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Effects of Milk Feeding Frequency on Growth of Holstein Calves

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Abstract: The study was undertaken to compare the performance of Holstein calves fed with milk once and twice a day in terms of weight and body measurements. Calves stayed with their mothers for 3 days after parturition. The calves were then transferred to individual pens and fed. The animals were allocated to 2 groups. The calves in the first group were fed with 7% milk of their birth weight until weaning. Milk was given once a day at 08:00 in the morning. The calves in the second group were also fed with 7% milk of their birth weight but received the milk in 2 meals, at 08:00 and 18:00 until weaning. The animals in both the groups were weaned at 60 days of age. The effect of application of 2 different feeding frequencies with milk on the growth characteristics of the calves was found insignificant. The average weigth of 4 month old calves and the mean daily weight gains at the period between the birth and 4 months of age for the first group were 80.8±1.8 and 0.34±0.01 kg and for the second group were 84.7±1.8 and 0.37±0.01 kg, respectively ($p>0.05$). Body measurements, such as heart girth, body lenght, height at withers, chest depth and front shank circumference were not significantly influenced by the groups.

Key words: Calves, milk feeding frequency, growth, body measurement

INTRODUCTION

In a dairy farm, one of the main goals is to raise calves as economically as possible. Therefore, expenses in calf raising must be reduced by employing improved methods. For that reason, feeding calves with milk once a day could be helpful by reducing cost of labor. It was reported that feeding calves with milk once a day, which was regarded as an economical application for rearing of the calves of dairy cattle breeds did not negatively affect their growth and viability by this kind of application, while the cost of labor significantly decreased, the income of the owner would increase (Owens and Stake, 1971; Yanar and Ockerman, 1993; Kehoe *et al.*, 2007).

Our observations indicate that the breeders, lived in Western Anatolia, prefer twice a day feeding program in feeding of calves with whole milk. This situation causes the increasing of labour expense in especially large capasity dairy farms. However, as far as we know there is no scientific research which determined the effects of milk feeding frequency on the growth of Holstein calves reaered in the Western part of Anatolia. The study was undertaken to compare the performance of calves fed milk once and twice a day in terms of growth and body measurements.

MATERIALS AND METHODS

A total of 18 Holstein calves, born at Uvecik Yahya Cavus Research and Training Centre, Faculty of Agriculture, Canakkale Onsekiz Mart University, were used in the present study. Calves stayed with their mothers for 3 days after parturition. The calves were then transferred to individual pens and fed. The animals were allocated to two groups. The calves in the first group (G1) were fed with 7% milk of their birth weight until weaning. Milk was given once a day at 08:00 in the morning. The calves in the second group (G2) were also fed with 7% milk of their birth weight but received the milk in two meals; at 08:00 and 18:00 until weaning. The animals in both the groups were weaned at 60 days of age. Calves were seperated to study groups based on their birth weights. The aim of this application was to have animals who were similar to each other in terms of birth weight. The calves were housed in a building which was specifically constructed for calves and contained individual pens which were furnished with feeders and milk or water buckets.

Two different calf starters were used. While, one of them (Starter I) contained 18% crude protein, 7% crude ash and 8% crude cellulose, the other one (Starter II) contained 16% crude protein, 8% crude ash and 9% crude

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cellulose. Starter 1 was fed from birth to 2 months of age and the starter 2 after 2 months of age. The quantity of starters was limited to 2 kg day^{-1}. Medium quality dried hay was offered to the calves *ad lib.* during the study.

The body weights and body measurements (heart girth, body lenght, height at withers, chest depth and front shank circumference) were determined and recorded at birth, weaning and 4 months of age. The experimental data were analyzed statistically by using a 2×2 completely randomized factorial experimental design. The analysis was carried out by using the statistics package program (SAS, 1996).

RESULTS AND DISCUSSION

Data concerning this research are presented in Table 1 and 2. It was found that gender had a significant effect on birth weight ($p<0.05$). The result is in accordance with the findings of Aydin *et al.* (2008). Birth weight of calves used in the present study was higher than that was found by Ugur *et al.* (1996) and Ugur and Yanar (1998).

The weaning weights of calves in male and female groups were 64.9±1.5 and 61.3±1.5 kg, respectively. The weaning weight of G1 and G2 calves used in the present study is similar to that found by Winter (1985) and Yun and Chung (1985). The weaning weights of calves were not significantly influenced by the groups. Likewise, the effect of groups on weights for 4 months of age was not statistically significant (Table 1). Similar findings were also reported by Yanar and Ockerman (1993).

