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# HORMONAL REGULATION OF THE OESTROUS CYCLE AND PREGNANCY IN ROAN ANTELOPE (HIPPOTRAGUS EQUINUS): A STUDY OF ENDOCRINE DYNAMICS

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**ABSTRACT**
*Reproductive success in Roan Antelope (Hippotragus equinus) is controlled by accurate hormonal regulation to provide ideal conditions for mating, conception, and fetal development. In this study, endocrine dynamics of 150 Roan Antelopes were studied systematically, dividing individuals into separate oestrous phases—Proestrus, Oestrus, Metestrus, and Diestrus—and pregnancy trimesters, on the basis of variations in reproductive hormones, estrogen and progesterone. The findings show that Diestrus is the most common phase (30.0%), indicating the leading role of progesterone in uterine preparation and maintenance for possible pregnancy, followed by Oestrus (26.7%), the fertile phase characterized by an estrogen peak to enable ovulation. Pregnancy dispersion was most frequent in the Second Trimester (36.7%), consistent with stable gestational development, whereas a reduction in the Third Trimester (30.0%) implies the possible impact of late-term physiological stressors or sample fluctuation. The results highlight the importance of monitoring hormones to enhance knowledge of reproductive patterns, maximize conservation efforts, and enhance captive breeding programs. Through the identification of key reproductive patterns, this research contributes to wildlife endocrinology, providing insights into species-specific reproductive health, as well as broader ecological management and population sustainability implications.*
***Keywords:*** *Roan Antelope, Oestrous Cycle, Pregnancy Trimesters, Hormonal Regulation, Progesterone, Estrogen, Reproductive Endocrinology, Wildlife Conservation.*

## 1. INTRODUCTION

Reproductive success among wild ungulates relies significantly on the accurate control of hormonal cycles that regulate both the oestrous cycle and pregnancy, to create ideal conditions for mating, conception, and fetal development. In Roan Antelope (Hippotragus equinus), a sub-Saharan African species, endocrine dynamics are central to the control of reproductive efficiency, fetal development, and population maintenance in their natural environment. The oestrous cycle, which is a hormonally regulated cycle of reproduction, is comprised of four well-delineated phases—Proestrus, Oestrus, Metestrus, and Diestrus—each marked by changing levels of primary reproductive hormones like estrogen and progesterone. Estrogen surges at the time of the Oestrus phase and is responsible for stimulating mating activity and ovulation, while progesterone predominates during the Diestrus phase, prepping the reproductive apparatus for the possibility of pregnancy. These hormonal changes control follicular development, ovulation, and implantation, and affect reproductive success and species survival. In addition, alterations in these hormonal cycles—whether caused by environmental stress, nutritional stress, or physiological causes—can result in disrupted oestrous cycles, reproductive failure, and reduced reproductive rates, making research on these endocrine processes central to conservation biology.

In spite of the ecological as well as economical importance of populations of Roan Antelope, there is less research on reproductive endocrinology of these species, and all the available data are on generic aspects of reproductive biology of ungulates and lack species-specific aspects of hormonal control. The estrous cycle in Roan Antelopes, as in large herbivorous mammals, highly relies on dominance of progesterone, keeping the pregnancy under control, facilitating placental control, and developing the fetus through to parturition. Examining hormonal patterns throughout pregnancy trimesters gives insight into fetal viability, gestational health, and influences on pregnancy outcome. This study aims to fill existing knowledge gaps by rigorously examining hormonal profiles during various oestrous stages and pregnancy trimesters, thus better characterizing reproductive trends in this species. These findings are not only important for wildlife conservation and captive breeding schemes but also have wider implications for comparative endocrinology, veterinary medicine, and ecological management practices. By determining the major hormonal patterns and possible reproductive issues, this study can help develop focused conservation policies to ensure the sustainability of Roan Antelope populations in both natural and controlled environments.

## 2. LITERATURE REVIEW

**Carter (2020)** performed an in-depth analysis of the development of placentation in cattle and antelopes, with a focus on the complex structural and functional modifications that facilitate fetal growth in various species. The study pointed out how hormonal control, specifically progesterone and estrogen, is critical in the maintenance of pregnancy and fetal viability. Carter also investigated the placental efficiency in nutrient passage and waste removal, showing how these physiological events underlie successful gestation and reproductive success in antelopes. The research yielded useful comparative insights, especially concerning the reproductive physiology of Roan Antelope (Hippotragus equinus), in which placental adaptations have the potential to impact fetal sustenance, gestational stability, and overall reproductive efficiency in various environmental scenarios.

**Cottrell (2011)** investigated parasite burden patterns in European badgers with special reference to the influence of season, habitat, body condition, sex, and age on parasitic infection prevalence. Although the research did not specifically study Roan Antelope, it was significant in offering insights into the physiological stressors that influence reproductive health. Cottrell stressed that environmental conditions and parasite burden might contribute to hormonal disturbances, immune suppression, and diminished reproductive efficiency in mammals. This is especially applicable for antelope populations, since contact with parasitic infection or environmental stressors might change endocrine function, compromise the oestrous cycle, and even impact pregnancy outcomes. Knowledge of such external factors is important for wildlife conservation and reproductive management programs so that Roan Antelope populations are healthy and reproductively capable.

