

## The Effect of Levels of Milk Replacer Feeding on the Performance of Brown Swiss Calves Raised in Eastern Turkey

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**Abstract:** The effects of three levels of milk replacer on growth performance of Brown Swiss calves (15 males and 15 females) were investigated in the study. The amount of daily milk replacer given to calves in the treatment groups was kept constant at 6, 7 and 8% of their birth weight. The calves were weaned at 35 days of age. The weaning weight, 4 and 6 months weights were, respectively 42.0±1.2, 93.5±4.3 and 142.0±6.3 kg for calves in 6% group, 42.6±1.2, 96.4±4.2 and 146.8±6.3 kg for those in 7% group and 45.4±1.2, 89.6±4.2 and 133.9±6.3 kg for young animals in 8% group. The weights were not significantly affected by the levels of the milk replacer. Levels of the milk replacer feeding did not affected significantly on the daily weight gains and gains in the body measurements in the pre- and post-weaning periods of the growth. Overall results of the study suggested that it could be possible to drop the level of milk replacer from 8 to 6% of birth weight without causing a detrimental influence on the growth characteristics of Brown Swiss calves.

**Key words:** Milk replacer, calves, weight gains, calf feeding, growth

### INTRODUCTION

In recent years, use of milk replacers imported from countries of European Union to Turkey has been increasing since its price is relatively cheaper than whole milk and it gives opportunity to save milk for human consumption. Result of studies conducted in Eastern Turkey revealed that whole milk might be completely replaced by the milk replacer without causing any adverse effect on the growth traits of dairy calves<sup>[1,2]</sup>. The milk replacer in the studies was offered to calves at 10% of their birth weight and the amount was kept constant during milk replacer feeding period of 9 weeks. On the other hand, it is well known fact that the cost of feeding for dairy calves is one of the most significant factors influencing profit of the dairy cattle farming<sup>[3]</sup>. Because of that, it is necessary to reduce the amount of milk replacer to be offered to dairy calves without causing a detrimental effect on their growth traits. Therefore, the study was undertaken to investigate whether decreasing levels of the milk replacer from 8 to 6% has any adverse influence on growth characteristics of Brown Swiss calves.

### MATERIAL AND METHODS

Brown Swiss calves (15 male and 15 female) from cattle herd of the Research Farm of the Agricultural College at Atatürk University, Erzurum, Turkey were

randomly allocated to each of 3 levels of the milk replacer (given amount of milk replacer 6, 7 and 8% of birth weight) according to sex. After calves were born, they suckled their dams for 4 days. Then, they were housed in a calf barn contained individual pens furnished by feeders and plastic buckets. The chemical compositions of the milk replacer in the meal form, calf starters and dry hay are presented in Table 1.

The milk replacer was diluted with warm water (about 50°C) to give 12% of dry matter as recommended by the manufacturer. It was cooled around 35-36°C before giving to the calves. The levels of the milk replacer offered to the calves were calculated as 6, 7 and 8% of their birth weights. The quantity of the milk replacers remained constant in all treatment groups until weaning. The milk replacer was given by using bucket once-a-day (every morning) and the calves were weaned at five weeks of age as suggested by Yanar *et al.*<sup>[4]</sup>.

Two different calf starters (starter I and II) were used in the study. Starter I and II were given, respectively from birth to 4 months of age and after 4 months of age. The animals were fed individually and daily amount of starters was limited to 2 kg/head. Dry hay was offered to the calves as *ad libitum* during the trial (six months). Body weights and body measurements such as body length, height at withers, heart girth, chest depth were determined and recorded at birth, weaning, 4 and 6 months of ages.

The data were analysed statistically by using 3x2 completely randomised factorial experimental design in

**Table 1: Chemical composition of milk replacer, starters and dry hay**

Nutrients	Milk replacer (%) <sup>1</sup>	Starter I (%)	Starter II (%)	Dry hay (%)
Dry matter	95.8	89.0	89.2	89
Protein	21.0	18.2	17.1	6.5
Ether extract	15.0	3.3	2.9	1.5
Ash	9.5	7.2	7.4	9.3
Cellulose	1.0	10.0	11.1	32.0

<sup>1</sup>Composition of the milk replacer in the meal form

SPSS statistics package program<sup>[5]</sup>. Since the interactions of sex groups with levels of milk replacer were not found to be significant in the preliminary statistical analysis, the two-way interactions were excluded from mathematical model. The birth weight was included to the model as a covariate when weights taken at the weaning, 4 and 6 months of ages as well as weight gains at pre- and post-weaning periods were analysed.

### RESULTS AND DISCUSSION

Least squares means of weights at birth, weaning, 4 and 6 months of ages are presented in Table 2. The average birth weights of Brown Swiss calves allocated to the levels of milk replacer were not significantly different.

The data regarding with average birth weights are in accordance with results of Aydin *et al.*<sup>[6-8]</sup>. The average weaning weight of the calves consumed the lowest level of milk replacer was the lightest compared to other calves, although the differences were not statistically significant (Table 2). The result indicates a relation between weaning weight and amount of milk replacer given in the pre-weaning period. Similar findings were also reported by Fallon and Harte<sup>[9]</sup>, Fallon and Harte<sup>[10]</sup>. The weaning weight differences in favour of calves in 8% milk replacer group disappeared at 4 and 6 months of ages. The result could be attributed to the compensatory growth occurred in the post-weaning period. Similar findings were already reported by Strzetelski *et al.*<sup>[11]</sup> who studied the effects of various levels of milk replacer on the growth traits of calves.

