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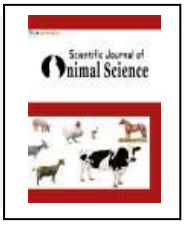

Original article

Some blood biochemical parameters of meriz does during different physiological status

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ABSTRACT

Eleven clinically healthy Meriz goat, 3 ± 0.5 years old, and 35.30±0.6 kg in weight were used to investigate the effect of physiological status on blood serum concentration of total protein (TP), albumin, glucose, triglyceride, cholesterol, alanine aminotransferase (ALT) and aspartate aminotransferase (AST). Results revealed that the physiological status have a significant (P≤0.05) effect on total protein, triglyceride, cholesterol and AST. Yet, the lowest and highest values of each of total protein (5.25±0.16, 5.91±0.22 g/dl), triglyceride (0.68±0.06, 1.32±0.16 mg/dl) was recorded during pregnancy and dry periods, respectively. Cholesterol was at its lowest (60.38±2.03 mg/dl) and highest (71.65±2.34 mg/dl) values during lactation and pregnancy periods. The highest activity of AST (151.47±6.78 IU/L) was recorded at dry period. Albumin, Glucose and ALT was not affected significantly by different physiological status of does.

1. Introduction

Meriz goats are found in Kurdistan region and raised primarily for their fine hair. They are smaller in size than the native black goats, some of them are white, red, or brown hair and some are a mixture of these colors, and adapted to survive under adverse conditions of feed limitations (Alkass and Juma, 2005).

It is known that blood metabolic profile is the most common indicator in assessing nutritional status and animal health (Herdt et al., 2000; Antunovic et al., 2009). Moreover, significant variation in the blood metabolic profiles exists depending on many factors including genetic and non-genetic factors. One of the most important factors is the physiological status of an animal which affects the concentration of these metabolic indicators in the blood (Antunovic et al., 2002; Roubies et al., 2006).

In sheep and goats during late pregnancy, blood serum lipids profile is characterized by increased concentration of total cholesterol and triglycerides (Schlumbohm et al. 1997) due to the diminished responsiveness of target tissues towards insulin that, together with an increased mobilization of fatty acids from adipose tissue make available new sources for foetal growth (Iriadam, 2007). Moreover, during lactation, the mammary gland secretory cells utilize 80% of the blood circulating metabolites for milk synthesis, depending on the speed of infiltration of precursors of milk compounds (i.e. free amino acids, glucose and fatty acids) (Piccione et al. 2009). In lactating goats an increasing total protein level of serum was observed with the progress of lactation (Krajničáková et al. 2003) due to the catabolism of protein for milk synthesis.

Since information on blood serum biochemical and enzyme activity of Meriz does is scanty, therefore the present study was conducted to investigate the effect of physiological status on some blood serum biochemical and ALT and AST enzyme activity of local Meriz does.

2. Materials and methods

Eleven clinically healthy Meriz does, 3 ± 0.5 years old, and 35.05 kg in weight kept at animal farm, Faculty of Agriculture and Forestry, University of Duhok, Kurdistan region-Iraq. The does used in this experiment are freely grazed on pasture with an access to concentrate mixtures.

Blood samples (7ml) were withdrawn at monthly interval from the jugular vein and deposited in anticoagulant free plastic tubes and allowed to clot at room temperature within 1 hour of collection. The tubes were centrifuged at 3,000 rpm for 10 min and the serum samples were stored at -20oC for biochemical and enzyme analysis. Determination total protein g/dL, albumin g/dl, globulin g/dl, cholesterol mg/dl, triglyceride and glucose mg/dl, and the alanine transaminase (ALT) and aspartate transaminase (AST) were determined by using biochemical kits (Biolabo Company Maizy, France), by Spectrophotometer (JENWAY 6300).

General Linear Model (GLM) within the statistical program (SAS, 2002) was used to analyze the factors affecting the studied traits. Duncan Multiple Range Test (Duncan, 1955) was used to detect the significant differences between different physiological status.

