, insluitende die bees, het farmakologiese onderdrukking van prolaktienvrystelling 'n stimulerende effek op eierstokaktiwiteit gedurende die post-partum periode. Die effek van bromokriptien op eierstokfunksie van lakterende vleisbeeskoeie is getoets. Tien Mashona-koeie het ongeveer 40 dae na kalwing, daaglikse inspuitings van òf bromokriptien òf soutoplossing (kontrole) vir 'n periode van 10 dae ontvang. Beraamde daaglikse melkoprengs is met 10,2% deur bromokriptien in vergelyking met die kontrole verlaag. Die behandeling het skynbaar geen effek op die duurte van post-partum anestrus of die vrystelling van progesteroon gedurende die post-partum periode gehad nie.

*SUMMARY:*

Pharmacological suppression of prolactin release has been shown to have a stimulatory effect on ovarian activity during the post-partum period in some species other than the bovine. This trial was designed to test the effect of treatment with bromocryptine on ovarian function after calving in suckling beef cows. Ten Mashona cows received daily injections of either bromocryptine or saline (controls) for a 10 day period approximately 40 days after calving. Estimated milk yield was depressed by 10,2% when compared with controls. Treatment had no apparent effect on the duration of post-partum anoestrus or the secretion of progesterone during the post-partum period.

Duration of the post-partum anoestrous period in cows is related to the degree of mammary stimulation (Moller, 1970; Wettemann, Turman, Wyatt & Totusek, 1978). Stimulation of the udder by suckling or milking causes an immediate discrete peak in blood prolactin level (Fell, Beck, Blockey, Brown, Catt, Cumming & Goding, 1971; Karg & Schams, 1974). High levels of prolactin have been shown to suppress the release of gonadotrophins from the pituitary gland in certain species (e.g. Monkey: Maneckjee, Srinath & Moudgal, 1976; Sheep: Kann, Martinet and Schirar, 1978) and to inhibit the production of progesterone by human luteal granulosa cells *in vitro* (McNatty, Sawyers & McNeilly, 1974). Prolactin may therefore be implicated in delaying the onset of ovarian activity in the post-partum cow.

Bromocryptine (2-bromo-α-ergocryptine methansulphonate. CB-154 Sandoz Ltd, Basle, Switzerland), administered in daily injections, of 100 mg, can effectively block the release of prolactin from the pituitary gland and will depress prolactin levels and milk yield in the cow (Schams, Reinhardt & Karg, 1972; Karg & Schams, 1974). Administration of bromocryptine during the early post-partum period has stimulated ovarian activity in both women (Rolland, De Jong, Schellekens & Lequin, 1975) and sheep (Kann *et al.*, 1978). This experiment was designed to study the effect of bromocryptine on ovarian activity in beef cows during early lactation.

## Procedure

Ten mature, lactating, Mashona cows, which had shown no signs of behavioural oestrus prior to day 32 *post partum*, were allocated at random to 2 equal groups. All had calved normally and the calves were healthy and active. They were fed concentrate and hay at a rate designed to provide for the nutritional requirements of this stage of lactation.

Bodymass of cows and calves was recorded at weekly intervals after calving. Cows were observed twice daily at 0530 and 1730 h for a 30-min. period in the presence of epididymectomised bulls for the occurrence of oestrus behaviour.

One group of cows (Treatment group) received daily (09 h 00) subcutaneous injections of 100 mg bromocryptine in 4 ml saline-ethanol (60:40) for a 10 day period from approximately 40 days *post partum*. The other group (control) received daily subcutaneous injections of 4 ml saline over the same period. Blood samples were collected from all cows at 48 h intervals from day 32 *post partum* until day 40; thereafter every

24 h for an 18 day period. A further 8 blood samples were collected at 3-day intervals after the first oestrus had been recorded. Samples were obtained by jugular veni-puncture and collection into tubes containing an anti-coagulant. The blood was centrifuged within 1 hour of collection and the plasma stored at —20° C for subsequent progesterone assay.

