

GROWTH, HEALTH AND BEHAVIOURAL TRAITS OF DAIRY CALVES FED ACIDIFIED WHOLE MILK

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The present study was undertaken to determine whether feeding acidified whole milk (AM) gives satisfactory result on growth, health performance and behavioural traits of Holstein Friesian calves reared in Eastern Region of Turkey.

Materials and Methods

Twenty seven Holstein Friesian calves (15 female, 12 male) born in the Research Farm of Collage of Agriculture at Atatürk University, Erzurum, Turkey were assigned randomly to acidified whole milk (AM) or sweet whole milk (SM) groups. The calves were kept in the individual pens containing feeders and milk water buckets during the trial. The AM was prepared daily by adding formic acid to the whole milk. Then, the final pH of the milk dropped to 4.8 Calves were offered either AM or SM from open pails once a day (every morning at 8.00 AM) at 8% of their birth weight, and all calves were weaned at five weeks of age (Yanar *et al.*, 1997). The experiment lasted for six months.

Two kinds of starters were used in this study. Starter I (18.5% crude protein) was fed before 4 months of age, and starter II (17.6% crude protein) was offered between 4 and 6 months of age. The quantity of starters was limited as 2kg/day, however, dry hay was given to calves *ad libitum*.

Birth weight, weaning, 4 and 6 months of ages weights were determined and recorded. Body length, height at withers, heart girth and chest depth were also measured at birth and 6 months of ages. In the preweaning phase, faecal consistency scores for each calf were determined daily as follows : 1=normal (soft-solid consistency, no fluid), 2=soft (semi-solid, mostly solid), 3=runny (semi-solid, mostly fluid), 4=watery (all fluid) as described by Larson *et al.*, (1977). Data concerning behavioural traits were obtained from individual video records of each calf with 5 minute interval after feeding of milk.

The data were analysed statistically by suitable technique and by using a 2x2 completely randomised factorial experimental design.

Results and Discussion

Body weights of calves obtained various stages of the growth are presented in the table 1. Birth, weaning, 4 and 6 months weights were not different among AM and SM treatments. These data were in agreement with findings Kaya *et al.*, (2000). Weight of male calves at birth and 6 months of age were heavier by 4.7 and 12.6 kg respectively. Comparable results concerning influence of sex groups were

Table 1 : Body weights, daily weight gains, gains in body measurements and feed efficiency values of Holstein Friesian calves (LSM \pm SD)

	Milk Replacer			Sex		
	Acidified N=14	Sweet N=13	S	Male N=12	Female N=15	S
Weight at (kg);						
Birth	32.8 \pm 1.2	35.1 \pm 1.2		36.3 \pm 1.3	31.6 \pm 1.1	**
Weaning	43.9 \pm 1.0	43.5 \pm 1.1		42.5 \pm 1.2	44.9 \pm 1.0	
4 months of age	89.2 \pm 2.6	89.0 \pm 2.8		90.7 \pm 3.0	87.5 \pm 2.6	
6 months of age	136.1 \pm 3.9	138.6 \pm 4.1		143.7 \pm 4.5	131.1 \pm 3.9	*
Daily Weight Gain in (kg);						
Preweaning period	0.293 \pm 0.030	0.283 \pm 0.032		0.253 \pm 0.035	0.323 \pm 0.031	
Postweaning period	0.636 \pm 0.026	0.656 \pm 0.027		0.698 \pm 0.030	0.594 \pm 0.026	*
Overall	0.568 \pm 0.022	0.582 \pm 0.022		0.610 \pm 0.025	0.540 \pm 0.022	*
Gain in body measurements between birth and 6 months of age (cm);						
Body Length	32.5 \pm 0.9	32.2 \pm 1.0		32.0 \pm 1.1	32.7 \pm 1.1	
Height at withers	27.5 \pm 1.0	26.0 \pm 1.1		27.8 \pm 1.3	25.7 \pm 1.0	
Heart girth	53.9 \pm 5.5	45.8 \pm 5.8		53.3 \pm 6.4	46.5 \pm 5.6	
Chest depth	17.0 \pm 0.9	16.7 \pm 0.95		17.2 \pm 1.1	16.5 \pm 0.9	
Feed Efficiency :						
Preweaning period	2.11 \pm 0.19	2.24 \pm 0.20		2.37 \pm 0.22	1.98 \pm 0.19	
Postweaning period	4.79 \pm 0.23	4.58 \pm 0.25		4.19 \pm 0.27	5.18 \pm 0.24	**
Overall	4.48 \pm 0.20	4.33 \pm 0.21		4.05 \pm 0.24	4.77 \pm 0.20	*

S : Significance *: P<0.05 ** P<0.01

also reported by Turgut *et al.*, (1997) and Yanar *et al.*, (2000).

In preweaning and post weaning phase, daily weight gains of AM-fed calves did not significantly differ from those consumed SM. However, daily weight gains of male calves in postweaning period as well as during the whole rearing period were higher than those of female calves (Table 1). The results were in accordance with results of El-Ayouty *et al.*, (1991) and Frelich *et al.*, (1992). Gains in body measurements between birth and 6 months of age were not significantly influenced by feeding of AM. In other words, acidification of the whole milk did not results in a detrimental effect on the skeletal growth of the Holstein Friesian calves.