3. Results and discussion

In the present work, serum total protein was significantly (P≤0.05) higher (5.82±0.24 g/dl) in late pregnancy when compared to early pregnancy (4.47±0.22 g/dl) (Table 1). Such increase may be due a higher energy need for foetal growth and when colostrums being formed in the mammary gland during latest months of pregnancy (Kaneko et al., 2008). However, no significant differences in total protein exist between early, mid and late lactation periods (Table 2). Moreover, total protein showed significantly (P≤0.05) lower value (5.25±0.16 g/dl) during pregnancy as compared with lactation (5.77±0.13 g/dl) and dry periods (5.91±0.22 g/dl) (Table 3). This may due to that maternal serum protein concentrations decrease due to an increased foetal growth, and especially the utilization of amino acids from the maternal circulation for protein synthesis in the foetal muscles (Antunovic et al. 2002). Such result is in accordance with the finding of Piccione et al. (2009).

Blood serum albumin was not significantly differing among the stages of pregnancy or lactation. Also no differences were found among pregnancy, lactation and dry periods. This result was supported by Antunovic et al. (2011) and Swenson (1993), while in contrast with the finding of Piccione et al. (2009) who found a significant difference among different physiological status.

A significant increase (P≤0.05) in triglyceride (0.68±0.06 mg/dl) during late pregnancy as compared to early pregnancy periods (0.39±0.07 mg/dl) was observed. Similar results have been reported earlier by Piccione et al. (2009) and Smith and Walsh (1975). Also, at early lactation a significant decrease in triglyceride was noticed compared to mid and late lactation periods (Table 2). Such decrease was consistent with an increased energy requirement and negative energy balance and the effect of increased lipolysis which is hormonally regulated (Holtenius and Hjort, 1990). Also, triglyceride was significantly (P≤0.05) increased from its lowest value (0.43±0.03 mg/dl) at early lactation to reach the value of 1.44±0.21 mg/dl at late lactation. This result is in accordance with those reported by Gradinski-Urbanac et al. (1986) and (Hussein and Azab 1998).

A significantly higher concentration of triglyceride was recorded at dry period (1.32±0.16 mg/dl) as compared to either pregnancy (0.60±0.04 mg/dl) or lactation periods (0.82±0.09 mg/dl) (Table 3). This increase may be due to that adipose tissue metabolism is strictly related to insulin, which stimulate lipogenesis in pregnant does (Watson et al., 1993). These results are in agreement with those of Karapehlivan et al. (2007).

The concentration of glucose in the blood serum during all studied physiological status not differ significantly among them, however, the highest (60.03±7.30 mg/dl) and the lowest (52.78±3.67 mg/dl) values were recorded during early pregnancy and mid lactation, respectively. This may due to the constant energy loss with the milk (Pambu-Gollah et al., 2000). Current finding is consistent with earlier report in lactating ewes (Roubies et al., 2006) and in lactating mares (Heidler et al., 2002).

Results reveal that neither different stage of pregnancy of lactation had a significant effect on the concentration of cholesterol. This is probably related to the role of the compound in ovary steroidgenesis, so that the total cholesterol concentrations are under control of the complex factors (Nazifi et al. 2002).

In this experiment, there was a significant effect of physiological status on cholesterol concentration (Table 3). Lactation period showed significantly (P≤0.05 mg/dl) the lowest level (60.38±2.03 mg/dl) compared to pregnancy ((71.65±2.34 mg/dl) and dry periods (69.79±4.78 mg/dl). This finding was supported with other authors working on goats (Antunovic et al., 2011 and Piccione et al., 2009) who reported a significant increase of serum total cholesterol at dry and pregnancy periods. The decrease observed during lactation period compared to other periods could be ascribed to the increased cholesterol uptake by tissues involved in milk synthesis (Nazifi et al. 2002).

Table1

Mean ± SE blood serum biochemical parameters of meriz goats according to pregnancy stages.