Estimates of milk yield were made on days 36, 45 and 50 after calving. Calves were separated from their dams on the day prior to estimation, and allowed to suck after 6 h. The following day, dams were allowed to suckle their calves on 3 occasions at 6 hour intervals, and calves were weighed before and after suckling. The sum of the difference in calf bodymass was taken to be the milk yield for that period.

All cows were served at the second post-partum oestrus, and subsequently if necessary. Pregnancy diagnoses were carried out 8 weeks later.

*Progesterone assay*

Progesterone concentrations in plasma were determined by radioimmunoassay as described by Holness and Hale (1979). Antiserum was raised against progesterone-11 α -hemisuccinate bovine serum albumin in sheep by Dr J.C. Morgenthal, University of Stellenbosch. Efficiency of extraction of 6,4 ng from control sera was 94% (n = 4). The cumulative intra-assay coefficient of variation (c.v.) based on 10 samples per assay was 11,4%, and the inter-assay c.v. was 17%.

## Results

Mean estimated milk yields in treated cows were reduced by 10,2 per cent when compared with controls (Fig. 1(a)). All cows and calves gained bodymass over the experimental period. There was neither a permanent nor transitory effect of treatment on the bodymass gains of calves (Fig. 1(b)).

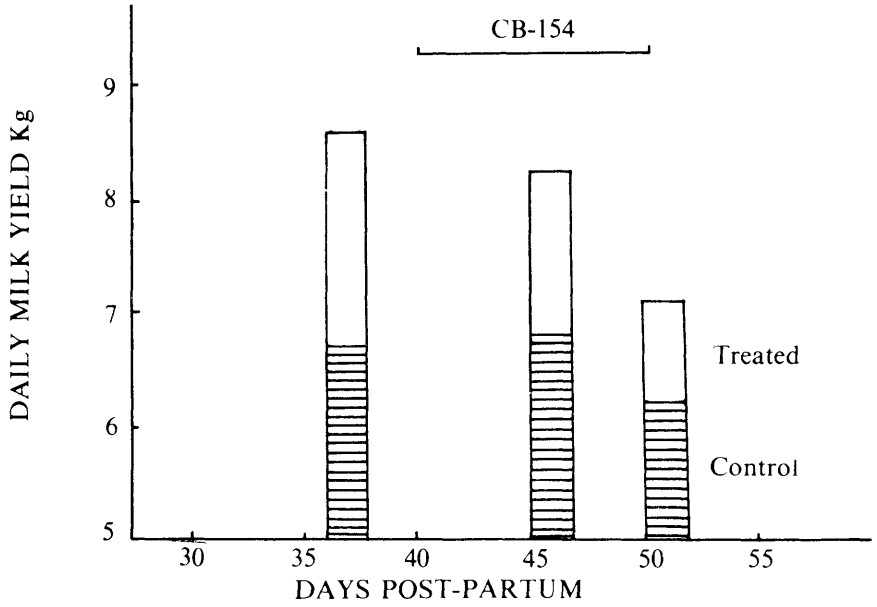


Fig. 1 (a) *Changes in mean estimated milk yield in control and CB-154 treated Mashona cows*

