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EFFECT OF STEAMING- UP UPON PRE-CALVING AND POST-CALVING GROWTH PERFORMANCE IN CROSSBRED COWS

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ABSTRACT

This investigation was carried out at the dairy farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. It was conducted to evaluate the effect of steaming-up upon pre-calving and post-calving growth performance in crossbred cows at the dairy farm of Banaras Hindu University Varanasi Uttar Pradesh. Twelve animals (S X J) (7 heifers and 5 cows) were assigned to two groups each having six animals. These animals were either first calvers or in second lactation. The cows in these groups had the same characteristics and attributes in respect of body weight, lactation and age. The age of experimental animals varied between 2-6 years. The average body weight of the two groups viz. Control group (T1) and Steaming-up group (T2) at the start of the experiment were 290.33kg and 290.66kg respectively. These animals were offered concentrate feed (20.1% crude protein) individually in the morning. Crossbred cows of Treatment group T2 (Steaming up group n=6) were fed additional feed @4kg concentrate and 5kg wheat straw per animal per day with similar composition during last weeks of gestation and control group T1 (n=6) without any additional concentrate feed. The daily increase in body weight per animal was 535grams in T_2 and 507grams in T_1. The interpolated body weight of pregnant cows at 0 day (calving) taking into account growth rate between -45 and -15 days of calving for T_2 and T_1 are 333.9kg and 313.1kg respectively. Similarly, the average birth weight of calves in T2 was 21.0±1.15kg as against 19.1±1.67 kg in T_1. It is thus concluded that steaming up of cows with @4 kg of concentrate had a better effect on body conditioning and birth weight of calves compared to feeding @2kg of concentrate supplements.

Key words: Steaming-up, Crossbred Cows, Pre-Calving, Post-Calving, Concentrate, Performance.

Introduction

Dairying is acknowledged as one of the major instruments which can bring socio-economic transformation to the rural poor in India. Milking animals in India are usually fed one or two locally available concentrate feed ingredients such as oilseed cakes or meals with brans to supplement grasses and crop residues. This often leads to feeding of a nutritionally imbalanced ration which contains proteins, energy, minerals. Imbalanced feeding adversely impacts productivity, health and welfare of animals, as well as the quality and safety of animal products and increases the environmental impact. In addition, income of farmers from milk production is adversely affected since up to 0.7 of the total cost of milk production is feed. (Garg 2013). 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). Prolonged feeding of concentrate from 3 to 6 weeks prepartum may be additionally beneficial (Strzetelski *et al.* 2008) 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 (Gannsworthy and Topps 1982; Treacher *et al.* 1986) and Garmsworthy and

Jones 1987). Khan *et al.* (2002) also observed that cows with restricted level off feeding produced slightly more milk than the cows that were on ad lib. diet during the last trimester of pregnancy. They do not always supplement milking animals with adequate quality of concentrate but only a small quantity during milking. On the other hand, enhancing nutrition by supplementary concentrate diet during the late gestation period increases birth weights of calves and milk production from the dam (Sanh, 2009). According to some authors two-third of the live weight gain in a mature pregnant cow takes place during 90 day before calving which is most important because 50 percent of increase in weight takes place during this period. The influence of maternal nutrition on the early growth performance of off-springs is mainly mediated through its influence on the birth weight besides milk yield and quality. Although there are many studies that have demonstrated a positive impact of maternal nutrition on the birth weight of calves, its effects in influencing the early growth performance of the calves is often without agreement. There are positive reports of the effect of maternal plane of nutrition on growth performance of calves in Hereford cows, buffaloes and crossbred cows (Panigrahi 2005). The objective of the present study was therefore to ascertain whether the pregnant crossbred cow fed with extra concentrate during the last 30 days pre-partum would perform better than pregnant crossbred cow given the normal recommended diet. The present study has been undertaken with crossbred cows maintained at the Dairy Farm of Banaras Hindu University Varanasi.