Parameters	Early Pregnancy	Mid Pregnancy	Late Pregnancy
Total Protein g/dl	4.47±0.22^{b}	5.06±0.27^{ab}	5.82±0.24^{a}
Albumin g/dl	2.10±0.14^{a}	2.63±0.15^{a}	2.50±0.17^{a}
Triglyceride mg/dl	0.39±0.07^{b}	0.62±0.08^{ab}	0.68±0.06^{a}
Glucose mg/dl	60.03±7.30^{a}	56.43±4.15^{a}	57.03±3.17^{a}
Cholesterol mg/dl	66.45±6.05^{a}	76.90±3.67^{a}	69.01±3.27^{a}
ALT IU/L	55.60±3.86^{a}	65.65±4.21^{a}	59.37±2.15^{a}
AST IU/L	106.45±9.85^{b}	103.90±6.39^{b}	141.60±8.32^{a}

Means within each row having different litter are significantly different (P≤0.05).

Table2

Mean ± SE blood serum biochemical parameters of meriz goats according to lactation stages.

Parameters	Early lactation	Mid lactation	Late lactation
Total Protein g/dl	6.09 ± 0.156^{a}	5.55±0.23^{a}	5.57±0.37^{a}
Albumin g/dl	2.70 ±0.13^{a}	2.69±0.17^{a}	2.78±0.26^{a}
Triglyceride mg/dl	0.43±0.03^{c}	0.91±0.16^{b}	1.44±0.21^{a}
Glucose mg/dl	55.51±3.07^{a}	52.78±3.67^{a}	55.60±7.44^{a}
Cholesterol mg/dl	58.75±3.45^{a}	59.03±2.79^{a}	66.36±4.92^{a}
ALT IU/L	69.25±4.12^{a}	67.37±4.55^{a}	56.60±2.67^{a}
AST IU/L	113.57±7.33^{b}	130.02±8.21^{b}	155.65±6.35^{a}

Means within each row having different litter are significantly different (P≤0.05).

Table3

Mean ± SE blood serum biochemical parameters of meriz goats according to physiology stages.

Parameters	Pregnancy periods	Lactation periods	Dry periods
Total Protein g/dl	5.25±0.16[b]	5.77±0.13[a]	5.91±0.22[a]
Albumin g/dl	2.47±0.10[a]	2.71±0.10[a]	2.71±0.20[a]
Triglyceride mg/dl	0.60±0.04[b]	0.82±0.09[b]	1.32±0.16[a]
Glucose mg/dl	57.39±2.49[a]	54.44±2.37[a]	54.73±2.96[a]
Cholesterol mg/dl	71.65±2.34[a]	60.38±2.03[b]	69.79±4.78[a]
ALT IU/L	61.13±2.08[a]	65.97±2.56[a]	58.50±2.27[a]
AST IU/L	119.49±5.22[b]	128.57±5.01[b]	151.47±6.78[a]

Means within each row having different litter are significantly different (P≤0.05).

In the present work, the effect of period of pregnancy, lactation, as well as different physiological status had no significant effect on ALT. These findings of lactating ewes are consistent with earlier reports (Antunovic et al., 2004 and Antunovic et al., 2011).

AST activity differ significantly (P≤0.05) among pregnancy, lactation periods and physiological status. The highest concentration of AST observed in late pregnancy (141.60±8.32 IU/L) and lactation (155.65±6.35 IU/L) compared to early and mid pregnancy and lactation periods could be due to the increases in liver metabolism in those stages (Kaneko et al., 1997). Similar result was observed by El-Ghoul et al. (2000) ;Antunovic et al. (2004) and Stojevic et al. (2005). The overall means of serum AST was significantly (P≤0.05) higher at dry periods (151.47±6.78 IU/L) compared to pregnancy (151.47±6.78 IU/L) and lactation periods (119.49±5.22 IU/L) (Table 3). The decrease of the serum AST concentration at pregnancy period my due to hepatic lipidosis to alter the normal function of the liver (Greenfield et al., 2000). This result is in accordance with a study by Antunovic et al. (2011).

4. Conclusion

In conclusion, most of studied blood serum biochemical parameters (total protein, triglyceride and cholesterol) and AST enzyme activity was affected by different physiological status, except albumin, glucose and ALT enzyme activity.

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