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Effect of 'steaming-up' on subsequent production in dairy cows

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Extra feeding of nutrients (steaming-up) helps in enhancing the milk production of cows (Chicco *et al.* 1982, Gargantini *et al.* 1984, Olson *et al.* 1998 and Singh *et al.* 2003). But, contrary reports are also available which suggest that cows having more fat and body weight gain during the last trimester of pregnancy produce less milk during post-calving period (Garmsworthy and Topps 1982, Treacher *et al.* 1986 and Garmsworthy and Jones 1987). Khan *et al.* (2002) also observed that cows with restricted level of feeding produced slightly more milk than the cows that were on *ad lib.* diet during the last trimester of pregnancy. Most of the earlier studies on extra feeding of nutrients during late pregnancy period were conducted in multiparous cows. Similar information on pregnant heifers, which need adequate nutrients to grow her own body as well as foetus and to build up necessary body reserve to cope up with production stress during early lactation, is not available in the literature. The objective of the present study was therefore to ascertain whether the pregnant heifers fed with extra concentrate during the last 30 days pre-partum would perform better than pregnant heifers given the normal recommended diet.

The experiment was conducted on 12 pregnant heifers (crosses of Jersey, Holstein-Friesian and Hariana) maintained at the Indian Veterinary Research Institute's Cattle and Buffalo Farm. The animals were selected on the basis of similarity in age, body weight and pregnancy status. The experiment continued from 30 days pre-partum to the end of full lactation. All the experimental animals were maintained under loose housing and group management systems. The experimental animals were randomly divided into 2 groups of 6 animals in each, viz. control group and steaming-up group. The feeding schedule for the two groups is detailed in Table 1. The dry matter and crude protein content ranged from 13 to 16% and 6 to 14%, respectively, for green fodder and 88 to 92% and 18.3 to 18.9%, respectively, for concentrate. At the time of concentrate feeding, all the animals were tethered and fed individually. Animals were allowed to drink *ad lib.* clean and fresh drinking water throughout experimental periods.

Table 1. Details of feeding of experimental animals

	Control group (n=6)	Steaming-up group (n=6)
Feeding 30 days pre-partum		
Forage	*Ad lib.*	*Ad lib.*
Concentrate	2.5 kg/day	2.5 kg/day
Extra concentrate	–	2 kg/day
Feeding post-partum		
Forage	*Ad lib.*	*Ad lib.*
Concentrate for maintenance	2 kg/day	2 kg/day
Concentrate for milk production	2.5 kg/litre of milk	2.5 kg/ litre of milk

The peak milk yield, days taken to attain peak milk yield, 150 days milk production, total milk production, total lactation length, per day milk production, birth weight of calves were recorded. Milk constituents, viz. fat and SNF% were estimated at fortnightly interval up to 150 days of lactation. Statistical 't' test (Snedecor and Cochran 1967) was used to compare the differences between the 2 feeding groups.

The effect of 'steaming-up' on milk production of crossbred primiparous cows is presented in Table 2. Although the peak yield was almost similar in the control (11.08 kg) and steaming-up group (11.5 kg), but peak yield was attained earlier in the control group (26 days) compared to the steaming-up group (35 days).

Both the 150 days milk production and total milk production were higher in the steaming-up group compared to the control group. The total lactation days and per day milk yield were also higher in steaming up group (292 days and 7.10 kg, respectively) as compared to the control group (282 days and 6.18 kg, respectively). The body weight loss

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Table 2. Effect of 'steaming-up' on milk production traits in primiparous crossbred dairy cows

Production traits	Control group (n=6) mean±SE	Steaming-up group (n=6) mean±SE	Overall mean±SE
Peak milk yield (kg)	11.50±1.32	11.08±1.27	11.29±0.9
Time taken to attain peak milk yield (days)	26.17±5.79	35.00±7.34	30.58±4.7
150 days milk production (kg)	1058.55±71.09	1222.92±87.27	1140.73±59.11
Total milk production (kg)	1733.13±178.83	2116.33±287.83	1924.73±171.57
Total lactation length (days)	281.67±18.94	291.67±25.56	286.67±15.24
Per day milk production (kg)	6.18±o.52	7.10±0.44	6.64±0.35
Body weight of calves (kg)	21.83±1.4	23.83±1.3	22.83±1.0

after calving was comparatively lower in steaming-up group than the control. The steaming-up group produced comparatively heavier calves as compared to the control group. But all the differences between the 2 feeding groups were statistically nonsignificant. Lodge *et al.* (1975) also reported nonsignificant effect of higher pre-partum feeding on milk production. However, significant increase in milk production due to higher feeding level was reported in the multiparous cows by Chicco *et al.* (1982), Olson *et al.* (1998) and Singh *et al.* (2003). But, Khan *et al.* (2002) noted the advantage of restricted level of feeding during pregnancy in multiparous cows that produced slightly more milk than those were on *ad lib.* diets during pregnancy. Considering the cost of concentrate and the cost of milk produced it was found that steaming-up was more economical than control group.

The steaming-up during pre-partum period had no effect on the quality of milk in the present study (Table 3). Both fat and SNF content were slightly higher in the control group than the steaming-up group throughout 150 days of lactation except the first fortnight; but these differences were not statistically significant. At second fortnight of lactation the fat content was significantly ($P<0.01$) differed between the groups. The slightly higher fat and SNF content in the control group might be due to the lesser amount of concentrate supplied to the animal and lesser production of milk as compared to steaming-up group. In contrary to the present findings, Treacher *et al.* (1986) and Singh *et al.* (2003) recorded improved milk quality in cows fed high level of feed during pregnancy.

