

Growth performance of Brown Swiss calves reared on two milk feeding schedules

METE YANAR, FEYZI UGUR, NACI TUZEMEN and RECEP AYDIN

Ataturk Universitesi, Ziraat Fakultesi, Zootečni Bölümü, 25240, Erzurum, Turkey

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There are several milk-feeding programmes used by breeders for calves throughout the world. These programmes are intended as guide only and should not be followed rigidly (Roy 1977).

In Turkey, a new milk feeding programme has been used in some research works conducted by Yanar and Ockerman (1993). Yanar *et al.* (1993), Yanar *et al.* (1994 a) and Yanar *et al.* (1994 b). In the present study, alternative feeding programmes were tried. Before a new programme was suggested to breeders, effects of these programme on the growth features of calves were investigated.

Table 1. Chemical composition of starter rations and dried hay

Nutrients	Starter 1 (%)	Starter 2 (%)
Dry matter	90.0	91.6
Protein	19.0	18.0
Ether extract	2.0	2.0
Ash	7.2	7.9
Cellulose	8.0	12.0

In this research, 12 male and 12 female Brown Swiss calves born in the research farm of Agricultural College at Ataturk University, Erzurum, Turkey were used. The study was carried out in a calf unit containing individual pens with feeders and milk-water buckets. After birth, the calves were kept with their dam to suckle colostrum for the first 3 days. Then, the calves were assigned randomly to milk-feeding programmes A and B. In programme A, the amount of milk fed calves were calculated based upon 8% of their birth weight. The amount was kept constant during the milk-feeding period. In programme B, milk fed in the first, second, third, fourth and fifth weeks of age were, respectively, 7, 8, 10.8 and 7% of their birth weight. All calves were weaned at 5 weeks of age. Milk was offered to the calves once a day (every morning) as suggested by Yanar and Ockerman (1993).

Calf starter 1 containing 19% protein and 2800 Kcal/kg metabolic energy was offered to calves until 4 months of age. Calf starter 2 having 18% protein and 2600 Kcal/kg metabolic energy was fed between 4 and 6 months of ages. The amount of starter 1 and 2 were limited as 2 kg/day. Dried hay was offered *ad lib*. Chemical composition of the starters and hay are presented in Table 1.

Table 2. Weights and weight gains of Brown Swiss calves

	Milk feeding programmes		Weight (S)	Sex		Significant (S)
	Programme A n = 15 $\bar{x} \pm s_x$	Programme B n = 11 $\bar{x} \pm s_x$		Male n= 14 $\bar{x} \pm s_x$	Female n= 12 $\bar{x} \pm s_x$	
<i>Weights at (kg)</i>						
Birth	35.6*1.12	33.6*1.41	NS	34.5*1.26	34.7*1.26	NS
Weaning	44.4±1.24	43.6*1.38	NS	44.1*1.38	44.0*1.38	NS
4 months	90.5±2.08	95.1*2.64	\s	94.1*2.32	91.6*2.32	NS
6 months	117.6±2.26	122.9*2.87	NS	121.1*2.55	119.5*2.54	NS
<i>Daily weight gain (kg)</i>						
Birth to weaning	0.25±0.03	0.29*0.04	NS	0.27*0.04	0.27*0.04	NS
Weaning to 4 months	0.54*0.02	0.61*0.03	NS	0.58*0.02	0.55*0.02	NS
4 months to 6 months	0.45±0.02	0.46*0.02	NS	0.45*0.02	0.46*0.02	NS
Birth to 6 months	0.46±0.03	0.49*0.03	NS	0.48*0.04	0.47*0.04	NS
Amount of milk consumed (kg)	99.7±3.20	94.1 ±3.74	NS	96.6*3.30	97.2*3.50	NS

NS : Nonsignificant; $\bar{X} \pm s_x$: least squares means * standard error of mean : S : significance.