Materials and Methods

This investigation was carried out at the dairy farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, situated in the eastern part of Uttar Pradesh which extends from 80°30’ E and 23°45’N to 28°30’N, it is situated at an altitude of 128.93m above the mean sea level and enjoy a subtropical climate. The average rainfall at Varanasi is about 1100mm per annum. Twelve crossbred (S x J) pregnant cows ranging from 2 years to 6 years of age were selected from the dairy farm. Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, during January-February. The selection animals were in their advanced stage of pregnancy (Six months of pregnancy). These animals were either first calvers or in second lactation. Twelve animals (7 heifers and 5 cows) were assigned to two groups each having six animals. The cows in this group had the same characteristics and attributes in respect of body weight, lactation and age. The age of experimental animals varied between 2-6 years. The average body weight of the two groups *viz.* Control group and Treatment group at the start of the experiment were 290.66kg and 290.33 kg respectively. These animals were offered concentrate feed (20.1% crude protein) individually in the mornimg (Table 1). Crossbred cows of Treatment group (Steaming up group n=6) were fed additional feed @4kg concentrate and 5 kg wheat straw per animal per day with similar composition during last weeks of gestation and control group (n=6) without any additional concentrate feed (Table 2). Data collection the animals were weighed using Avery Dial type Weight Bridge. All weightments were done consecutively for two days in the morning before feeding the pregnant heifers and cows. All animals were weighed at 15 days intervals from 90 days before calving. The animals were weighed immediately after calving, along with the weight of the new born calves. Parturition difficulties, if any were also noted. The weights of these experimental animals were also taken at the end of 90 days period. The feed intakes of all the animals under experiment were also recorded after calving.

Results and Discussion

Feed Intake

Table 2 shows the average amount of wheat straw and concentrate offered in the two treatment groups where as table no.3 shows

the dry matter intake per kg. body weight and per kg metabolic body weight.

Table 1: Composition of the concentrate feed offered to crossbred cow under study.

Item	Quantity
Crude Protein	20.1
Crude Fibre	2.5
Sand and Silica	4%
Urea	1%
Salt	2%
Calcium	0.5%
Phosphorus	0.5%
Vitamin A &D_3	5000IU/kg
M.E.	2500K cal/kg

(The concentrate offered were procured from Parag feed factory, Pradeshik Co-operative Dairy Federation (PCDF), Ramnagar Varanasi)

Table 2: Details of feeding and dry matter intake in experimental animals

Content	T1- Control group (n=6)		T2- Steaming-up group (n=6)	
Feeding 30 days pre-partum				
D.M. offered (Wheat Straw)	*5kg./day/animal*		*5kg./day/animal*	
D.M. Intake (Wheat Straw)	4.239kg./day/animal		4.257kg./day/animal	
Concentrate offered	2 kg/day/ *animal*	2kg./day/ animal	2 kg/day/ *animal*	4kg./day /animal
Extra concentrate *offered*	-		2 kg/day/ *animal*	
Concentrate Intake	1.664 kg/day/ *animal*		3.498 kg/day/ *animal*	
Feeding post-partum.				
Dry Matter offered (*Wheat Straw)*	*Ad lib.*		*Ad lib.*	
Concentrate for maintenance	2 kg /day/ *animal*		2 kg /day/ *animal*	
Concentrate for milk production	2.5 kg/litre of milk		2.5 kg/litre of milk	

In treatment T_2 (steaming-up group) the animal were given 5 kg of wheat straw and 4 kg of concentrate (20.1%CP) each in table 1. Whereas, in T_1 (Control group) the animals were given 5kg. Wheat straw and 2 kg concentrate each. The dry matter intake per animal in T_2 and T_1 were 7.755 kg and 5.994 kg respectively. The dry matter intake per kg body weight and per kg $W^{0.75}$ in T_2 (steaming-up group) were 0.0273 kg and 0.111 kg respectively. Whereas for treatment T_1 (Control group) the values were 0.021kg and 0.0867 kg respectively.

It seems the prepartum grain feeding depressed roughage intake during 60 days period. This is apparent from the data presented in table 2 and 3. Whereas the T_2 (steaming-up group) was given 4kg of concentrate against only 2kg in T_1 group the total dry matter intake in both the group did not vary to the extent of concentrate. In similar studied conducted by emery *et al.*

(1968), it has been observed that prepartum grain feeding depressed roughage intake mostly before the fifth day postpartum. In their studies 1.0kg of extra grain depressed roughage intake at least 0.5kg, considerable more than other including our study. Because of the lack of separate refusal data for concentrate Bhusa and Berseam in our study, we cannot specifically compare our data with Emery *et al*. (1968).

