

Effect of Weaning on Growth Performance and Health Status of Crossbred Calves

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Abstract— The present study entitled "Effect of weaning on growth performance and health status of crossbred calves" was performed at Livestock Farm Complex, College of Veterinary Science and A.H., Mhow. Twelve calves were selected at the age of 6 days after calving and divided randomly into two groups, control (suckled) and treatment (weaned), with six calves in each group. The duration of the study was 90 days. Growth performance values such as average body weight, daily gain, body length and height at wither were found to be significantly higher in suckled calves as compared to weaned calves, while the average incidence of diseases in weaned calves (50.00%) was found to be higher than in suckled calves (33.33%). The results indicate better performance of suckled calves than weaned calves.

Keywords— Growth Performance, Health Status, Suckled Calves and Weaned Calves.

I. INTRODUCTION

Crossbred cows contribute 28.0% of total milk production in the country and average milk yield (kg/day) of crossbred and indigenous cows are 7.22 and 3.34, respectively (Livestock Census, 2019). Calf rearing during the milk feeding period is a laborious management practice on livestock farms. Therefore, calf management should be scientific, proper and appropriate. Rearing after birth may have a significant impact on subsequent performance and behaviour of animals (Soberon et al., 2012). It is done either by natural suckling or artificial rearing. Artificial rearing involves the separation of neonatal calves from the dam and rearing them without suckling from their mother, a practice called weaning. Under the artificial rearing system, morbidity and mortality could be reduced significantly. The most common reasons for adopting this practice are the accurate recording of milk yield, the economical and scientific feeding of the calves, the facilitation of the mechanization and automation of farm operations such as machine milking, the saving of labour cost and ensuring clean milk production (Singh et al., 2017). Considering the significance of calf weaning, an experiment was designed to study the effect of weaning on the growth performance and health status of crossbred calves.

II. MATERIALS AND METHODS

Location of the work: The present study was conducted at Livestock Farm Complex, Department of Livestock Production Management, College of Veterinary Science and Animal Husbandry, Mhow, N.D.V.S.U. (M.P.).

Plan and duration of experiment: The study was conducted for 90 days. Twelve calves were selected at the age of 6 days after calving. Twelve calves were divided randomly into two groups, control (suckled) and treatment (weaned), with six calves in each group.

TABLE 1
DETAILS OF EXPERIMENTAL GROUPS

S. No.	Groups	No. of calves	Period (days)
1	Control/suckled group	6	90
2	Treatment/weaned group	6	90

The control calves were allowed to suckle from the dam twice a day before milking from birth to 90 days of age, while the treatment calves were separated from the dam on the 6th day of age and termed the weaned group. The amount of milk was given to treatment calves with the help of a milk pail (wide mouth bucket) as per their age and body weight. The calves were kept in a well-ventilated pucca floor house and in groups. Free access to fresh and clean water was provided to the calves. Deworming was done for all the experimental calves.

2.1 Management of experimental crossbred calves:

The experimental crossbred calves were housed under an asbestos-roofed shed. All the experimental crossbred calves were offered green fodder ad libitum from the 16th day onwards. Free access to fresh and clean water was provided to the calves. The veterinary aid measures were provided for all the experimental crossbred calves as per the farm schedule.

TABLE 2
FEEDING SCHEDULE OF WEANED CALVES

Age of calves (days)	Colostrum	Whole milk	Calf starter (g)	Green fodder
0-5	1/10th of b. wt.	Nil	Nil	Nil
13-20	Nil	1/10th of b. wt.	50-100	Ad libitum from 16th day onwards
21-30	Nil	1/10th of b. wt.	250	
31-40	Nil	1/15th of b. wt.	500	
41-60	Nil	1/20th of b. wt.	750	
61-90	Nil	1/40th of b. wt.	800	

(Upadhyay et al., 2014)

Medication: Prophylactic measures against disease and endo-ectoparasitic infestations were carried out as prescribed by the health calendar of the farm to ensure that the calves were in healthy condition throughout the study.

Housing: The experimental crossbred calves were reared under a shed made of asbestos roofing with a cement concrete floor sloped towards the drain to avoid dampness. The crossbred calves of the treatment groups were kept in a different shed. The crossbred calves were kept in groups within the houses.

2.2 Parameters studied:

2.2.1 Growth performance

a) Birth weight (kg)

The birth weight of experimental crossbred calves of both groups was recorded and thereafter at fortnightly intervals using a digital weighing machine before offering feed and water.

b) Average daily gain (g)

Average daily gain of each individual calf was recorded at fortnightly intervals from birth to 90 days of age.

$$\text{Average daily gain} = \frac{\text{Current body weight (kg)} - \text{Previous body weight (kg)}}{\text{Number of days in interval}} \quad (1)$$

c) Body measurements of crossbred calves (cm) were recorded at fortnightly intervals using a measuring tape.

