

Effect of Oral Medroxy-Progesterone Acetate and Nutritional Supplementation during Late Gestation on Birth Weight of Nellore Sheep

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ABSTRACT

The present study was conducted to evaluate the effect of oral medroxy progesterone acetate and a liquid nutritional supplement on birth weight and early growth performance in Nellore ewes and their lambs under extensive rearing conditions. A total of 120 second-lambd Nellore ewes in mid to late gestation were randomly allotted into four experimental groups (n=30 each). Group I served as Control, Group II as medroxy progesterone (10 mg tab daily for 5 days), Group III liquid nutritional supplement (5 mL tonic daily for 7 days) and Group IV with combination of medroxy progesterone acetate and liquid nutritional tonic, administered orally during late gestation as above. Mean birth weights of lambs in Group II and Group III were 3.91 ± 0.41 , 3.58 ± 0.31 kg against 2.96 ± 0.15 kg in the control group ($p < 0.01$), while a combined supplement group gave the highest birth weight of 4.15 ± 0.42 kg. The findings suggested that hormonal and nutritional interventions during late pregnancy can improve lamb birth weight, which is critical for survival and postnatal growth under free-range sheep rearing systems.

Key words: Birth weight, Liquid nutritional supplement, Medroxy progesterone acetate, Nellore ewes.

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INTRODUCTION

Sheep and goats constitute an important segment of the livestock sector in India and play a crucial role in the rural agrarian economy by providing livelihood and employment to millions of households. Sheep rearing contributes nearly 8.5% of the total livestock output, particularly in arid, semi-arid, and mountainous regions where crop cultivation and dairy farming are not economically viable. In India, more than 80% of the sheep population is maintained under extensive or free-range systems, relying primarily on natural grazing resources. Under this system, shepherds frequently migrate across districts and states in search of fodder, water, and shelter. Limited access to concentrate feeds, poor economic status of shepherds, and lack of scientific feeding practices prevent nutrient supplementation according to NRC recommendations (Shilpa and Ravindranath, 2018; Shivakumar *et al.*, 2020).

Pregnant ewes, particularly during late gestation, require approximately 50% higher nutrient intake compared to maintenance requirements. This increased demand cannot be met through grazing alone. Nutritional supplementation during late pregnancy through concentrates or high-quality forages has been shown to improve fetal growth and lamb birth weight (Gardner *et al.*, 2007; Naveena *et al.*, 2025). Fetal growth in sheep is influenced by several factors, and approximately 90% of fetal growth occurs during the last trimester of gestation (Redmer *et al.*, 2004). Maternal

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undernutrition during this critical period has been associated with reduced fetal growth and low birth weight (Rhind, 2004; Rangamma *et al.*, 2023). Progesterone plays a vital role in pregnancy maintenance by regulating nutrient partitioning, placental function, and immunological tolerance. It influences carbohydrate, lipid, and protein metabolism and induces physiological adaptations essential for fetal growth (Ronald

and Kalkhoff, 1982). Considering the constraints of extensive sheep rearing systems, the present study was designed to evaluate the effect of oral medroxy progesterone acetate and liquid nutritional supplementation on birth weight of lambs in Nellore ewes and to assess postnatal supplementation strategies for improving weaning weight.

MATERIALS AND METHODS

The study was conducted on pregnant ewes in field condition. A total of 120 second- parity, mid to late pregnant Nellore Brown ewes of a shepherd maintaining a migratory flock under extensive conditions in Anantapur District, Andhra Pradesh, were selected. The ewes were randomly divided into four equal groups each of 30 ewes. Group I served as Control that was supplemented with 10 mg/kg dextrose powder daily in drinking water for 7 days. Group II and III were supplemented with 10 mg medroxy progesterone acetate (Tab Deviry®, Torrent Pharmaceuticals Ltd., India) daily orally for 5 days, and 5 mL liquid nutritional supplement containing vitamins A, D₃, E, B-complex, amino acids, minerals, and antioxidants (Optiblend®, Bovian Pharma Pvt. Ltd., India) daily orally for 7 consecutive days, respectively, while Group IV received a combination of both medroxy progesterone acetate and liquid nutritional tonic as above, and the animals were followed till lambing.

