

THE PLASMA CHOLESTEROL LEVELS OF EWES DURING PREPARTAL AND POSTPARTAL PERIODS *

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Doğum öncesi ve sonrası dönemde koyunların plazma kolesterol düzeyleri.

ÖZET

Koyunlardan kan numuneleri, gebelikte ve doğumdan sonraki 2. haftaya kadar alınmıştır. Kolesterol düzeyleri 426 numunede saptanmış ve değerlendirilmiştir.

Bu çalışmanın amacı, yukarıda bildirilen periyotlarda kolesterol düzeylerindeki değişimleri saptamak ve gebe olmayan, tek ve çok yavrulu koyunlar için elde edilen sonuçları karşılaştırmaktır.

Doğumda ve laktasyonun ilk dönemindeki plazma kolesterol düzeyleri, gebelikteki düzeylerden önemli ölçüde daha düşük bulunmuştur.

Elde edilen sonuçlara göre, gebelik ve laktasyonun ilk dönemindeki Türkgeldi koyunları için referans kolesterol değerlerini önermekteyiz.

ANAHTAR KELİMELER: Plazma kolesterol, koyun, gebelik, erken laktasyon.

SUMMARY

Blood samples were taken from ewes during pregnancy and until two weeks after lambing. Cholesterol levels were determined and evaluated in 426 samples.

The aim of this study was to estimate the variations of cholesterol levels in the periods mentioned above and to compare the results of nonpregnant and single or multiple pregnant ewes. Significant differences were detected between multiple pregnant and other ewes (nonpregnant and single pregnant) ($P<0.05$).

The plasma cholesterol levels at lambing and in early lactation were significantly lower than the levels in pregnancy.

According to our results, we recommend reference values of cholesterol levels for Türkgeldi ewes during pregnancy and early lactation.

KEY WORDS: Plasma cholesterol, ewes, pregnant, early lactation.

INTRODUCTION

Cholesterol is synthesized in the tissues of ruminants like other species. Practically, it is synthesized in whole body cells. It is a component of cell membranes where it lies between the fatty acid "arms" of the lipid molecules and increases the rigidity of the membrane structure. Excess cholesterol is excreted in the bile, partly as bile acids and bile salts, and partly as unchanged cholesterol. Cholesterol is produced by the cells of jejunum, liver and skin at the rate of 97 % (2). In the blood of ruminants, cholesterol is generally in esterified form at the rate of 60-80 % and the rest is in free form. Cholesterol is esterified by binding long chained and unsaturated fatty acids (3). However it is usually present in free form in milk (17).

Vitamin D in skin (14) and progesterone in endocrine organs which contain enzyme systems such as adrenal glands, ovarium and testis are derived from cholesterol.

Previously, serum cholesterol had been used as an index of thyroid function because hypothyroidism is generally associated with an elevation in serum cholesterol. However, serum cholesterol varies with many factors unrelated to thyroid activity (8). Plasma cholesterol levels are changed by different factors such as ingredient of ration, age, sex, breed, season, pregnancy, lactation, liver and biliary tractus diseases in ruminants (1, 4, 9, 12, 13). Graff et al. (5) reported that the serum cholesterol levels are also affected by genetic factors in ruminants.

The aim of this study was to determine changes in plasma cholesterol levels during pregnancy, parturition and early lactation and to compare the plasma cholesterol levels between nonpregnant and the single or multiple pregnant Türkgeldi ewes.

MATERIALS and METHODS

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Animals; Thirty mature, six months aged and synchronized Türkgeldi ewes (Eastfries x Kıvrıkcık) were used. They were fed with ad libitum hay and individually 600 g/day concentrated supplements (14 % crude protein, 600 starch units energy). Water was given to ewes ad libitum.

All animals were apparently healthy and free from internal and external parasites. They were bred under the same environmental and nutritional conditions. The pregnancies of animals were assigned with progesterone analysis. Nonpregnant eight ewes were control group. Single pregnant ewes ($n=10$) were group I, and multiple pregnant ewes ($n=12$) were group II.

Blood Sampling and Analysis. Uncoagulated blood samples were collected from 30 ewes during pregnancy at and after parturition (fortnightly during pregnancy, two days before parturition, at parturition and the four

Table 1. The mean concentrations of plasma cholesterol in Türkgeldi ewes before and after parturition (mg/dl).

Time	Mean (mg/dl)	
	X	SE
Pre Partum		
- 114 days	71.42	1.60 a
- 100 days	71.26	2.20 a
- 86 days	71.83	2.17 a
- 72 days	70.82	2.63 a
- 58 days	68.50	2.41 a
- 44 days	69.66	2.37 a
- 30 days	68.21	2.65 a
- 16 days	68.97	2.09 a
- 2 days	70.03	3.30 a
Parturition		
0	62.96	2.96 b
Post Partum		
+ 4 days	64.15	2.53 b
+ 15 days	63.08	2.59 b

a,b Values were significantly different, as assessed by paired t test: $P<0.05$.

Table 2. The mean concentrations of plasma cholesterol in Türkgeldi ewes (mg/dl).

	n	x	SE
Nonpregnant (control)	8	67.47	0.91 a
Single pregnant (group I)	10	66.76	1.29 a
Multiple pregnant (group II)	12	71.21	0.82 b

a,b Values were significantly different, as assessed by paired t test: $p < 0.05$.