- 1) Body length: Measurement from the point of shoulder to the point of pin bone.
- 2) Height at wither: Measurement from ground level to the highest point above the shoulder.
- 3) Heart girth: Measurement of the circumference of the body just behind the shoulder blade.

2.2.2 Health status

a) Incidence of disease:

All calves were visually examined every day in the morning and evening for their health status, and records were maintained for any injuries or illnesses (such as diarrhoea/dysentery, alopecia, calf mortality, bruises, injury, and other health problems including lameness, eye infection, fever, navel ill, weakness, nasal discharge, joint ill, and maggot wound), which were immediately recorded and treated accordingly.

b) Eggs per gram of faeces:

Data was recorded at fortnightly intervals in both groups by the McMaster egg counting technique.

2.2.3 Statistical analysis:

The data obtained in the study were subjected to statistical analysis as per the procedure described by Snedecor and Cochran (1994). The significance of differences between the mean values of various parameters studied was tested by employing an independent t-test.

III. RESULTS AND DISCUSSION

3.1 Growth performance of crossbred calves

3.1.1 Body weight (kg)

The body weight (kg) of crossbred calves under the suckled and weaned groups is presented in Table 3, which revealed a highly significant difference ($p < 0.01$) fortnightly in both groups. The crossbred suckled calves showed a significantly higher body weight (36.47 ± 4.44 kg) than that of the weaned calves (29.46 ± 2.92 kg), which signifies high dry matter intake from whole milk in the suckling group. These observations are congruent with the earlier studies reported by Kantharaja (2011) and Yilma et al. (2006).

TABLE 3
AVERAGE BODY WEIGHT (kg) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Fortnightly	Suckled	Weaned
0 ^{NS}	21.85 ± 0.67	20.02 ± 0.48
1 ^{**}	26.10 ± 0.57	22.85 ± 0.70
2 ^{**}	29.85 ± 1.07	25.30 ± 0.58
3 ^{**}	35.15 ± 1.23	28.24 ± 0.68
4 ^{**}	40.47 ± 1.11	31.45 ± 0.70
5 ^{**}	47.34 ± 1.20	36.57 ± 0.61
6 ^{**}	54.56 ± 1.06	41.80 ± 0.75
Overall Average ^{**}	36.47 ± 4.44	29.46 ± 2.92

NS = non-significant

***= Significant difference ($p < 0.01$)*

3.1.2 Average daily gain (g)

The average daily gain (g) of crossbred calves was calculated fortnightly under the suckled and weaned groups and is presented in Table 4. A highly significant difference ($p < 0.01$) was observed in the 3rd fortnight and a significant difference ($p < 0.05$) was observed in the 4th and 5th fortnights in both experimental groups. A significant difference ($p < 0.05$) was observed between

the two groups. The overall mean of the suckled group (363.49 ± 37.60 g) was higher than that of the weaned group (248.04 ± 37.39 g). It might have happened due to the fact that the suckled group of calves had a slower rate of colostrum as well as milk ingestion per unit time, which may have resulted in more secretion of saliva, better mixing of the milk digestive enzymes and hence better utilization of colostrum and milk. The present findings were in agreement with Solanki et al. (2021) and Singh et al. (2019).

TABLE 4
AVERAGE DAILY GAIN (g) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Fortnightly	Suckled	Weaned
1 ^{NS}	283.34 ± 40.51	188.89 ± 23.83
2 ^{NS}	250.00 ± 90.22	163.34 ± 24.93
3 ^{**}	353.34 ± 56.93	195.56 ± 18.67
4 [*]	354.45 ± 64.62	214.45 ± 23.18
5 [*]	457.78 ± 29.85	341.12 ± 34.32
6 ^{NS}	482.00 ± 09.53	384.89 ± 20.12
Overall average*	363.49 ± 37.60	248.04 ± 37.39

NS = non-significant

** = Significant difference ($p < 0.05$)*

*** = Significant difference ($p < 0.01$)*

3.2 Body measurements of crossbred calves

3.2.1 Body length (cm)

The body length (cm) of crossbred calves under this study was calculated fortnightly under the suckled and weaned groups as presented in Table 5. A highly significant difference ($p < 0.01$) was observed in the 2nd, 3rd, and 4th fortnights, and a significant difference ($p < 0.05$) was observed in the 1st, 5th, and 6th fortnights in both experimental groups. The crossbred suckling calves showed a significantly higher estimate of body length (70.86 ± 3.07 cm), which was more than the weaned group (67.00 ± 2.68 cm), reflecting better growth due to higher milk consumption. The present finding was in harmony with those reported by Kantharaja (2011), who found a significant ($p < 0.01$) effect of calf rearing system on most of the weekly body lengths.