Lamb birth weight was recorded immediately after parturition using a calibrated digital weighing balance. Data obtained from the experimental groups were tabulated and subjected to statistical analysis using One-way ANOVA and *Post-hoc* Tukey's HSD test to evaluate treatment effects using Graphpad Prism, 10.6.1 for Windows 10.

RESULTS AND DISCUSSION

There was a significant ($p < 0.05$) increase in lamb birth weight in ewes supplemented with medroxy progesterone acetate and liquid nutritional tonic compared to the control group. The highest mean birth weight was observed in combination treatment group (Group IV) followed by medroxy progesterone acetate (MPA) treated group (Group II), and the liquid nutritional supplement (Group III, Table 1) indicating the beneficial or synergistic role of combined supplementation of hormone MPA and nutritional tonic during late gestation.

Table 1: Descriptive statistics of lamb birth weight (kg)

Group	N	Mean $\pm$ SD	Range
Group I (Control)	30	2.96 $\pm$ 0.15 ^a	2.7-3.4 ^a
Group II (Tablets)	30	3.91 $\pm$ 0.41 ^b	3.4-4.5 ^b
Group III (Tonic)	30	3.58 $\pm$ 0.31 ^b	3.15-4.0 ^b
Group IV (Both)	30	4.15 $\pm$ 0.42 ^b	3.5-5.0 ^b

Means with different superscripts within a column differ significantly ($F = 68.60$, $p < 0.001$).

Birth weight is a critical determinant of lamb survival, growth rate, and overall productivity. The present study

demonstrated that supplementation of pregnant Nellore ewes with medroxy progesterone acetate and liquid nutritional supplement during late gestation significantly increased ($p < 0.05$) lamb birth weight. Several factors modulate fetal growth during late pregnancy, including breed, litter size, placental development, maternal age, nutritional status, and progesterone concentration (Gardner *et al.*, 2007). Approximately 90% of fetal growth in sheep occurs during the last trimester of gestation, making this period highly sensitive to maternal nutrition (Redmer *et al.*, 2004).

Maternal nutrition plays a key role in fetal programming and nutrient partitioning (Godfrey, 2002). Supplementation during late gestation has consistently been associated with improved birth weight and neonatal survival. Naveena *et al.* (2025) reported that concentrate supplementation during the last trimester and creep feeding before weaning positively influenced lamb growth and immunity. Similarly, Gao *et al.* (2008) observed severe fetal growth retardation under maternal undernutrition, particularly when dietary energy levels fell below critical thresholds. The present findings aligned with reports by Fraga *et al.* (2018), who demonstrated that undernutrition during late-pregnancy reduced lamb birth weight by up to 22%, while improved maternal nutrition enhanced fetal growth. Studies on amino acid and energy supplementation further support the beneficial role of targeted nutritional strategies during late gestation (Castillo-Gutierrez *et al.*, 2022; Ahmadzadeh-Gavahan *et al.*, 2023).

Progesterone plays a central role in pregnancy maintenance by regulating uterine secretions, nutrient availability, and metabolic adaptations necessary for fetal development (Spencer and Bazer, 2002). It influences carbohydrate, lipid, and protein metabolism, promoting energy storage while modulating insulin sensitivity (Ronald and Kalkhoff, 1982). The present study indicates that oral medroxy progesterone acetate, when administered during late gestation, contributes positively to fetal growth, particularly when combined with nutritional supplementation. The superior performance of Group IV suggests that hormonal support coupled with enhanced nutrient availability optimizes intrauterine growth conditions under extensive rearing systems. This is in accordance with the findings of Garoussi *et al.* (2020), who evaluated the effect of intravaginal MPA sponges with or without equine chorionic gonadotropin (eCG) in ewes and concluded that MPA increases the conception rate as well as the birth weight of lambs.

The present study demonstrated that oral supplementation of medroxy progesterone acetate (Deviry®) and liquid nutritional tonic (Optiblend®) during late gestation improved lamb birth weight in Nellore ewes maintained under extensive grazing conditions in their second-parity. The combined treatment produced the highest birth weights, indicating a synergistic effect of hormonal and nutritional intervention. This approach offers a practical, economical, and field-applicable strategy for improving lamb growth and survival in resource-limited extensive sheep production systems.

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