

*Original Research***Serum Biochemical Components in NARI Suwarna Ewes at Different Stages of Pregnancy****Shwetha, H. S., Narayana Swamy, M., Ranganath, L., Srinivas, R. B. *, Kalmath, G. P. and Veena, M. P.**

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Abstract

The present study was designed to assess the serum biochemical parameters in NARI Suwarna ewes at different stages of pregnancy and diestrus. Non-pregnant ewes (n=7) at diestrus stage served as control group (Group I). The second, third, fourth and fifth month pregnant animals served as Group II, III, IV and V, respectively. Total serum protein, albumin and minerals such as calcium, phosphorus, potassium, sodium and chloride were determined from serum samples using commercially available reagent kits. The total protein, albumin, calcium and phosphorus levels in Group IV and V were significantly ($P<0.05$) lower compared to control group. However, serum sodium, potassium and chloride concentrations did not differ significantly between various groups. It was concluded that the reduced levels of total serum protein, albumin and certain minerals during late gestation periods could be due to haemodilution by blood volume expansion during pregnancy and increased demand of nutrients for the growing fetus.

Key words: Calcium and Phosphorus, NARI Suwarna Ewes, Pregnancy, Protein**How to cite:** Srinivas, S., M, N., Lingappa, R., Bellur, S., Kalmath, G., & Prabushankar, V. (2018). Serum Biochemical Components in NARI Suwarna Ewes at Different Stages of Pregnancy. International Journal of Livestock Research, 8(7), 232-237. doi: 10.5455/ijlr.20171027090517**Introduction**

Sheep husbandry plays a vital role in meat and wool production and it continues to be a backyard profession, primarily in the hands of poor, landless or small and marginal farmers. To enhance the fertility rate in local breeds of Maharashtra and to improve the economic status of farmers, Nimbkar Agricultural Research Institute (NARI) Phaltan District, Maharashtra, India, had evolved NARI Suwarna breed with increased production rate and litter size by crossing the Deccani (90%) with highly prolific breed Garole (10%) or with crossing of Deccani (60%), Madgyal (30%) and Garole (10%) (Anon, 2005). There will be changes in body metabolic rate in ewes during various physiological stages such as non-pregnancy, early

pregnancy, mid pregnancy and late pregnancy. Blood biochemical parameters like total protein and albumin are important indicators of the metabolic activity in ewes (Karapehlivan *et al.*, 2007). Mineral components play essential role in cellular metabolism, homeostasis, reproduction and growth as per the stages of life. Pregnancy represents the high anabolic period in the life cycle of female animal. During pregnancy, protein and minerals acts as important nutrient substances for the dam and growing fetus. Mineral imbalance can affect pregnancy outcome through alterations in the metabolism of maternal and conceptus sides and the evaluation of protein and mineral profile during different stages of pregnancy would help in better management practice, nutritional practice and diagnosis of health condition.

Materials and Methods

The present study was conducted in NARI Suwarna ewes maintained at the Department of Gynaecology and Obstetrics, Veterinary College, Bengaluru under Rashtriya Krishi Vikas Yojana (RKVY). All the animals were maintained under semi-intensive rearing system. Seven healthy non pregnant ewes were selected and subjected to estrus synchronization by using intra-vaginal progesterone sponge for 11 days. After removal of sponge, pregnant mare serum gonadotropin 150 IU per animal and 75 microgram of cloprostenol per animal was given by intramuscular route. The seven ewes which were not mated or not artificially inseminated were allowed to enter the diestrus stage of estrous cycle to serve as Group I (Control group). Seven naturally mated animals were selected and second month of pregnancy was confirmed by using trans-rectal and trans-abdominal ultrasonography based on foetal head diameter, anechoic embryonic vesicle, fetal heart beat, gestational sac diameter and placentomes. The pregnant ewes were subjected to a longitudinal study which were designated as Group II (second month of pregnancy at 45-48 days), Group III (third month of pregnancy at 75-78 days), Group IV (fourth month of pregnancy at 105-108 days) and Group V (fifth month of pregnancy at 135-138 days) as the pregnancy advanced for these seven pregnant ewes. It is also designated as second month of pregnancy as early pregnancy, third as mid pregnancy, fourth and fifth as late pregnant animals.

