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The Milk Biochemical Parameters Having Economic Importance in Non-Dairy Acidosis Animals

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This research was aimed to investigate the effect of acidosis on economic and non-economic biochemical components of milk in early lactation period. In the experiment, 10 acidosis and 10 healthy Karayaka ewes were used. The milk fat rate (economic) was lower for acidosis animals. Protein rates (economic) of milks were similar for both groups. There were statistically no significant differences between the groups for non-economic parameters (urea-N, Ca, P). There was found positive correlation between milk urea and protein ($r = 0.52$; $p < 0.05$), but there were no significant correlations among other economic and non-economic milk parameters. Prevention of acidosis and suitable rumen environment to increase production of milk with maximum levels of milk fat is essential for achieving the economic benefits.

Key Words: Acidosis, Economic, Milk parameters.

INTRODUCTION

Biochemical parameters from animal products have got favourable economic benefits[1]. Milk protein and fat has economic value because higher protein and fat leads to higher cheese yields[2]. They are therefore called economic parameters, but some parameters such as calcium, phosphorous and urea-N have not high importance in production. The milk biochemical parameters having economic importance impact product development and international trade in milk components[3]. Recently, dairy producers focus on maximizing economic biochemical parameters such as milk fat and protein. Current milk pricing formulas emphasize milk fat, giving maintenance of normal milk fat test an economic advantage. Normal milk fat percentages also reflect good rumen and animal health. Generally, diets with high energy that cause low milk fat test also cause sore feet (laminitis), acidosis and feed intake problems. Feeding diets with a high proportion of concentrate and low fiber to dairy cattle can result in decreased pH in the rumen[4-6] and in some cases to (subclinical) acidosis[4,6]. Grohn *et al.*[7]

reported that acidosis mostly occurs in early lactation. This research was aimed to investigate the effect of acidosis on economic and non-economic biochemical components of milk in early lactation period. This is the first detailed study on acidosis sheep in this period.

EXPERIMENTAL

10 Acidosis and 10 healthy Karayaka ewes were used. To determine milk composition, samples were obtained by hand milking. Acidosis animals were fed concentrates with high energy (135 g crude protein and 18.7 metabolisable energy MJ/d) but healthy animals were fed with standard ration and roughage. Milk samples were composites of milk collected at consecutive morning and afternoon. The samples were collected into plastic vials preserved with microtabs, stored 4ºC until analysed 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[8]. The urea-N was determined by an enzymatic (urease and glutamate dehydrogenase) colourimetric method (Boehringer- Mannheim). The milk calcium and phosphorus were analysed by auto-analyzer.

All of the data are indicated as mean ± SEM. Comparisons were done by using Duncan test with help of the SPSS. Correlations between all traits were obtained using Person correlation coefficients[9].

RESULTS AND DISCUSSION

Table-1 presents significant differences between acidosis and healthy animals with respect to milk fat rate. The milk fat rate was lower for acidosis animals. Protein rates of milks were similar for both groups. Milk protein rates of acidosis and healthy sheep in this study are consistent with normal values for sheep announced by Koneko and Cornelius[10]. Milk fat rate of acidosis sheep was found lower than normal values (6-9 %)[10]. The reason of decreasing in milk fat was high energy of diet. Samuelsson[11] mentioned that cows a high plane of nutrition generally have a reduced fat content in the milk whereas cows with low energy intake have an increased fat content. Barley rate was higher in diet in this study to meet energy needs of sheep in early lactation period. It is concluded that low milk fat was affected by high energy intakes and high rate of barley (fermentable starch) in diet. Properly feeding concentrates primarily involves maintaining proper forage to concentrate ratios and non-fiber carbohydrate levels. Non-fiber carbohydrates include starch, sugars and pectin. Feeding proper non-fiber carbohydrate levels can improve milk fat test, while overfeeding with high energy diets leads to milk fat depression. The milk fat rates of acidosis animals were low for economic cheese production because, milk must contain a fat percentage at least 3.2 % for economic cheese.

TABLE-1
ECONOMIC PARAMETERS OF MILK

Parameters (%)	Animals		
	Acidosis	Healthy	P
Fat	2.14 ± 0.84	5.32 ± 0.20	0.014
Protein	5.11 ± 0.16	5.91 ± 0.16	0.524

The reason of low fat level in acidosis animals can be explained as the increased insulin release which occurs when high starchy concentrate diets are fed, preferentially channels nutrients to adipose tissue, resulting in a shortage of nutrients at the mammary gland and thus milk fat depression. This theory may be questioned because injections of insulin in some cases did not result in a lower milk fat content[12].

As shown in Table-2, there were statistically no significant differences between the groups for non-economic parameters. Non-economic parameters of acidosis and healthy sheep in this study are consistent with normal values for sheep announced by Koneko and Cornelius[10].

TABLE-2
NON-ECONOMIC PARAMETERS OF MILK

Parameters	Animals		
	Acidosis	Healthy	P
Calcium (mg/100 g)	206.11 ± 6.15	212.70 ± 4.46	0.659
Phosphorus (mg/100 g)	119.51 ± 5.05	123.6 ± 2.87	0.701
Urea-N (mg/dL)	8.50 ± 0.17	9.01 ± 0.70	0.677

It was found positive correlation between milk urea and protein ($r = 0.52$; $p < 0.05$), but there were no significant correlations among other economic and non-economic milk parameters (Table-3). According to Velazquez[13], milk urea concentrations were positively correlated with milk protein in dairy cattle.

TABLE-3
CORRELATION COEFFICIENTS BETWEEN EXPERIMENTAL DATA

		Fat (%)	Protein (%)
Non-economic	Calcium (mg/100 g)	NS	NS
	Phosphorus (mg/100 g)	NS	NS
	Urea-N (mg/dL)	NS	0.52*

*$p < 0.05$; NS= Not Significant.

According to chemical findings from this study, the amount of grain per feeding should be limited to avoid rumen acidosis, off-feed problems and reduced fat content of milk. Otherwise, alterations of the rumen environment of animal can lead to costly health and economic problems. However, a decrease in milk fat percentage can directly lead to financial loss if the milk price depends on milk fat percentage. In addition, it has been shown that a strong decrease in milk fat percentage in early lactation is related to a larger and longer lasting negative energy balance. Proper feeding management of the lactating animal can improve the economy of production and provide for a healthier animal. Suitable feeding regimes to increase production of milk with maximum levels of milk fat and protein are essential for achieving these benefits.

The changes in milk components of acidosis animals result in different economic values of milk and milk products. Prevention of acidosis to increase production of milk with maximum levels of milk fat is essential for achieving the economic benefits. Therefore, further researches are needed to improve the interpretations about lactation biology in acidosis non-dairy sheep considering the reasons for lower milk fat and to determine the effect of biochemical parameters having economic importance on productivity of milk and its products.

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