TABLE 5
AVERAGE BODY LENGTH (cm) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Fortnightly	Suckled	Weaned
0 ^{NS}	58.00 ± 0.45	57.00 ± 0.37
1 [*]	63.00 ± 0.52	60.33 ± 0.67
2 ^{**}	67.50 ± 0.67	64.00 ± 0.45
3 ^{**}	70.17 ± 0.60	66.00 ± 0.26
4 ^{**}	74.83 ± 0.48	69.33 ± 0.61
5 [*]	79.67 ± 0.80	74.67 ± 1.65
6 [*]	82.83 ± 0.60	77.67 ± 1.71
Overall average*	70.86 ± 3.07	67.00 ± 2.68

NS = non-significant

** = Significant difference ($p < 0.05$)*

*** = Significant difference ($p < 0.01$)*

3.2.2 Heart girth (cm)

The heart girth (cm) of crossbred calves under the suckled and weaned groups is presented in Table 6. Non-significant changes were observed for heart girth of crossbred calves in the entire experiment under both the suckled and weaned groups.

TABLE 6
AVERAGE HEART GIRTH (cm) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Fortnightly	Suckled	Weaned
0 ^{NS}	67.50 ± 2.32	70.16 ± 2.32
1 ^{NS}	73.00 ± 1.86	74.00 ± 2.57
2 ^{**}	78.16 ± 1.82	76.67 ± 2.55
3 ^{**}	82.00 ± 1.84	80.17 ± 3.07
4 ^{**}	86.17 ± 2.01	83.83 ± 3.22
5 ^{NS}	90.00 ± 2.02	87.17 ± 3.66
6 ^{NS}	93.16 ± 1.83	91.17 ± 3.36
Overall average NS	81.43 ± 3.07	80.45 ± 2.64

NS = non-significant

3.2.3 Height at wither (cm)

The height at wither (cm) of crossbred calves was calculated fortnightly under the suckled and weaned groups as presented in Table 7, which showed a highly significant difference ($p < 0.01$) in the 2nd, 3rd, and 4th fortnights in both groups. Limiting milk consumption at the end of the pre-weaning period appears to increase body size, which seems to be positively affected by the suckling process.

TABLE 7
AVERAGE HEIGHT AT WITHER (cm) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Fortnightly	Suckled	Weaned
0 ^{NS}	68.34 ± 0.61	67.67 ± 0.33
1 ^{NS}	73.00 ± 0.86	72.00 ± 1.61
2 ^{**}	77.17 ± 0.48	74.17 ± 0.65
3 ^{**}	80.67 ± 0.33	77.34 ± 0.67
4 ^{**}	84.67 ± 0.33	79.67 ± 0.92
5 ^{NS}	88.00 ± 0.45	84.50 ± 1.69
6 ^{NS}	90.67 ± 0.49	88.00 ± 1.55
Overall average*	80.36 ± 2.73	77.62 ± 2.49

NS = non-significant

*** = Significant difference ($p < 0.01$)*

** = Significant difference ($p < 0.05$)*

3.3 Health status of crossbred calves

The average incidence of diseases of crossbred calves under the suckled group was recorded as diarrhoea/bruises/injury/lameness/fever/navel ill, with 1 (16.67%) found from birth up to 90 days. The overall incidence of diseases recorded in crossbred calves under the suckled and weaned groups was found to be 33.33% and 50.00%, respectively. The incidence of diseases recorded in crossbred calves is presented in Table 8. These results are consistent with the reports of Sikka et al. (2002), Singh et al. (2019), and Ahmad et al. (2004).

TABLE 8
OVERALL INCIDENCE OF DISEASES (%) OF CROSSBRED CALVES UNDER SUCKLED AND WEANED GROUP

Condition	Suckled calf no. (%)	Weaned calf no. (%)
Diarrhoea	1 (16.67)	2 (33.33)
Alopecia	0 (0.00)	0 (0.00)
Calf Mortality	0 (0.00)	0 (0.00)
Bruises	1 (16.67)	1 (16.67)
Injury	1 (16.67)	1 (16.67)
Lameness	1 (16.67)	1 (16.67)
Eye Infection	0 (0.00)	1 (16.67)
Fever	1 (16.67)	1 (16.67)
Navel ill	1 (16.67)	2 (33.33)
Nasal Discharge	0 (0.00)	0 (0.00)
Joint ill	0 (0.00)	0 (0.00)
Maggot Wound	0 (0.00)	0 (0.00)
Total	2 (33.33)	3 (50.00)

IV. CONCLUSIONS

The results indicate that all the growth traits, namely average body weight, average daily gain, and body measurements, showed an increasing trend over the experimental duration in suckling calves as compared to non-suckling or weaned calves. The higher live weight of suckling calves strongly favours the maternal instinct of the experimental animals. The experiment also revealed that the overall incidence of diseases was quite high in weaned calves, which indicates that unweaned calves remain healthier on account of natural suckling rather than weaned calves.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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