Approximately 10 ml of blood samples were collected from seven non pregnant ewes at once and from pregnant animals at monthly intervals during morning hours between 9:30 and 10:30 AM before they were allowed for grazing. As per Institutional Animal Ethical Guidelines blood samples were collected vide No. VPY/334/2015-16 dt. 15.03.2016. Blood samples were allowed to clot for 45 minutes at room temperature and serum was separated by centrifugation at 3000 rpm for 20 minutes. Separated serum samples were stored at -20 °C until analysis. The serum total protein, albumin, calcium, phosphorus, sodium, potassium and chloride levels were analysed by using assay reagent kits manufactured by Erba diagnostics, Mannheim, Germany. All these parameters were estimated by using Auto Analyzer (Model: Star 20 Analyzer) supplied by Rapid Diagnostic Pvt. Ltd. Delhi. The data was subjected to statistical

analysis by using GraphPad Prism version 5.01 (2007), a computerized statistical software. One-way ANOVA with Tukey's post test was employed to know the differences between various groups. The values were expressed as Mean \pm Standard Error and the level of significance or non-significance was determined at P value of 0.05.

Results and Discussion

The serum total protein and albumin levels in Group IV and V were significantly ($P < 0.05$) lower compared to non pregnant ewes (Table 1).

Table 1: The mean \pm SE values of biochemical parameters in NARI Suwarna ewes at different stages of pregnancy and diestrus (n=7)

Parameter	Group I	Group II	Group III	Group IV	Group V
Total protein (g/dL)	7.30 \pm 0.26 ^a	6.68 \pm 0.17 ^{ac}	7.21 \pm 0.12 ^a	6.34 \pm 0.16 ^{bc}	6.48 \pm 0.14 ^{bc}
Albumin (g/dL)	4.07 \pm 0.54 ^a	3.67 \pm 0.05 ^b	3.52 \pm 0.06 ^{bc}	3.37 \pm 0.06 ^c	3.18 \pm 0.02 ^d
Calcium (mg/dL)	9.86 \pm 0.21 ^a	9.09 \pm 0.24 ^{ac}	8.75 \pm 0.24 ^{bc}	8.48 \pm 0.15 ^{bc}	7.80 \pm 0.35 ^b
Phosphorus (mg/dL)	4.27 \pm 0.30 ^a	4.07 \pm 0.22 ^a	3.92 \pm 0.24 ^{ac}	2.92 \pm 0.32 ^{bc}	2.53 \pm 0.29 ^b
Sodium (mEq/L)	139.20 \pm 0.92 ^a	138.90 \pm 0.91 ^a	139.30 \pm 0.83 ^a	138.40 \pm 0.82 ^a	139.60 \pm 0.74 ^a
Potassium (mmol/L)	5.26 \pm 0.21 ^a	5.68 \pm 0.20 ^a	6.04 \pm 0.32 ^a	6.07 \pm 0.17 ^a	5.71 \pm 0.23 ^a
Chloride (mmol/L)	102.50 \pm 1.36 ^a	103.90 \pm 0.43 ^a	104.70 \pm 0.49 ^a	105.20 \pm 1.30 ^a	104.90 \pm 0.48 ^a

The values with different superscripts within a row differ significantly ($P < 0.05$)

