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Effect of Breed and Live Weight on Milk Fat Depression in Sheep

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This research was aimed to investigate the effect of breed and live weight on milk fat depression in early lactation. In the experiment, 12 Karayaka (K) and 12 Gicik (G) ewes and 12 light (L) and 12 heavy (H) ewes (6 K and 6 G for both live weight groups) were used. Ewes were fed high-energy concentrate diet (139 g crude protein and 10.1 metabolizable energy MJ/d). No differences were found in the milk fat levels between the two non-dairy breeds during experiment. The severity of milk fat depression was similar for both non-dairy breed throughout the experiment. The milk fat rate was lower for light ewes in first ($p < 0.04$) and second weeks ($p < 0.02$). L sheep were shown to be more sensitive to milk fat depression than H ones for these weeks. H and L sheep had similar results for levels of milk fat depression for last two weeks. There were statistically no significant differences between the genotypes or live weight groups for protein rates during weeks.

Key Words: Milk fat depression, Sheep, Breed, Live weight.

INTRODUCTION

Feed intake with a high proportion of concentrate can result in decreased pH in the rumen leading to decrease of milk fat percentage (milk fat depression)[1]. Normal milk fat percentages also reflect good rumen and animal health. Grohn *et al.*[2] reported that decreased pH in the rumen mostly occurs in early lactation period because of high energy intake. Development of lambs depends on maternal milk during this period (especially, during the first four weeks). The understanding of the effective factors on milk components is a major importance to the sheep industry because the milk and components of it influence the rearing of offspring. Although the exact mechanism is not known, one of the proposed theories is that milk fat synthesis is inhibited because of metabolic changes in the rumen[3]. Although

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much is known about causal relationships between composition of the diet and milk fat depression, but little is known about differences in milk fat depression between genotypes or live weights. This research was aimed to investigate the effect of breed and live weight on milk fat depression in early lactation period. This is the first detailed study on milk fat depression in non-dairy sheep for this period.

EXPERIMENTAL

In the experiment, 12 Karayaka (K) and 12 Gicik (G) ewes and 12 light (L) and 12 heavy (H) ewes (6 K and 6 G for both live weight groups) were used. K and G ewes had similar weights (55.1 ± 1.3 *vs.* 53.4 ± 1.9, kg). H animals had higher ($p < 0.05$) initial weight than the L animals (56.7 ± 1.6 *vs.* 51.8 ± 0.9, kg). Ewes were fed high-energy concentrate diet (139 g crude protein and 10.1 metabolizable energy MJ/d). To determine the milk composition, samples were obtained by hand milking on last 3 d each week. The samples were composites of milk collected at consecutive morning and afternoon and were collected into plastic vials preserved with microtabs, stored at 4 ºC until analyzed for determination of parameters. The total protein of the milk was determined by Kjeldahl method (N × 6.38). The milk fat was determined by Roese-Gottlieb Method[4].

All the data are indicated as mean ± SEM. Comparisons were done by using Independent samples t-test with help of the SPSS[5].

RESULTS AND DISCUSSION

Milk fat levels in both breed during experiment were lower than normal values (6-9 %)[6] as expected from previous knowledge on intake of high energy (Fig. 1). No differences were found in the milk fat levels between the two non-dairy breeds during weeks. Non-dairy breeds characterized by small cistern volume and a low cistern milk fraction[7] showed the similar reduction in milk fat levels. The severity of milk fat depression was similar for both groups throughout the experiment (Fig. 1).

The milk fat rates were lower ($p < 0.05$) for light ewes in first (4.7 ± 0.2 *vs.* 5.3 ± 0.1) and second (4.5 ± 0.2 *vs.* 5.2 ± 0.2) weeks (Fig. 2). There was a main effect of high energy intake for L animals at these weeks (Fig. 2). Milk fat rates of H and L sheep were found lower than normal values (6-9 %)[6]. The reason of decreasing in milk fat was high energy of diet. Samuelsson[8] mentioned that feeding cows with high energy concentrate generally have a reduced fat content in the milk whereas cows with low energy intake have an increased fat content. Feeding diets with a high proportion of concentrate to animals can result in decreased pH in the rumen[9,10]. Properly feeding concentrates primarily involves maintaining proper forage to concentrate ratios and non-fiber carbohydrate levels. Non-fiber carbohydrates include