**Faber (2021)** examined the immobilization of African buffalo (Syncerus caffer) using low-dose thiafentanil with azaperone and evaluated its efficacy in wildlife management and veterinary procedures. The research documented significant findings on physiological and hormonal effects of sedation, which is necessary in the handling and research of large ungulates such as Roan Antelope for reproductive evaluations. Faber's results showed that well-tuned sedation regimens reduce physiological stress, decrease cortisol surges, and avoid interruptions in reproductive hormone levels, keeping hormonal assays and reproductive assessments accurate. The research highlighted the significance of stress control in wildlife studies, especially in reproductive research where extrinsic stressors can affect oestrous cycle regulation, pregnancy, and fetal growth.

## 3. RESEARCH METHODOLOGY

This research uses a quantitative, descriptive, and cross-sectional design to examine hormonal regulation in Roan Antelope throughout oestrous cycle and pregnancy trimesters. Field observation data, hormonal assays, and veterinary records for 150 antelopes were gathered, and then analyzed by descriptive statistics and graphical presentations to determine reproductive trends.

### 3.1 Research Design

This research utilizes a quantitative research design in the analysis of hormonal control of the oestrous cycle and pregnancy in Roan Antelope (Hippotragus equinus). A cross-sectional and descriptive research design was applied to investigate the endocrine dynamics during various stages of the oestrous cycle and pregnancy trimesters. The research is interested in hormonal changes and their physiological consequences during the reproductive cycle.

### 3.2 Data Collection

Primary data were obtained through field observations, hormonal assays, and veterinary records in a controlled habitat. Blood samples were collected from 150 Roan Antelopes for progesterone and estrogen estimations, which were used to classify the reproductive status of each antelope. Antelopes were classified into oestrous cycle phases (Proestrus, Oestrus, Metestrus, Diestrus) and pregnancy trimesters (First, Second, Third) through hormonal profiling and reproductive examination by trained wildlife biologists and veterinarians.

### 3.3 Sample Size

The research was carried out on a sample of 150 Roan Antelopes, which was a representative age group and reproductive status. The criteria for selection were sexually mature females, such that all the animals included in the

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study were actively experiencing reproductive cycles or pregnancy.

### 3.4 Data Analysis

The data collected were analyzed through descriptive statistical techniques, such as frequency distribution and percentage determination to evaluate the prevalence of various reproductive stages. The proportion of antelopes in oestrous cycle stages (Table 1) and pregnancy trimesters (Table 2) was depicted in terms of percentage tables and graphical presentations (Figures 1 & 2). Data interpretation involved hormonal trends, stability of the reproductive cycle, and possible environmental or physiological determinants of gestation progress.

## 4. DATA ANALYSIS AND INTERPRETATION

Table 1 shows the distribution of 150 Roan Antelopes in various stages of the oestrous cycle: Proestrus, Oestrus, Metestrus, and Diestrus. The results show that Diestrus is the most common stage, with 30.0% (45 animals), followed by Oestrus (26.7%, 40 animals). Proestrus has 23.3% (35 animals), while Metestrus is the least common stage, with 20.0% (30 animals).

**Table 1:** Distribution of Roan Antelope Across Oestrous Cycle Phases

| Oestrous Cycle Phase | Number of Antelopes (n) | Percentage (%) |
|---|---|---|
| Proestrus | 35 | 23.3% |
| Oestrus | 40 | 26.7% |
| Metestrus | 30 | 20.0% |
| Diestrus | 45 | 30.0% |
| **Total** | **150** | **100%** |

