

# SUCCESSIVE INDUCTION OF LACTATION IN CATTLE<sup>1</sup>

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## Summary

Five multiparous and four nulliparous cross-bred cows were administered *s/c* with oestradiol -17  $\beta$  and progesterone 0.1 mg and 0.25 mg/kg, *b.w./day* for 7 days and 2 mg *s/c* twice daily of reserpine on days 9 to 12. Lactation was successfully induced in all animals for periods from 258 to 476 days. All animals were dried off for a minimum of 2 months. Subsequently, they were injected *s/c* with oestradiol valerate and hydroxyprogesterone caproate at 0.1 mg and 0.25 mg/kg, *b.w./day* on days 1 to 3 and 2 mg twice daily of reserpine on days 8 to 11. Lactation was successfully reinduced in all the cows for a period varying from 228 to 426 days.

(Key Words: Cows, Induced Lactation, Oestradiol, Progesterone, Reserpine)

## Introduction

In the past, induction of lactation in bovine was achieved by administering steroids for up to 120 days. There are reports that reinduction of lactation is possible following the first lactation (Turner, 1959), but failures in reinduction have, also been noted (Hill, 1952; Dziuk et al., 1955). Williams and Turner (1962) were of the opinion that the milk yield during the second induced lactation was not as high as the level during the first induced lactation, when animals were injected with progesterone and oestradiol benzoate for 120 days. However, an increased level of milk yield following second induction was achieved when, cows were injected with decreasing amounts of progesterone and increasing amounts of oestrogen for 63 days.

Presently short-term treatments of 7 days (Smith and Schanbacher, 1973; Atheya and Sud, 1985), 5.5 or 3.5 days (Lembowicz et al., 1982) or 3 days (Dabas, 1987) are advocated with administration of massive doses of steroid hormones with or without additional injection of

reserpine or glucocorticoids. Few reports are available on reinduction of lactation using short-term hormonal therapy. The present experiment provides such data.

## Materials and Methods

Nine dairy cows, of Jersey, Holstein and Red Dane crosses and one Harijana cow, were used in this experiment. Five were heifers ranging in age from 32 to 42 months and the four multiparous animals (age 72 to 120 months) had lactated previously from 1 to 3 times. All the animals were repeat breeders except for one heifer which was in an oestrous condition. The cows had been dry for 15 to 60 months.

All the animals were injected for 7 days with oestradiol -17  $\beta$  and progesterone (0.1 and 0.25 mg/kg *b.w./day/animal*). The daily dose was divided into two equal portions and injected in the morning and evening. On days 9 to 12 each animal received 2 mg reserpine twice a day, subcutaneously. Hand milking twice a day, was started from day 10 onward.

After a successful lactation varying from a period of 258 to 476 days, the animals were dried off for a minimum period of 2 months (range 2 to 4 months). They were then injected with oestradiol valerate and hydroxy-progesterone caproate at 0.1 mg and 0.25 mg/kg *b.w./day/animal* for 3 days and 2 mg reserpine on days 8 to 11 twice a day. Hand milking was started from day 5 on

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ward.

### Results

All cows were induced and reinduced into lactation following steroid therapies. During the first induction of lactation the parous cows produced between 50.5 and 81.1 percent of milk (table 1) of their expected normal milk production only. Similarly milk yield during the second induced lactation were between 80.5 and 108.7 per-

cent of those recorded during the first induced lactation for both nulliparous and multiparous cows. The peak milk yields achieved and the total milk yields over a period of 305 days of lactation (figure 1) were also lower ( $p < 0.05$ ) in the second induced lactation compared to the first induced lactation. No persistency was noticed in either of the induced lactations.

Following steroid injections all cows exhibited oestrus. The oestrus persisted for longer period when synthetic oestrogen was administered, as

TABLE 1. BREEDING HISTORY AND LACTATION PERFORMANCE OF REINDUCED CATTLE

Animal	Age (month)	No. of previous calving	Milk yields <sup>1</sup> (kg)			Peak-yield		Duration of lactation(day)		
			Previous lactation	First induction	Second induction	First induction	Second induction	Previous lactation	First induction	Second induction
C <sub>1</sub>	120	3	2120(8.7)	1711(4.4)	1758(4.2)	7.0	6.5	243	390	415
C <sub>2</sub>	72	1	3500(9.6)	2717(6.0)	2024(5.7)	9.5	9.0	365	451	356
C <sub>3</sub>	96	1	4200(10.6)	3836(8.5)	2357(7.1)	16.0	14.0	395	448	330
C <sub>4</sub>	72	1	2400(7.7)	1509(4.6)	1979(5.0)	8.0	8.0	310	330	392
C <sub>5</sub>	36	Heifer	—	4558(9.6)	3826(9.2)	16.5	15.5	—	476	415
C <sub>6</sub>	32	Heifer	—	1841(4.5)	1685(4.5)	8.0	7.0	—	408	375
C <sub>7</sub>	42	Heifer	—	1062(4.1)	905(3.9)	6.0	6.5	—	258	228
C <sub>8</sub>	38	Heifer	—	1453(4.1)	1239(3.9)	6.5	5.5	—	350	316
C <sub>9</sub>	35	Heifer	—	3346(7.7)	2650(6.2)	14.5	12.0	—	435	426
Mean	60.3		3055(9.1)	2448(5.9)	2047(5.5)	10.22	9.33	328	394	361

<sup>1</sup>Values in parenthesis indicate average milk production (kg/day) throughout the lactation.

during the second induction. At oestrus animals were inseminated artificially, however none of them became pregnant.