Efficiencies of feed conversion to body weight gain were not significantly different among treatments. The results were similar to those reported in other trials (Kaya *et al.*, 2000; El-Ayouty *et al.*, *loc. cit.*).

Faecal consistency scores and calf days with scours were significantly lower for calves fed AM compared with those offered SM (Table 2). The result could be attributed to the reducing of pH in the lower digestive tract of young calves fed AM as noted by Woodford *et al.*, (1987). The acid conditions promote growth of the *Lactobacillus* bacteria in the intestinal system while discouraging growth of *E. Coli* (Richard *et al.*, 1988). The results dealing with decrease in incidence of diarrhoea were in agreement with findings of Toll-Vera and Vera (1996).

Table 2 : Faecal consistency score, calf days with scours and behavioural traits of Holstein Friesian calves (LSM \pm SD)

	Milk Replacer			Sex		S
	Acidified N=14	Sweet N=13	S	Male N=12	Female N=15	
Average faecal consistency scores²:						
4 to 17 d	1.36 \pm 0.08	1.86 \pm 0.08	**	1.69 \pm 0.08	1.53 \pm 0.08	
18 to 35 d	1.32 \pm 0.06	1.62 \pm 0.06	**	1.53 \pm 0.06	1.41 \pm 0.06	
4 to 35 d	1.34 \pm 0.06	1.74 \pm 0.06	**	1.61 \pm 0.06	1.46 \pm 0.06	
Calf days with scours (%)¹:						
4 to 17 d	0.05 \pm 2.98	28.94 \pm 3.13	**	18.48 \pm 3.24	10.4 \pm 62.88	
18 to 35 d	2.38 \pm 2.54	13.15 \pm 2.67	**	9.23 \pm 2.76	6.3 \pm 12.46	
4 to 35 d	1.34 \pm 2.03	20.06 \pm 2.13	**	13.28 \pm 2.20	8.12 \pm 1.96	
Behavioural Traits :						
Frequency of daily milk intake from open pail						
	2.53 \pm 0.15	1.66 \pm 0.16	**	2.24 \pm 0.17	1.95 \pm 0.15	
Time spent for the milk intake (min.)						
	2.56 \pm 0.25	2.28 \pm 0.26		2.51 \pm 0.27	2.34 \pm 0.34	
Number of days needed to teach the calf how to drink milk from open pail without help						
	5.50 \pm 1.48	5.81 \pm 1.53		6.52 \pm 1.58	4.78 \pm 1.41	
Time spent for licking the walls of the hutch						
	1.63 \pm 0.21	1.69 \pm 0.2		1.87 \pm 0.23	1.45 \pm 0.21	
Time spent for watching around						
	1.74 \pm 0.24	2.07 \pm 0.25		1.98 \pm 0.26	1.83 \pm 0.24	

S : Significance * : P<0.01

*1 = normal (soft-solid consistency, no fluid), 2= soft (semi-solid, mostly solid),

1 Percent of calf days with faecal consistency score is equal to or greater than 3.

Frequency of milk intake from open pail was significantly ($P<0.01$) affected by AM feeding. The calves fed AM drank frequent and small portions compared with those consumed SM (Table 2). The frequency of the AM and SM intakes ($r=-0.53$ and $r=-0.48$) were significantly ($P<0.01$) associated with days in the preweaning period. Total time needed to feed all of the AM and SM ($r=-0.69$ and $r=-0.68$) were significantly ($P<0.01$) correlated with days of the preweaning phase. The results could be explained that as long as days of milk feeding period advanced, the young calves accustomed to sour taste of the AM. The finding was in accordance with result of Richards *et al.*, (1988) who reported that as the calves got older, they

spent less time for drinking milk.

Acidic taste of the AM did not cause adverse effect on the number of days needed for the calves to learn drinking milk from open pail, and it took about 6 days for training of drinking milk from bucket.

Summary

Holstein Friesian calves reared in a new calf feeding program were assigned to diets of acidified (AM) or sweet (regular) milk (SM) to measure the effects of these diets on growth, health and feed efficiency. Calves were fed AM or SM at 8% of their birth weight during 5 weeks. Two kinds of calf starters (18.5% and 17.6% crude protein) were offered to calves between

birth and 4 months of ages and between 4 and 6 months of ages respectively. Weights at weaning, 4 and 6 months of ages and weight gains between various stages of the growth were not significantly affected by feeding of AM or SM. Gains in body measurements and feed efficiency values were also not significantly different among treatment groups. However, faecal consistency score and calf days with scours were significantly lower for calves fed AM compared with those consumed SM. Only frequency of milk intake among behavioural traits was significantly influenced by acidification of milk. Overall results of the study suggested that feeding of AM resulted in beneficial effect on the lowering incidence of diarrhoea in young calves without causing an adverse influence on the growth and feed efficiency parameters.

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