Table 3. Gains in body measurements

Gains in body	Milk feeding programmes		S	Sex		S
	Programme A	Programme B		Male	Female	
<i>Birth to weaning</i>						
Body length	3.9*0.64	3.8±0.70	NS	4.5*0.62	2.8*0.73	NS
Weight at withers	3.3±0.66	3.5±0.72	NS	2.6±0.64	4.6-1:0.75	NS
Chest depth	2.4,0.29	2.9±0.32	NS	2.5*0.28	2.8*0.33	NS
Heart birth	4.70*0.70	4.4±0.80	NS	3.5*0.72	6.2±0.84	*
<i>Weaning to 4 months of age</i>						
Body length	12.9±1.06	14.3*1.15	NS	13.1 ±1.02	14.5*1.10	NS
Weight at withers	10.8±1.17	11.1±1.27	NS	11.7*1.1)	9.7*1.32	NS
Chest depth	7.7*0.56	8.3*0.60	NS	7.8±0.53	8.4*0.63	NS
Heart girth	21.4±1.37	22.1 ±1.46	NS	20.7*1.32	23.4*1.54	\s
<i>4 to 6 months of Ages</i>						
Body length	6.7*0.84	9.8±0.91	**	8 7 0.81	7.6*0.95	NS
Weight at withers	6.9*0.71	7.8±0.76	NS	7.9*0.68	6.4*0.79	NS
Chest depth	3.9±0.38	3.7±0.41	NS	4.1*0.37	3.4*0.43	NS
Heart girth	6.2±0.92	8.8±1.00	NS	7.3*0.89	9.6*1.04	NS
<i>Birth to 6 months of age</i>						
Body length	<u>25.9ttl.77</u>	29.5±1.92	NS	27.6*1.70	28.7*1.99	NS
Weight at withers	19.8±1.31	21.9*1.41	NS	22.0*1.25	19.0*1.47	NS
Chest depth	14.1 ±0.70	14.6±0.85	NS	14.5*0.75	14.1*0.88	NS
Heart girth	35.9*1.57	35.9± 1.70	NS	33.6*1.51	39.4*1.76	*

NS : Nonsignificant; * : P < 0.05 ; ** : P<0.01; $\bar{X} \pm s$: least squares means ± standard error of mean : S : significance.

Weights and body measurements were recorded at birth, weaning (5 weeks), 4 and 6 months of ages.

Data were analysed statistically using 2x2 completely randomised factorial experimental designing. The ANOVA analysis was carried out by SAS statistics package programmes (SAS1986).

Data concerning various weights of Brown Swiss calves at birth, weaning 4 months and 6 months of ages are presented in Table 2. Average birth weights of calves allocated to the milk feeding programmes were not significantly different ($P>0.05$). Also, birth weights of calves were not influenced by Sex. Birth weight of calves used in the present study was lower than findings of Randel (1966), Vaccaro *et al.* (1986), but similar to results of Alpan (1961), Alpan *et al.* (1976), Aydin *et al.* (1994) and Yanar *et al.* (1995).

Weights at weaning, 4 months and 6 months of age were not significantly affected ($P<0.05$) by the milk-feeding programmes and sex (Table 2). Weights at 4 and 6 months of age were in agreement with findings of Alpan *et al.* (1976), Yanar *et al.* (1993, 1994a)

Daily weight gains of Brown Swiss calves were not affected ($P<0.05$) by different feeding programmes and sex (Table 2). Milk consumed by the calves in the different feeding programmes was also not significantly ($P<0.05$) different (Table 2). Gains in body measurements such as body length, height at withers, chest depth and heart girth were not significantly influenced ($P<0.05$) by the milk-feeding programmes and sex (Table 3).

Our results suggested that milk-feeding programmes did not have significant influence on the growth characteristics of Brown Swiss calves. Since application of Programme A is more convenient and practical than Programme B, the use of Programme A could be suggested for calf breeders.

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