### Discussion

As all the nulli- and multi-parous cows could be induced and reinduced to lactation, the results may be considered as quite encouraging. During the first trial naturally occurring oestrogen and progesterone were used for 7 days, while during the second trial commercially available synthetic steroids were used for 3 days only. Though several workers have used 7 days treatment for induction of lactation (Smith and Schanbacher, 1973; Harness et al., 1978), only a few have advocated the shorter duration of treatment (Lembowicz

et al., 1982; Dabas and Sud, 1989) even though the same concentrations of oestrogen and progesterone were administered. To the best of our knowledge comparable data are not available in the literature.

Earlier literature (Williams et al., 1955; Williams and Turner, 1952) where hormones were administered for about 120 days, suggested that a second artificial induction of lactation following first one is possible provided the animals have been given a sufficient dry period between the two trials. Chakarvarty et al.(1981) reported that a minimum rest period of 6 weeks was essential to ensure better responses of the subsequent hormonal treatment. Further, according to Williams and Turner (1962), doses of oestrogen or progesterone had to be varied to get better results.

## REINDUCTION OF LACTATION

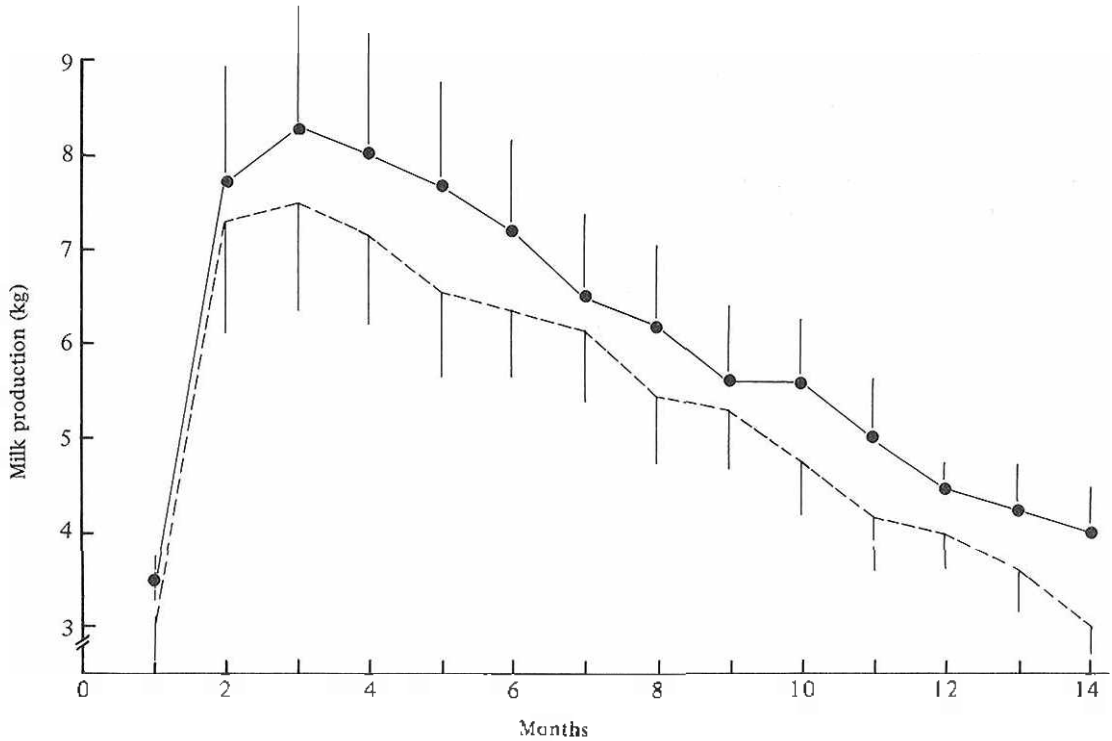


Figure 1. Daily milk production (mean  $\pm$  SEM), in induced cows during first (●—●) and second (-----) induction.

Whether the lower milk yields during the second induction were due to the shorter duration of treatment (3 days only) compared to the first induction (7 days) is not clear. It is clear however, that the cows could not attain their expected natural milk productivity following either first or second induction of lactation. This observation is similar to the one reported earlier by Lembowicz et al. (1982) and Atheya (1984).

Almost all the animals, during both the trials, exhibited oestrus following hormonal therapy and were artificially inseminated but none conceived. This is contrary to our earlier finding (Dabas and Sud, 1989) and we have no explanation for the difference in result. In summary, the study suggested that induction and re induction of lactation is possible in dairy cattle even with commercially available hormones. Whether or not milk production without reproduction throughout the life span of animal is possible, remains to be seen

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