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Biochemical analysis of proteins and lipids in colostrum of small ruminants

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Abstract: Colostrum is nutrient-rich fluid released shortly after birth abundant in immunological, growth and tissue repairing factors such as lactoferrin and bioactive peptides with inhibitory activity toward angiotensin-converting enzyme. The aim of this study was to investigate the levels of proteins and lipids in small ruminant's colostrum, emphasizing the level of lactoferrin. Quantification of total protein, albumin, globulin, triglycerides and cholesterol was assessed by biochemical tests and for the lactoferrin level we used ELISA assay. In sheep colostrum the level of total protein was 33.7 g/dL, while in goats the level was 44.3 g/dL. The level of albumin was similar in both species between 10.86 g/dL and 10.95 g/dL, whereas the globulin level was higher in goats (33.36 g/dL) compared with sheep (22.85 g/dL). The concentration of triglycerides is comparable for both sheep and goats with an average value of 1300 mg/dL, while the cholesterol concentration was 261 mg/dL in goats and 116 mg/dL. The level of lactoferrin measured by ELISA assay revealed values between 0.06-0.13 mg/mL in both goats and sheep species. In conclusion, small ruminant colostrum contains nearly twice the concentration of fat and total protein compared to bovine colostrum providing a higher caloric density for the neonate.

• Introduction

Colostrum contains a high concentration of proteins, consisting of immunoglobulins, caseins and bioactive proteins such as lactoferrin. In addition to this protein fraction, its composition encompasses triglycerides, vitamins, minerals, and growth factors, thereby providing essential nutritional support and immunological protection for the neonate. The aim of this study was to investigate the levels of proteins and lipids in small ruminant's colostrum, emphasizing the level of lactoferrin.

• Material and method

In this study were used 37 samples of ovine colostrum and 12 samples of caprine colostrum. The samples were collected in the first 2-3 hours post parturition in small sterile recipients. For total protein concentration we used Biuret method, GPO-PAP method for triglycerides, CHOD-PAP method for cholesterol and ELISA assay for lactoferrin.

• Results and discussions

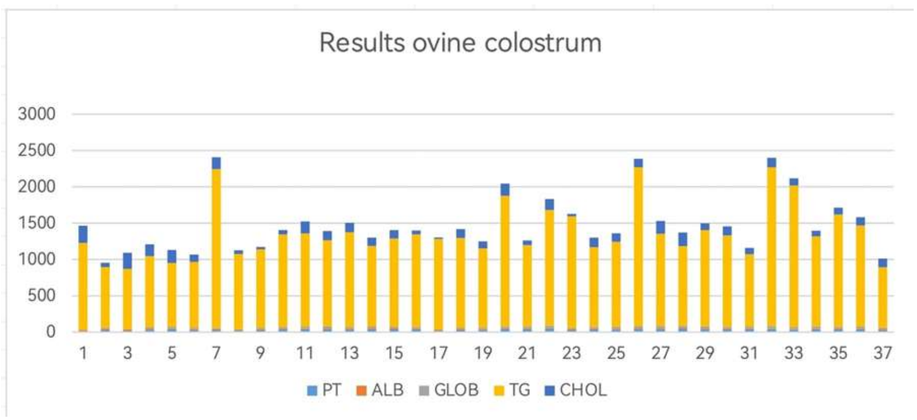


Fig. 1. Total Protein: 33.69 g/dL; Globulins: 22.85 g/dL; Albumin: 10.86 g/dL; Triglycerides: 1291.36 mg/dL; Cholesterol: 116.40 mg/dL;

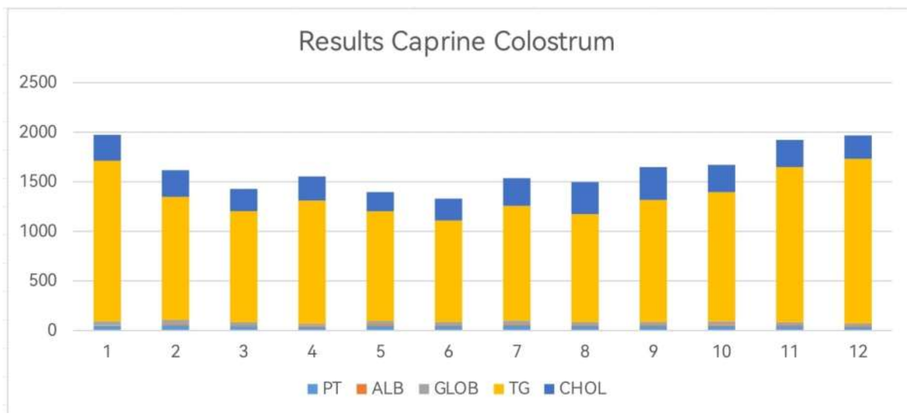


Fig. 2. Total Protein: 44.27 g/dL; Globulins: 33.36 g/dL; Albumin: 10.95 g/dL; Triglycerides: 1278.42 mg/dL; Cholesterol: 261.03 mg/dL;