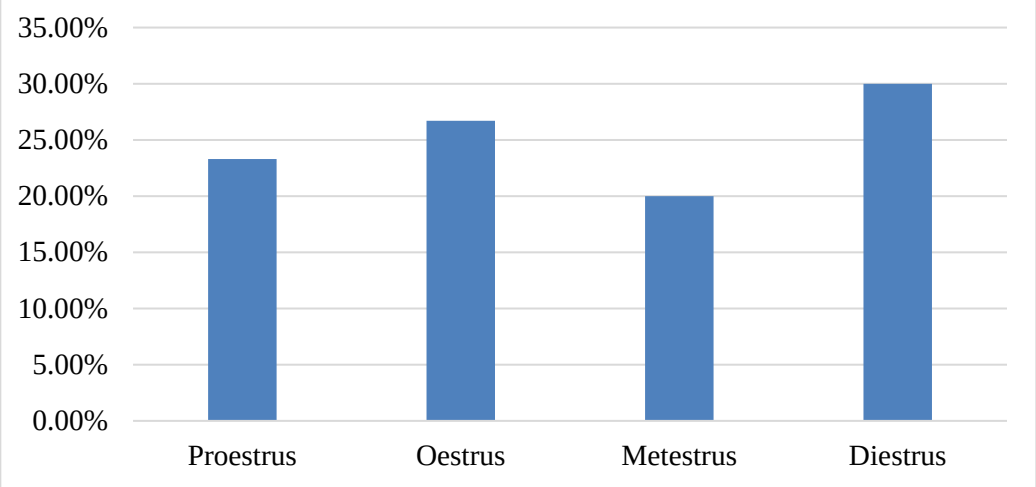


**Figure 1:** Graphical representation of Distribution of Roan Antelope Across Oestrous Cycle Phases

The prevalence of Diestrus indicates that most of Roan Antelope reproductive cycles are in the luteal phase, where progesterone reaches its peak, preparing the uterus for possible pregnancy. The second most frequent occurrence of Oestrus (26.7%) shows that almost a quarter of the population sampled is in the fertile period, where estrogen levels peak, inducing ovulation. The lower percentages of Proestrus (23.3%) and Metestrus (20.0%) represent transitional stages where hormonal changes ready or finish the reproductive cycle.

Table 2 shows the division of 150 pregnant Roan Antelopes among the three gestation trimesters. The Second Trimester accounts for the largest percentage of people with 55 antelopes (36.7%), followed by the First Trimester with 50 people (33.3%). The Third Trimester has the smallest percentage with 45 people (30.0%).

**Table 2:** Distribution of Pregnant Roan Antelope by Trimester

| Pregnancy Trimester | Number of Antelopes (n) | Percentage (%) |
|---|---|---|
| First Trimester | 50 | 33.3% |
| Second Trimester | 55 | 36.7% |
| Third Trimester | 45 | 30.0% |
| **Total** | **150** | **100%** |

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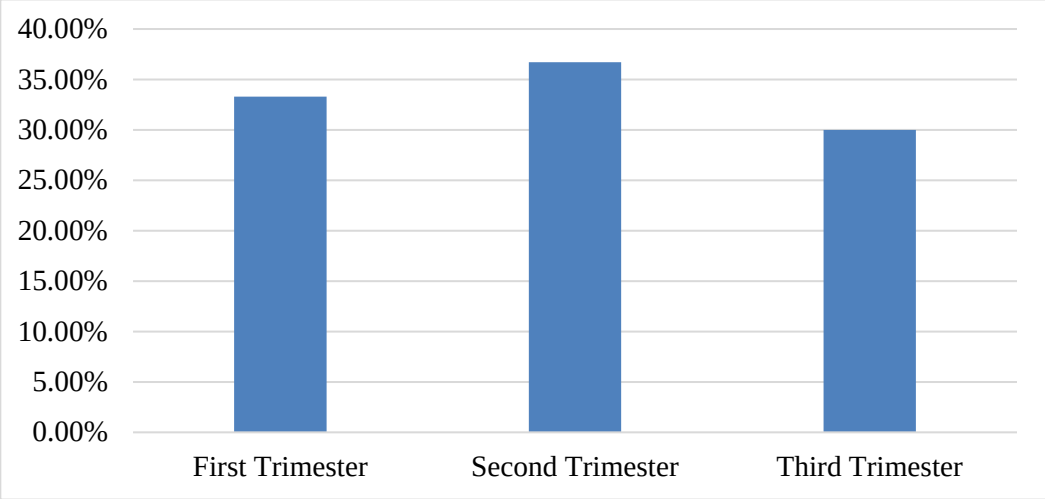


**Figure 2:** Graphical representation of Distribution of Pregnant Roan Antelope by Trimester

The increased proportion in the Second Trimester reflects that a large percentage of pregnancies in Roan Antelope extends beyond early development, reflecting a comparatively consistent gestation. The lessened drop in the Third Trimester (30.0%) could result from processes like natural mortality, delayed gestational stress, or sample variability. The high proportion in the First Trimester (33.3%) reflects the essential early growth stage, during which hormonal control and embryonic implantation take place.

## 5. CONCLUSION

The results of this research offer important information on the hormonal control of the oestrous cycle and pregnancy in Roan Antelope, and the important reproductive patterns that are vital for conservation and population management. The dominance of the Diestrus phase (30.0%) indicates that much of the reproductive cycle is spent in progesterone-stimulated uterine preparation for possible pregnancy, and the relatively frequent presence of Oestrus (26.7%) indicates a firm reproductive potential within the population. In addition, the breakup of pregnant animals by trimesters, with the largest percentage being in the Second Trimester (36.7%) and decreasing in the Third Trimester (30.0%), highlights the significance of tracking late-gestation indicators that could impact fetal viability. These hormonal patterns highlight the significance of specific conservation measures, such as habitat maintenance and reproductive well-being monitoring, to maintain sound breeding habits and counteract reproductive interference in free-ranging and captive populations. Knowledge of these endocrine processes not only broadens species-specific reproductive information but also has implications for general applications in wildlife endocrinology and ecological sustainability.

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