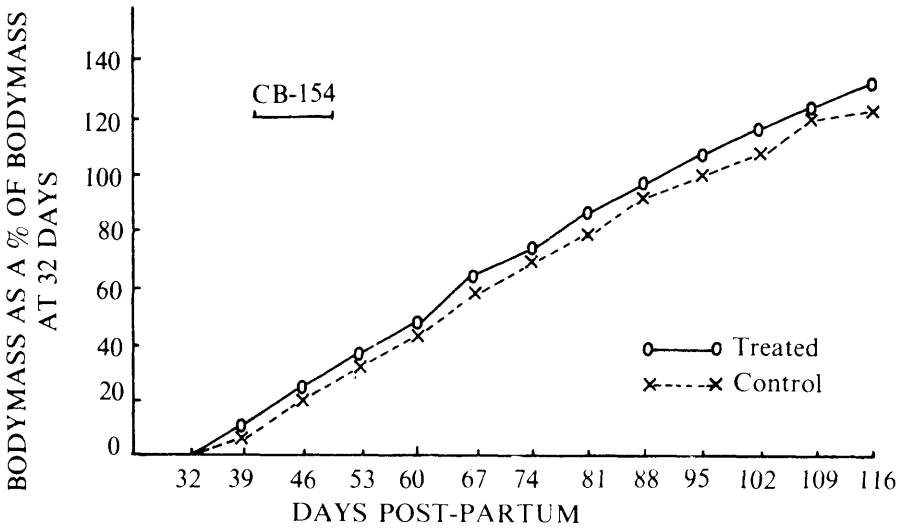


Fig. 1 (b) *Mean growth rates of calves reared by control or CB-154 treated Mashona cows*

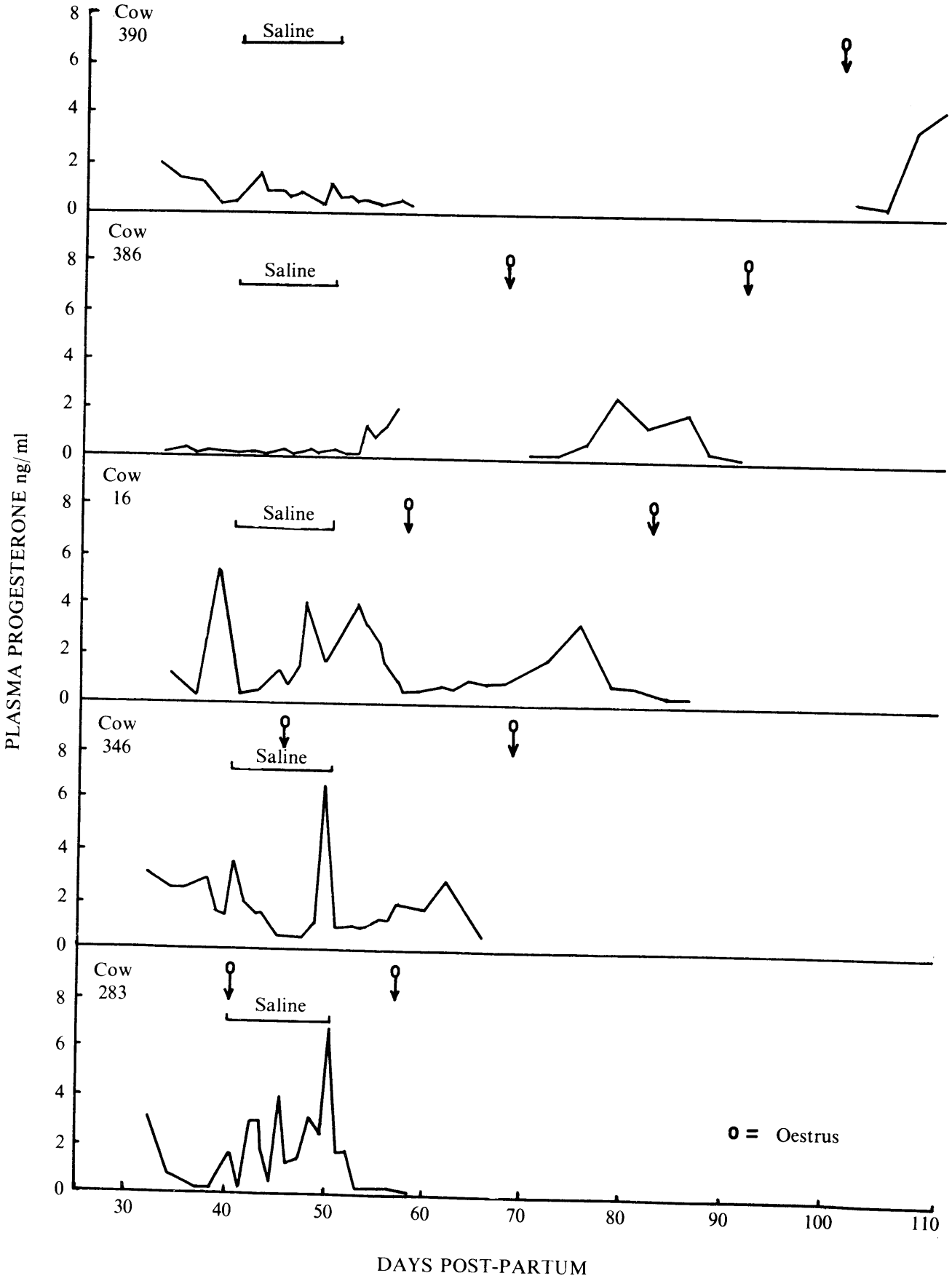


*Fig. 2 Plasma progesterone profiles and the occurrence of oestrus in control cows during the post-partum period*