The present findings were in conformity with (Obese *et al.*, 1994; Batavani *et al.*, 2006 and Farghaly *et al.*, 2011) who reported significant reduction in plasma total protein and albumin levels with advancement of pregnancy. The serum total protein level was lower in pregnant ewes compared to non-pregnant Bikaneri ewes (Purohit *et al.*, 1999 and Soliman, 2014). The values recorded in the present study were comparable to the normal range (6.0 to 7.9 g/dL) reported for ewes by Kaneko *et al.* (2008). Iriadam (2007) and Antunovic *et al.* (2011) reported decreased total protein levels during late gestation and attributed the finding to increased utilisation of maternal proteins for fetal development in goats and sheep, respectively. However, serum total protein levels were significantly increased in late pregnant ewes compared to non-pregnant and early pregnant ewes as reported by Piccione *et al.* (2009) Khatun *et al.* (2011) and McDonald (1980). In the present study, the decrease in the serum protein and albumin levels during late stages of gestation might be due to haemodilution owing to increase in blood volume during pregnancy and increase in nutrient demand by the foetus. Twins and triplets in NARI Suwarna ewes could have profound effect on maternal serum total protein owing to increased demand by multiple fetuses.

The significantly ($P < 0.05$) reduced levels of calcium and phosphorus in late pregnant ewes compared to early pregnant and non pregnant ewes were in agreement with the observations of Yildiz *et al.* (2005) in Akkaraman ewes, Pandya *et al.* (2012) in sheep and goats, El-Tarabany (2012) in sheep, Inayat *et al.*

(2013) in Corriedale ewes and Dar *et al.* (2014) in goats. The reduction in serum calcium levels during late pregnancy was attributed to the increased demand for the mineralization of fetal skeleton as concluded by Bamerny (2013). The reduced levels of calcium during late gestation in NARI Suwarna ewes observed in the present study could be due to increased calcium demand by the growing fetus. It could also be due to reduced absorption of the calcium from the intestine owing to reduced serum proteins levels during late gestation observed in the present study. This decline in the calcium could also be due to reduced maternal ability to mobilize the calcium from the bone in ewes carrying more than one lamb. This effect could be more pronounced in NARI Suwarna ewes as they are known to carry twins and triplets. There was a significant reduction in the serum calcium levels during late gestation and proportionately to serum phosphorus levels also decreased to maintain normal Ca: P ratio.

The non-significant ($P>0.05$) differences were noticed for serum sodium and potassium levels at various stages of pregnancy and diestrus. The results are in accordance with Akhtar *et al.* (2010), AL-Hadithya *et al.* (2012) Michalek (2010) and Waziri *et al.* (2010). However, Elnageeb and Adelatif (2010) in Awasi ewes, Hafid *et al.* (2013) in desert goats, Deghnouche *et al.* (2013) in Ouled Djellal sheep reported increased sodium and potassium levels in pregnant ewes and goats. The non-significant ($P>0.05$) differences were noticed for serum chloride levels in the present study were similar to the findings of Yokus and Cakir (2006), AL-Hadithya *et al.* (2012) and Akhtar *et al.* (2010) in cattle, Iraqi Awassi ewes and Buchi ewes, respectively. However, Yildiz *et al.* (2005) described that the serum chloride level was significantly increased from 100 days of gestation in sheep. The serum sodium, potassium and chloride concentrations recorded were within the normal reference range for sheep (Radostits *et al.*, 2007; Kaneko, 2008; Ranjith and Pandey, 2014). The normal reference levels recorded in the present study could indicate the efficiency of the internal homeostatic mechanism to maintain minimum changes in the serum sodium, potassium and chloride levels inspite of different physiological stages. As serum electrolytes are highly regulated components there is meagre chance of variations in these components during different physiological stages. Therefore, the non-significant variation in serum sodium, potassium and chloride levels in different groups indicated that the physiological status of the animal do not influence their levels in the body.

Conclusion

In conclusion, based on the findings of the present study, it is recommended that during last month of pregnancy the concentrate feed comprising of protein and mineral mixture should be provided to NARI Suwarna ewes to overcome deficiencies if any.

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