Kehoe *et al.* (2007) reported that milk feeding once a day did not affect calve growth performance negatively and reduced the cost of labor. In addition, several studies indicated that milk feeding once a day did not have a negative effect on glucose metabolism in calves (Stanley *et al.*, 2002). Niwinska and Strzetelski (2004) found that the increase in the frequency of milk feeding reduces concentrate intake by calves. These studies are consistent with the findings of the present study and advocates milk feeding once day application in the feeding of calves.

Daily weight gains of Holstein calves were not significantly affected ($p>0.05$) by the groups and gender (Table 1). Daily weight gains at the period between the birth and four months of age for G1 were 0.34±0.01 and for the G2 were 0.37±0.01 kg, respectively. These averages were similar to the findings of Yanar *et al.* (1997). However, they were lower than those reported by Ugur and Yanar (1998), Ugur *et al.* (1996), Kehoe *et al.* (2007) and Aydin *et al.* (2008). In the same research farm, the use of better quality roughages and concentrate feeds may improve performance in terms of daily live weight gain.

Table 1: Least squares means and standart error of means weights, daily weight gains of calves

	G1	G2		Male	Female	
	n = 8			n = 8		
Items	$\bar{X}\pm S_{\bar{x}}$		p	$\bar{X}\pm S_{\bar{x}}$		p
Weights (kg) at						
Birth	40.0±1.8	40.0±1.8	ns	43.5±1.8	37.4±1.8	*
2 Months	61.2±1.5	64.7±1.5	ns	64.9±1.5	61.3±1.5	ns
4 Months	80.8±1.8	84.7±1.8	ns	85.7±1.8	80.0±1.8	ns
Daily gain in weight (kg)						
Birth-2 months	0.35±0.03	0.40±0.03	ns	0.35±0.03	0.39±0.03	ns
Birth-4 months	0.34±0.01	0.37±0.01	ns	0.35±0.01	0.35±0.01	ns

*: $p<0.05$, ns: $p>0.05$

Table 2: Least squares means and standart error of means for body measurements of calves

	G1	G2		Male	Female	
	n = 8			n = 8		
Items	$\bar{X}\pm S_{\bar{x}}$		p	$\bar{X}\pm S_{\bar{x}}$		p
At birth (cm)						
Body length	64.8±2.1	66.3±2.1	ns	65.5±2.1	65.7±2.1	ns
Height at withers	72.2±1.6	72.5±1.6	ns	74.1±1.6	70.6±1.6	ns
Chest depth	30.3±1.2	30.3±1.2	ns	30.5±1.2	30.2±1.2	ns
Heart girth	81.0±2.6	79.8±2.6	ns	81.3±2.6	79.5±2.6	ns
Front shank circumference	12.5±0.2	12.6±0.2	ns	13.1±0.2	12.0±0.2	*
At 2 months (cm)						
Body length	75.3±0.8	79.7±0.8	ns	78.2±0.8	76.7±0.8	ns
Height at withers	80.3±1.9	79.3±1.9	ns	81.7±1.9	78.0±1.9	*
Chest depth	34.6±1.0	35.7±1.0	ns	36.3±1.0	34.0±1.0	ns
Heart girth	92.6±1.4	92.5±1.4	ns	94.3±1.4	90.7±1.4	*
Front shank circumference	13.7±0.2	13.4±0.2	ns	13.8±0.2	13.2±0.2	ns
At 4 months (cm)						
Body length	82.7±1.7	83.7±1.7	ns	83.7±1.7	82.7±1.7	ns
Height at withers	84.2±1.2	83.4±1.2	ns	84.8±1.2	82.7±1.2	ns
Chest depth	44.6±2.1	43.1±2.1	ns	47.1±2.1	40.8±2.1	ns
Heart girth	95.5±9.0	102.0±9.0	ns	105.5±9.0	92.0±9.0	ns
Front shank circumference	13.8±1.1	13.4±1.1	ns	13.9±1.1	13.2±1.1	ns

*: $p<0.05$, ns: $p>0.05$

In this study, the body measurements of the calves at 4 months of age for G1 and G2 groups were 82.7±1.7 and 83.7±1.7 cm for body lenght, 84.2±1.2 and 83.4±1.2 cm for height at withers, 44.6±2.1 and 43.1±2.1 cm for chest depth, 95.5±9.0 and 102.0±9.0 cm for heart girth, 13.8±1.1 and 13.4±1.1 cm for front shank circumference, respectively. These body measurements were also found to be insignificant ($p>0.05$) for the groups (Table 2). The results obtained from this study suggest that feeding Holstein calves with milk once a day does not affect adversely the skeletal development of Holstein calves. Similar findings were also reported by Yanar and Ockerman (1993) and Kehoe *et al.* (2007).

CONCLUSION

The results obtained from this study suggest that Holstein calves may be fed with milk once a day. This

applications can reduce the cost of labor. However, further studies need to be carried out to investigate the possibility of decreasing milk feeding frequency in Western Anatolia conditions.

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