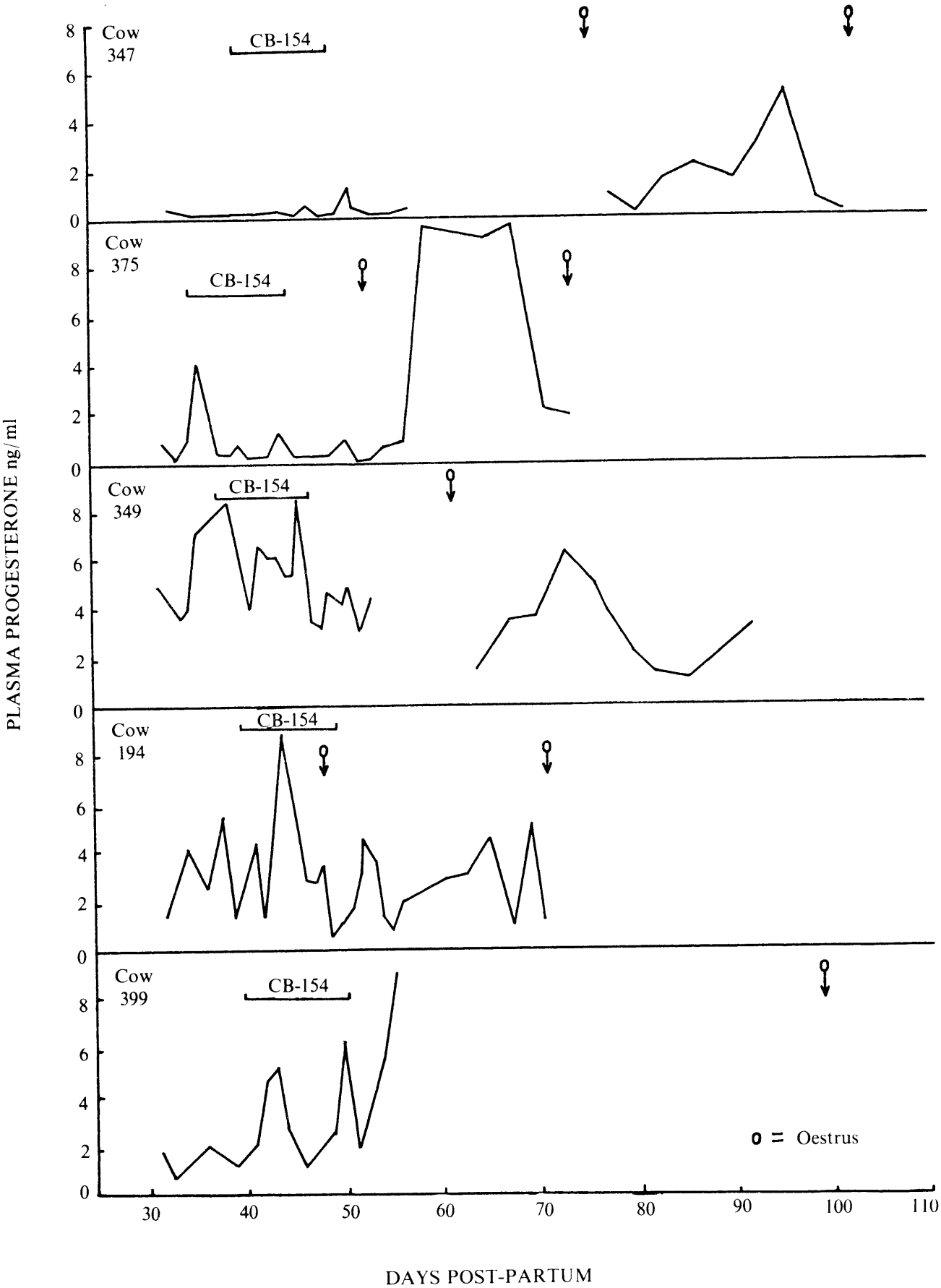


*Fig. 3* *Plasma progesterone profiles and the occurrence of oestrus in cows treated with bromocryptine (CB-154) during the post-partum period*