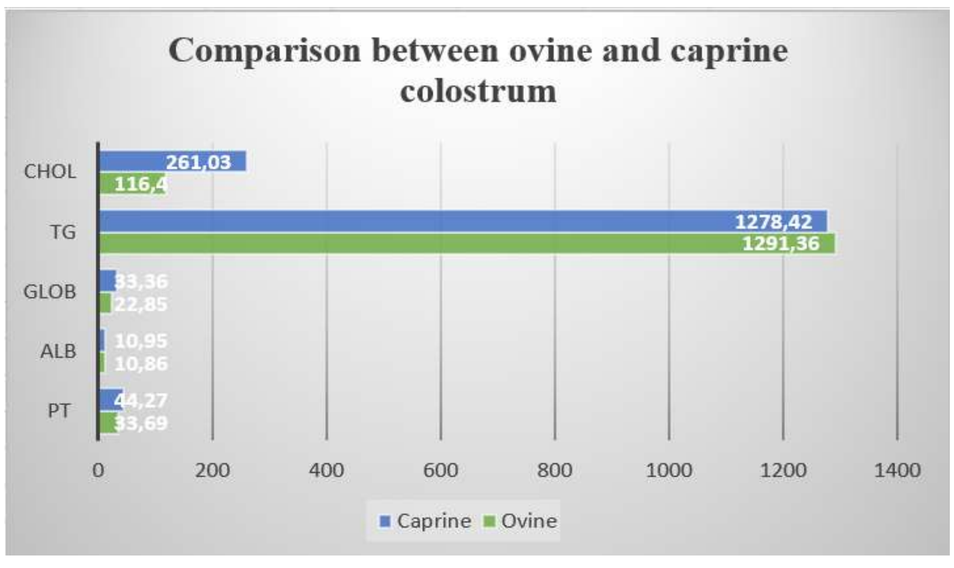


Fig. 3. Comparison between total proteins, globulins, albumin, triglycerides and cholesterol in ovine and caprine colostrum.

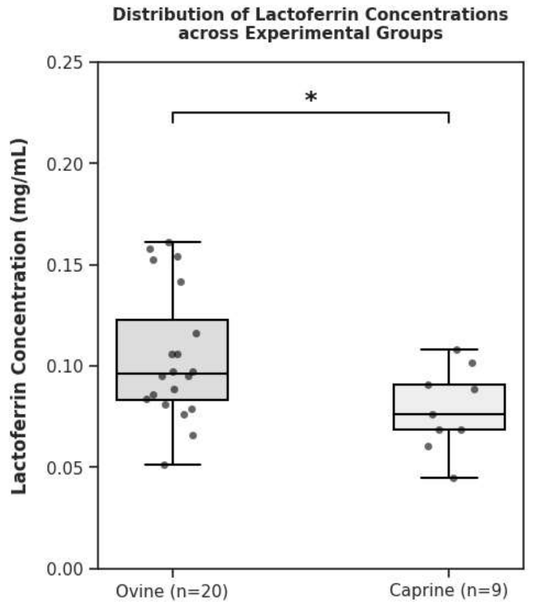


Fig. 4. Concentration of lactoferrin (0.104 mg/mL) in sheep compared to goats (0.078 mg/mL), suggesting the existence of metabolic or mammary synthesis peculiarities between this two species of small ruminants.

• Conclusions

The two species exhibit nearly identical values for albumin and triglycerides, reflecting similar physiological mechanism of metabolic and energy synthesis. Samples collected from goats exceed the globulin levels found in sheep colostrum by 46%, but sheep presents a higher level of lactoferrin by 33%. The superior quality and high performance of both types of colostrum are the direct result of genetic characteristics, the prevalence of twin births, and the rigorous optimization of pre-partum feed rations.