The steaming-up group showed more persistent lactation curve (Fig. 1) than control group. Although the steaming-up group produced slightly less milk in the first month of lactation compared to the control group (235 kg vs. 240 kg) but it quickly surpassed the control group in the second month (270 kg vs. 207 kg), third month (250 kg vs. 207 kg) and fourth month (245 kg vs. 200 kg) of lactation. In the next 4 months (fifth to eighth month of lactation), the differences between the 2 groups narrowed down (ranged from 7 to 22 kg/month). In the last 4 months of lactation, the fall of milk production was very rapid in the control group (from 95 kg in the 9th month to 14 kg in the 12th month) compared to the steaming up group (from 151 kg in the 9th month to 23 kg in the 12th month of lactation).

The present study indicated that 'steaming-up' could have beneficial effect on subsequent milk production traits in crossbred primiparous dairy cows. However, more studies

Table 3. Effect of 'steaming-up' on milk constituents at different fortnights after calving in primiparous crossbred dairy cows

Fortnight of lactation	Milk constituents					
	Fat (%)			SNF(%)		
	Control group mean±SE	Steaming-up group mean±SE	Overall mean±SE	Control group mean±SE	Steaming-up group mean±SE	Overall mean±SE
1st	4.5±0.08	4.9±0.24	4.7±0.13	8.67±0.03	8.74±0.25	8.70±0.12
2nd	4.9^{A}±0.10	3.9^{B}±0.20	4.4±0.18	8.62±0.04	8.35±0.79	8.49±0.06
3rd	4.3±0.06	3.6±0.17	4.0±0.13	8.58±0.04	8.45±0.13	8.51±0.06
4th	4.7±0.10	4.0±0.08	4.3±0.13	8.52±0.04	8.42±0.13	8.47±0.07
5th	4.1±0.08	3.7±0.14	3.9±0.10	8.46±0.45	8.37±0.20	8.42±0.10
6th	4.4±0.10	3.8±0.16	4.1±0.12	8.47±0.02	8.29±0.19	8.38±0.10
7th	4.0±0.07	3.9±0.07	4.0±0.05	8.41±0.02	8.42±0.18	8.41±0.09
8th	4.2±0.09	3.9±0.32	4.1±0.16	8.43±0.02	8.36±0.22	8.39±0.10
9th	4.0±0.04	3.9±0.20	3.9±0.10	8.35±0.03	8.51±0.12	8.43±0.06
10th	4.2±0.11	4.1±0.19	4.1±0.10	8.33±0.04	8.59±0.20	8.46±0.11
11th	4.0±0.06	3.9±0.17	3.9±0.09	8.38±0.03	8.42±0.10	8.40±0.05

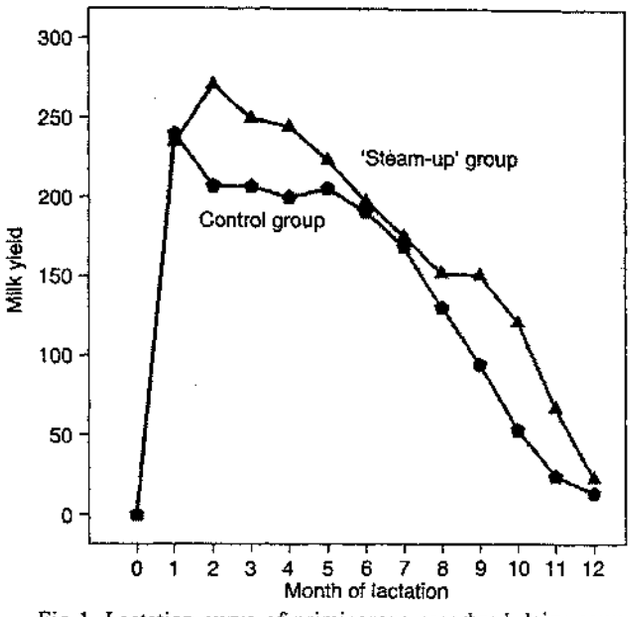

Fig 1. Lactation curve of primiparous crossbred dairy cows under different feeding regimes.

are required to be undertaken involving more number of animals before confirming the supposition.

SUMMARY

Crossbred (Hariana, Jersey and Holstein-Friesian) pregnant dairy heifers (12), were taken to study the effect of steaming-up on subsequent production. Animal were selected based on their similarity in age, body weight. Over and above the scheduled amount (@2.5 kg/day/animal) of concentrate, steaming-up group was provided extra 60 kg concentrate feed in 30 days (extra 2 kg/day/animal) whereas other group was considered as untreated control. After calving, animals were fed according to their milk yield i.e. 2 kg concentrate for maintenance plus 1 kg for every 2.5 kg milk production. Peak milk yield was almost similar but peak yield was attained earlier in control group than steaming-up group. Total milk yield, lactation length, per day yield and birth weight of calves were higher in steaming-up group than control group. The present study recommended that 'steaming-up' could have beneficial effect on subsequent milk production traits in crossbred primiparous dairy cows.

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