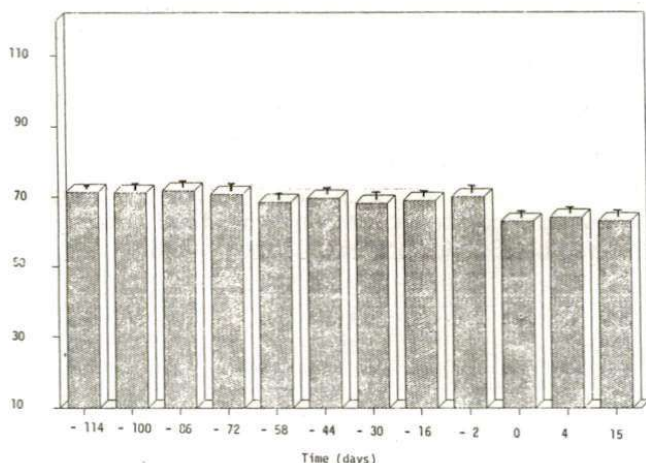


Figure 1. The mean concentrations of plasma cholesterol in Türkgeldi ewes before and after parturition.

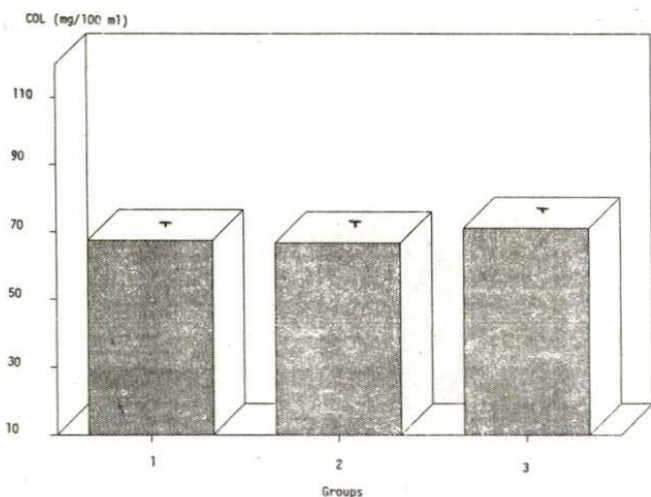


Figure 2. The mean concentrations of plasma cholesterol in Türkgeldi ewes.

and fifteen days after parturition). During the investigation period, the samples were obtained from each ewe by jugular venipuncture. Blood samples were collected in separation tubes. Plasma was separated by centrifugation at 3000 rpm for 15 minutes. Plasma was subsequently decanted into plastic vials and stored at -20°C until analysed.

The cholesterol levels were determined enzymatically by the CHOD-PAP method in Gem Profiler Autoanalyser

RESULTS and DISCUSSION

The plasma cholesterol levels during pregnancy, parturition and early lactation are shown in Table 1 and Figure 1 and those of nonpregnant, single and multiple pregnant ewes in Table 2 and Figure 2.

The changes in the mean plasma cholesterol concentrations during pregnancy were not significantly different. The mean level at pregnancy was determined as 69.4 mg/dl. This level fell at parturition ($P < 0.05$), and it remained low in early lactation. The mean cholesterol levels were not different between pregnant and nonpregnant ewes.

The cholesterol in circulating blood is physiologically significant for luteal function of ruminants because the rising serum cholesterol values are accounted for the increasing progesterone concentrations during the luteal phase (16). Since the cholesterol in circulating blood prevents de novo synthesis of cholesterol in ruminants as in many species, it is probably preferred as substrate to the newly synthesized cholesterol (6,15).

Pate and Condon (11), reported that prostaglandin $F_{2\alpha}$ inhibits the cholesterol synthesis and the progesterone synthesis from cholesterol. The decreases in plasma cholesterol levels at parturition may firstly be due to physiological stress and secondly to the prevention of the progesterone synthesis from cholesterol and the cholesterol synthesis by prostaglandin $F_{2\alpha}$. The plasma cholesterol level in early lactation may decrease because of the cholesterol used in colostrum.

At present study, the mean plasma cholesterol levels as seen in Table 2 were determined in nonpregnant ewes as 67.47 mg/dl and in multiple pregnant ewes as 71.21 mg/dl. In accordance with the results of statistical analyses, although we could not find the significant differences in plasma cholesterol levels between nonpregnant and single pregnant ewes, the cholesterol levels of nonpregnant ewes were found significantly lower than multiple pregnant ewes ($P < 0.05$).

In addition, the plasma cholesterol levels of multiple pregnant ewes were found higher than single pregnant ewes ($P < 0.05$).

In 1991, Shetaawi and Ross determined the level of plasma cholesterol as 62.0 mg/dl in pregnant ewes fed with concentrated supplements, and Halford and Galyean (7) determined the plasma cholesterol level as 67.0 mg/dl in the ewes within the first reproductive stage. These results showed a good correlation with the present study results.

Shetaawi and Ross (12) reported that the plasma cholesterol levels of ewes fed with concentrated supplements were insignificantly lower in lactation than in pregnancy.

The higher plasma cholesterol concentrations of multiple pregnant ewes may be attributed to the fact that fat mobilizes and consequently synthesis and concentrations of progesterone in these ewes increase (10).

CONCLUSION

The results show the plasma cholesterol levels of Türkgeldi ewes fed with concentrated supplements during various reproductive stages.

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