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GROWTH CHARACTERISTICS AND FEED EFFICIENCIES OF THE EARLY WEANED BROWN-SWISS, HOLSTEIN-FRIESIAN AND SIMMENTAL CALVES REARED IN TURKEY¹

Growth characteristics, body weight gain and feed efficiencies of early weaned Holstein-Friesian (HF), Brown-Swiss (BS), and Simmental (S) calves reared in the harsh environment of the eastern region of Turkey were investigated in this study. Thirty six calves were weaned at 35 days of age. The birth and weaning weight for BS were 37.7 and 49.6 kg, for HF were 38.5, 52.2 kg, for S were 39.2, 46.9 kg respectively. The four and 6 month weights were significantly ($P < 0.05$) influenced by the breed groups. Male calves were significantly heavier ($P < 0.01$) than females at weaning and significantly heavier ($P < 0.05$) at birth, 4 and 6 months of age. Daily weight gain was also influenced by the breed groups ($P < 0.05$). However, sex of calf significantly influenced ($P < 0.05$) daily gains from birth to weaning only. Before and after weaning, feed efficiency ratios were affected by genotype groups ($P < 0.05$), while sex did not influence feed efficiency ratio.

INTRODUCTION

European dairy cattle have been imported into Turkey in order to increase milk and beef production since 1950's. In the beginning, the Brown-Swiss (BS) breed was brought to the eastern region of Turkey since this area has high elevation and mountains, while Holstein-Friesian (HF) breed was distributed to the western portion of Turkey which is a lower elevated region and has a relatively warm climate. However, in recent years, the number of HF in the eastern region of Turkey has been increased by bringing the HF breed into the area by the dairy farmers. Besides HF, new imported Simmental (S) cattle have also been distributed to the dairy farmers by agricultural development projects.

The calves of the BS, S, and HF in this area are generally weaned around 4-6 months of age.

It is well known that the cost of feeding dairy calves is one of the most important factors influenc-

ing profit of the dairy farming business. Because of this, many studies about early weaning and its economic aspect were carried out utilizing different breeds (Morris et al. 1984; Winter 1985; Oppedal 1986; Saika et al. 1988).

However, there is lack of information about the effect of early weaning on the BS, HF, S calves raised under the harsh environment of the eastern region of Turkey. This study was undertaken to determine comparative growth characteristic, daily weight gain, and feed efficiency of the early weaned BS, HF, and S calves raised in the environmental conditions of the eastern region of Turkey.

MATERIAL AND METHODS

Thirty-six calves from three different breeds (12 BS, 12 HF and 12 S) were used in this research. The calves were allocated to three groups according to their breeds, and fed individually. Starter I was used before 4 months of age and starter II was used after 4 months of age. The composition of starters used in this research is given in Table 1. The calves were born in late fall and winter seasons. The weather conditions in Eastern Turkey during the winter season are generally very cold and snowy. The temperature ranges from 0 to -20°C but the humidity is low.

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TABLE 1
Chemical Composition of Diets

| Ingredients | Starter I | Starter II |
|-----------------------|-------------|------------|
| | % by Weight | |
| Barley grain | 30.0 | 36.0 |
| Wheat bran | 20.0 | 24.5 |
| Wheat grain | 10.0 | 9.0 |
| Molasses | 5.7 | 7.3 |
| Cotton meal | 30.0 | 19.0 |
| Salt | 1.0 | 1.0 |
| Limestone | 3.0 | 3.0 |
| Vitamin premix | 0.2 | 0.1 |
| Trace mineral mixture | 0.1 | 0.1 |

The calves were allowed to suckle the milk and received colostrum for first two days. Then, they were fed with whole milk using milk-buckets. The amount of milk given to the calves was 8% of their birth weight as suggested by Reddy et al. (1985). This amount of milk calculated for each calf was kept constant during the milk feeding period. The calves were weaned at 5 weeks of age. After weaning, *ad libitum* feeding was practiced.

All calves were housed in the same building which contains individual pens. The left over feed was weighed and recorded daily.

Data obtained from the study were analyzed statistically by using a 3 x 2 completely randomized factorial experimental design. The analysis were carried out by using the SAS statistics package program (SAS, 1985).

RESULTS AND DISCUSSION

Body weight

The weights at birth, weaning, 4 and 6 months of age are given in Table 2. The birth weight and standard deviations of the BS, HF, and S calves were 37.7 ± 2.5 , 38.5 ± 1.9 , and 39.2 ± 2.1 kg respectively. There was no significant difference among the breed group with respects to birth weight. However, birth weight of the male calves was significantly ($P < 0.05$) higher than that of the females. The birth weight of

male and female calves born in Eastern Turkey were 40.8 ± 1.6 , and 36.0 ± 1.8 kg respectively. The results of the birth weight of BS, HF and S calves are in agreement with Tuzemen (1983), Ugarte (1976) but higher than reported by Egbunike and Togun (1981).

The weaning weight was not significantly influenced by the breed groups. The weaning weight of BS, HF and S were 49.6 ± 6.1 , 52.2 ± 1.8 , and 46.9 ± 2.4 kg respectively. The weaning weight under the cold environmental conditions of the eastern region of Turkey was influenced significantly ($P < 0.01$) by sex. The weaning weight of the male calves was higher than that of the female calves. These results are in agreement with the findings of Tuzemen (1983).