Levels of the milk replacer feeding did not have any significant effect on the daily weight gains in the pre- and post-weaning periods of the growth. All calves had reduced daily weight gains between birth and weaning. Then, rate of weight gain tended to increase in the post-weaning period (Table 2). The result could be attributed to the increasing amount of starter ration (with

**Table 2: Least squares means with standard deviations for body weights, weight gains of brown swiss calves**

	Levels of milk replacer				Sex		
	% 6	% 7	% 8	S	Male	Female	S
	N=10	N= 10	N= 10		N= 15	N= 15	
Birth weight (kg)	40.7±2.2	36.5±2.2	35.7±2.2	NS	38.9±1.8	36.4±1.8	NS
Weaning weight (kg)	42.0±1.2	42.6±1.2	45.4±1.2	NS	44.2±1.0	42.5±1.0	NS
4 Months weight (kg)	93.5±4.3	96.4±4.2	89.6±4.2	NS	97.8±3.4	88.6±3.4	NS
6 Months weight (kg)	142.0±6.3	146.8±6.3	133.9±6.3	NS	149.0±5.1	132.8±5.1	*
Daily weight gain (g) in the pre-weaning period	125±34	142±34	222±34	NS	187±28	138±28	NS
Daily weight gain (g) in the post-weaning period	690±43	719±42	611±42	NS	723±34	623±34	*
Overall daily weight gain (g)	579±36	605±35	534±35	NS	617±28	528±28	*
Milk replacer intake (kg)	75.7±4.3	79.2±4.3	85.0±4.3	NS	82.5±3.5	77.4±3.5	NS

S: Significance, \*p<0.05, NS: Non-significant

**Table 3: Least squares means with standard deviations for gains in body measurements (cm) of the calves**

	Levels of milk replacer				Sex		
	% 6	% 7	% 8	S	Male	Female	S
	N=10	N= 10	N= 10		N= 15	N= 15	
<b>Gains in pre-weaning period;</b>							
Body length	3.3±1.2	4.6±1.2	5.4±1.2	NS	4.9±1.0	3.9±1.0	NS
Height at withers	1.6±1.4	1.6±1.4	3.2±1.4	NS	1.9±1.1	2.3±1.1	NS
Heart girth	4.1±1.5	4.0±1.4	3.9±1.4	NS	4.3±1.2	3.6±1.2	NS
Chest depth	1.9±0.8	2.3±0.8	1.6±0.8	NS	1.7±0.7	2.1±0.7	NS
Cannon bone girth	0.7±0.1	0.4±0.1	0.2±1.8	NS	0.6±0.1	0.2±0.1	NS
<b>Gains in post-weaning period;</b>							
Body length	27.7±1.6	28.0±1.6	24.7±1.6	NS	28.4±1.4	25.2±1.4	NS
Height at withers	21.5±1.4	22.7±1.4	19.2±1.4	NS	23.0±1.2	19.3±1.2	*
Heart girth	37.6±2.5	37.4±2.5	41.4±2.5	NS	41.8±2.0	35.8±2.0	*
Chest depth	12.4±1.3	12.4±1.3	13.2±1.3	NS	13.3±1.1	12.1±1.1	NS
Cannon bone girth	3.0±0.3	2.7±0.9	3.1±0.3	NS	3.6±0.3	2.4±0.3	*
<b>Overall gains;</b>							
Body length	31.0±1.4	32.6±1.4	30.1±1.4	NS	33.3±1.2	29.1±1.2	**
Height at withers	23.1±1.6	24.3±1.6	22.4±1.6	NS	24.9±1.3	21.6±1.3	NS
Heart girth	41.7±2.3	41.4±2.3	45.3±2.3	NS	46.1±1.9	39.5±1.9	*
Chest depth	14.3±1.3	14.7±1.3	14.8±1.3	NS	15.0±1.1	14.2±1.1	NS
Cannon bone girth	3.7±0.3	3.1±0.3	3.3±0.3	NS	4.2±0.2	2.6±0.2	**

S: Significance, \*p<0.05, \*\*p<0.01, NS: Non-significant

18.2% and 17.1% of crude protein) consumed by calves in place of milk replacer (with 2.6% of crude protein) as liquid form in the post-weaning period. Comparable findings were also reported by Fallon and Harte *et al.*<sup>[9]</sup>.

Gains in all body measurements including the body length, height at withers, heart girth, chest depth and cannon bone circumference were not significantly influenced in pre- and post-weaning periods (Table 3). The results indicated that decreasing level of milk replacer in this calf rearing program did not affect adversely the skeletal development of Brown Swiss calves.

Overall results of the study suggested that it could be possible to reduce the level of milk replacer from 8 to 6% for Brown Swiss calves reared under conditions of the Eastern Turkey without causing an adverse effect on their growth traits. Levels of the milk replacer feeding did not have any significant effect on the daily weight gains in the pre- and post-weaning periods of the growth.

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