Table 3: Dry matter intake per body weighty and $W^{0.75}$

Particulars	Treatments	
	T_1 (Control)	T_2 (Steaming- up)
Average body weight (kg)	290.333±46.359	290.666±48.633
Dry matter intake (kg)	5.994±0.0533	7.755±0.112
Dry matter intake per (kg) body weight	0.0211±0.0036	0.0273±0.0039
Dry matter intake per (kg) $W^{0.75}$	0.0867±0.0108	0.1118±0.124

Change in body weight before and after calving

The average body weights per animal during last 3 months of pregnancy are presented in table 4. The mean body weight in T_2 was 274±6.0 kg at the beginning of the experiment which increased to 322.1 kg before calving thus the animals gained 48kg during the course of experiment. Similarly, the body weight of animals in T_1 increased from 261.15 to 306.66 kg thus gaining 45.1kg in 90 days. The daily increase in body weight per animal was 535grams in T_2 and 507grams in T_1. The interpolated body weight of pregnant cows at 0 day (calving) taking into account growth rate between -45 and -15 days of calving for T_2 and T_1 are 333.9kg and 313.1kg respectively.

It is thus clear that when pregnant cows were on a higher plane of nutrition the animals put on more weight during pregnancy. Prasad and Tomer (1997) have also reported that the animals which were provided with better nutrition during pregnancy had a better body condition score compared with animals on a lower plane of nutrition. Lacasse et al. (1993) have also observed that the daily weight gains in pregnant cows were affected by the previous plane of nutrition.

Table 4: Average body weight of cows before calving and 90 days post calving

Average body weight (kg)	Treatment	
Days	T_1 (Control Group)	T_2 (Steaming-up Group)
- 90	261.1±45.46	274±6
- 75	267.2±40.12	280±7.8
- 60	294±44.21	303±49.53
- 45	293.3±41.0	299.3±48.88
- 30	297±37.49	309.3±49.61
- 15	306.6±39.32	322.4±49.49
0 (Calving)	313.1	333.9
Body weight after calving +90 days	266.5±46.21	275.5±44.8

A number of studies in this regard have reported that good conditioned cows during pregnancy tend to lose weight or maintain their body weight post calving, whereas poor conditioned cows gain weight after calving. Perusal of table no. 4 supports this contention. The cows in treatment T_2 (Steaming –up Group)had an average body weight of 274±6.0 kg 90 days before calving

and had an average gain of mere 1.5kg at 90 days post calving. On the other hand the body weight 90 days before and after calving in T_1 (Control) were 261±45.4 kg and 266±46.2 kg respectively and hence had a gain of 5.4 kg. Studying the body weight changes of individual cows also revealed the same fact. Heavier cows in T_2 (CBH 218 and SH 397) and in T_1 (CBH 235 and HH 335) lost weight from 6kg to 17kg during 90 days and post calving whereas the lighter cows in T_1 (CBH 261 and CBH 233) gained weight (12-15kg) during the above period. From 75 days before calving to 60 days after calving, there was a sharp increase in body weight after which it remained almost constant for another 15 days and increased thereafter until calving. Similar finding were reported by Prasad and Tomer (1997), Lacasse et al. (1993). It is thus concluded that steaming up of cows with 4 kg of concentrate had a better effect on body conditioning and birth weight of calves compared to feeding 2kg of concentrate supplements.

Table 5: Average birth weight of calves in different groups

Treatment							
T1 (Control) Group				T2 (Steaming –up) Group			
S.N.	Breed and brand name of Cows	Calves weight (kg)	Mortality	S.No.	Breed and brand name of Cows	Calves weight (kg)	Mortality
1.	CBH 261	18	-	1.	CB 229	20	-
2.	CBH 233	20	-	2.	CBH251	20	-
3.	CBH 235	20	-	3.	CBH 218	22	-
4.	HH 335	16	-	4.	SH 397	20	-
5.	CB 149	20	-	5.	HH 388	21	-
6.	HH 337	21	-	6.	CB 116	23	-
Mean ± SD		19.1± 1.67		Mean ± SD		21 ± 1.15	

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