starch, sugars and pectin and high levels of them in diet lead to milk fat depression. H and L ewes had similar results for levels of milk fat depression for last two weeks (Fig. 2). However, L sheep were shown to be more sensitive to milk fat depression than H ones for first two weeks. Characteristically, dam in first weeks synthesizes and secretes more energy (in her milk) than she can consume in feed[11]. She can not eat enough to meet her energy need in early weeks postpartum, body fat reserves are necessary to allow her to mobilize energy for high production in these weeks[12]. Hence, L ewes may not have sufficient reserves for maximum milk and fat production in the first weeks postpartum. As a consequence, L animals experience a more severe negative energy balance, which is associated with an increased risk of metabolic disorders and milk fat syndrome[13].

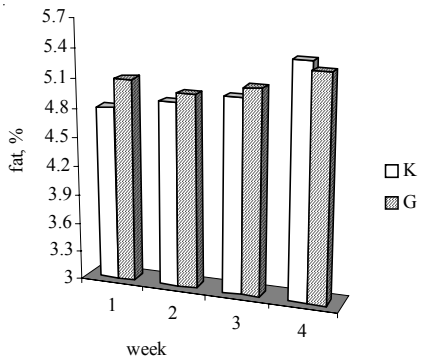

Fig. 1. Milk fat rates of K and G ewes

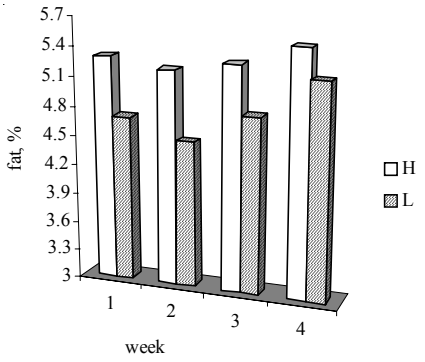

Fig. 2. Milk fat rates of H and L ewes

There were statistically no significant differences between the genotypes or live weight groups for protein rates during weeks (Figs. 3 and 4). Protein rates of groups in this study are compatible with normal values for sheep studied by Koneko and Cornelius[6] and are consistent with other observations in mammals indicating that the mammary gland is capable of producing milk with similar protein concentration regardless of differences in environment or management[14].

According to the present results, the amount of concentrate diet per feeding should be limited to avoid decreased pH in the rumen and milk fat depression. Prevention of low pH in the rumen to increase milk yield with high levels of milk fat is obligatory for achieving the economic benefits. A decrease in milk fat percentage can directly lead to financial loss if the milk price depends on milk fat percentage. Proper feeding management of the lactating animal can improve the economy of production and provide for a healthier animal and optimum growth for lambs. Although the knowledge about the lactation physiology is well for dairy sheep, but the same thing

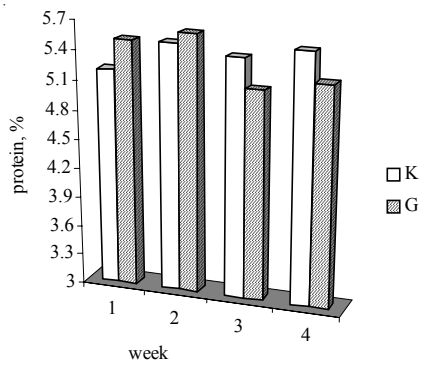

Fig. 3. Milk protein rates of K and G ewes

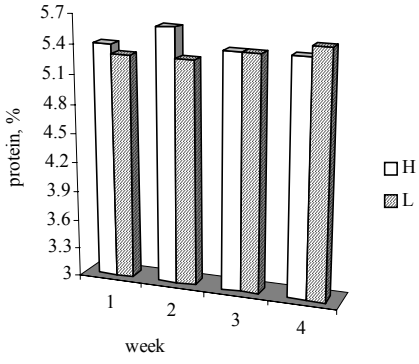

Fig. 4. Milk protein rates of H and L ewes

can not be said for non-dairy sheep. Jordan[15] reported the problems encountered in attempting to get non-dairy ewes to alter milk composition when stimulated with increases in nutrient intake during a whole lactation period. But there were not enough reports about the reason of this problem for non-dairy sheep in his studies. Therefore, further research is needed to investigate on basic lactation knowledge of non-dairy sheep.

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