The period from calving to the first oestrus ranged from 38 to 102 days in the 10 cows, and in 3 cases oestrus occurred during the period of treatment or saline injections (Figs. 2 and 3). Treatment did not reduce the mean post partum anoestrous interval (Table 1). With one exception (cow 347), two consecutive progesterone values greater than 1,0 ng/ml plasma were recorded before the first oestrus. Although not an absolute comparison as sampling only commenced on day 32 *post partum*, the mean time from calving to 2 progesterone values greater than 1,0 ng/ml was not affected by treatment (Table 1). In individual cows, administration of bromocryptine did not appear to stimulate the secretion or release of progesterone when levels were low (cow 347, Fig. 3), or to induce the expression of oestrus when progesterone levels indicative of normal luteal function were evident (cow 399, Fig. 3). In all cows, elevated progesterone levels occurred after the first oestrus (Figs. 2 and 3). Treatment had no effect on conception rate (70%) or the mean calving interval (343,1 ± 28,7 days).

**Table 1**

*The occurrence of the first oestrus after calving and elevated progesterone levels in lactating beef cows*

| | Control | Treated (CB-154) |
|---|---|---|
| No. of cows | 5 | 5 |
| Mean time (days ± s.e.m.) from calving to First oestrus | 60,0 ± 12,1 | 66,4 ± 8,4 |
| 2 Consecutive progesterone values > 1,0 ng/ml plasma | 43,0 ± 3,9 | 46,4 ± 10,2 |

## Discussion

Estimated milk yields were of the same order as those recorded in other studies on beef cows (Richardson, Oliver & Clarke, 1974). Similarly, results from the present study are consistent with other reports (Karg & Schams, 1974; Cummins, Findlay & Lawson, 1977), that injections of bromocryptine during the phase of galactopoesis do not have a pronounced effect on milk yield or calf growth rates.

Bromocryptine administration in the early post-partum period in lactating women causes a highly significant reduction in the period of amenorrhea, but also completely inhibits lactation (Rolland *et al.*, 1975). On the other hand, hypoprolactinaemia induced in the early post-partum ewe depresses, but does not terminate, lactation (Kann, 1976). Kann *et al.* (1978) have shown that ovulation occurred earlier after lambing in ewes treated with bromocryptine than controls.

In agreement with the findings of Cummins *et al.* (1977), there was no evidence that bromocryptine treatment had any influence on ovarian activity or the occurrence of oestrus in the cow. Moreover, these data do not support the hypothesis that prolactin levels may directly influence the secretion of progesterone by the corpus luteum (Rhind, Chesworth & Robinson, 1978). In spite of the high levels of prolactin that are known to occur in early lactation, it was notable that ovarian steroid secretion in some cows commenced relatively early, irrespective of treatment (Figs. 2 and 3). Elevated levels of progesterone before the first oestrus in post-partum cows has been recorded in other studies (Donaldson, Bassett & Thorburn, 1970; Holness, Hale & Hopley, 1980). Although the origin or significance of this peak is unknown, Donaldson *et al.* (1970) found it to be associated with follicular development, and proposed that the first oestrus may be preceded by partial luteinisation of a follicle, rather than ovulation and formation of a corpus luteum (Castenson, Sorenson, Cobos & Fleeger, 1976). Reasons for the difference in ovarian response to induced hypoprolactinaemia in sheep and cattle remain obscure. In cattle, however, it is apparent that although prolactin may be involved, other mechanisms must be sought to explain the marked suppression of ovarian activity and oestrus which occurs during suckling.

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