In relation to the 4 and 6 months of age weights, the HF had the heaviest weight compared to the other groups. Weights at four months were 93.2 ± 5.7 , 105.1 ± 3.6 , and 93.0 ± 4.6 kg respectively for BS, HF, and S calves. The four months weight of HF calves was highest among the genotypic groups ($P < 0.05$). These results are in accordance with the findings of Barradas et al. (1981). The male calves reared under this environment had the heaviest 4 and 6 months of weight ($P < 0.05$).

Gain in the body weight

The overall daily weight gains and standard deviations (Table 2) from birth to six months for BS, HF, and S calves were 0.521 ± 0.02 , 0.58 ± 0.03 , 0.48 ± 0.04 kg respectively. The largest weight gain was observed in the HF group. The differences among the breed groups were significant ($P < 0.05$). The significant difference among the genotype groups for weight gain is in agreement with results of Barradas et al. (1981). However, sex of calf did not influence weight gain from birth to six months of age.

The average daily weight gains from birth to weaning for BS, HF, and S calves were 0.34 ± 0.02 , 0.39 ± 0.04 , and 0.22 ± 0.03 kg, and gains in weight for BS and HF calves were significantly higher ($P < 0.05$) than S calves.

The daily weight gain from weaning to six months for HF group was significantly higher ($P <$

Feed Efficiencies

TABLE 2
Performance of Brown-Swiss, Holstein and Simmental Calves

| | Breed groups | | | | Sex | | |
|------------------------------------------------|--------------------------|--------------------------|--------------------------|----|--------------------------|--------------------------|----|
| | Brow Swiss | Holstein Friesian | Simmental | S | Male | Female | S |
| | n = 12 | n = 12 | n = 12 | | n = 18 | n = 18 | |
| Weights (Kg) at: | | | | | | | |
| Birth | 37.7 ± 2.5 | 38.5 ± 1.9 | 39.2 ± 2.1 | NS | 40.8 ± 1.6 ^a | 36.0 ± 8 ^b | * |
| Weaning | 49.6 ± 6.1 | 52.2 ± 1.8 | 46.9 ± 2.4 | NS | 53.8 ± 1.6 ^a | 45.2 ± 1.8 ^b | ** |
| 4 Month | 93.2 ± 5.7 ^b | 105.1 ± 3.6 ^a | 93.9 ± 4.6 ^b | * | 102.2 ± 4.1 ^a | 92.7 ± 4.2 ^b | * |
| 6 Month | 131.0 ± 6.1 ^b | 143.2 ± 5.3 ^a | 126.3 ± 6.7 ^b | * | 129.0 ± 4.9 ^a | 138.0 ± 5.0 ^b | * |
| Average Daily Weight Gain (Kg) between : | | | | | | | |
| Birth to Weaning | 0.34 ± 0.02 ^a | 0.39 ± 0.04 ^a | 0.22 ± 0.03 ^b | * | 0.37 ± 0.04 ^a | 0.26 ± 0.03 ^b | * |
| Weaning to 6 Month | 0.56 ± 0.02 ^a | 0.63 ± 0.03 ^b | 0.55 ± 0.05 ^a | * | 0.58 ± 0.03 | 0.58 ± 0.03 | NS |
| Birth to 6 month | 0.51 ± 0.02 ^a | 0.58 ± 0.03 ^b | 0.48 ± 0.04 ^b | * | 0.56 ± 0.03 | 0.54 ± 0.04 | NS |

a, b Means with different superscripts within a row and within a group are statistically different
S : Significant, NS : Non significant * : P < 0.05, ** : P < 0.01

0.05) than the other breed groups. Similarly findings were reported by Ugarte (1976).

Feed consumption and feed efficiency

An average of 105.6 ± 5.7, 108.0 ± 5.0, and 109.5 ± 5.2 kg of whole milk were fed to BS, HF, and S calves respectively throughout the study. Differences among the groups in milk consumption were not significant (P > 0.05). However, male calves consumed 11.5 kg more milk than female calves (P < 0.05). The amount of milk consumed by male and female calves were 114.3 ± 1.7, and 102.8 ± 1.0 kg respectively.

Feed efficiency ratios from birth to weaning for BS and HF calves were significantly lower than S calves (P < 0.05). Total kg of dry matter consumed per kg weight gains for BS, HF, and S calves were 4.48 ± 0.8, 2.92 ± 0.9, and 5.6 ± 0.8 respectively. However, sex of calf did not influence feed efficiency ratio, and the ratio for female and male calves were 3.99 ± 1.5, 4.56 ± 1.1 respectively.

Feed efficiency ratios from weaning to six months for BS, HF, and S calves were 4.10 ± 0.6, 3.35 ± 0.3, and 3.2 ± 0.5 respectively. The differences were

significant (P > 0.05). On the other hand, the influence of the sex on the feed efficiency ratios after weaning was not significantly different (P > 0.05). The feed efficiency ratios for male and female calves were 4.56 ± 1.0, and 3.65 ± 1.2 respectively.

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