



DYNAMICS OF MORPHOMETRIC CHANGES IN THE RIGHT HORN OF THE GOAT UTERUS DURING POSTNATAL ONTOGENESIS

Mallayev Muhridin G'ofur o'g'li

Termiz State University of Engineering and Agrotechnologies

*Assistant at the Department of Zootecology, Veterinary and Sericulture, PhD
in Veterinary Sciences*

Tangirov Kayum Jurayevich

Termiz State University of Engineering and Agrotechnologies

*Acting Professor at the Department of Zootecology, veterinary and
sericulture, Candidate of veterinary sciences*

Abstract: This article examines the dynamics of morphometric changes in the right horn of the uterus in goats during postnatal ontogenesis. The results showed that the length, width, and thickness of the right uterine horn developed unevenly depending on age, while demonstrating an overall growth trend. From 3 days to 60 months of postnatal ontogenesis, the length of the right uterine horn increased 14.4-fold, its width 6.55-fold, and its thickness 4.78-fold. The findings indicate intensive and differential morphological growth of the right uterine horn during postnatal development in goats.

Keywords: Goat, postnatal ontogenesis, morphometric parameters, growth coefficient, absolute parameter, uterine horn.

Introduction. In the Republic, extensive measures are being implemented to fully meet the population's demand for food products and to increase the production of environmentally friendly products in a wide range of varieties. Goat milk and meat are of particular importance as dietary products due to their beneficial effects on the human body. Therefore, rational utilization of goats requires consideration of their biological and genetic potential, as well as the mechanisms underlying the



formation and development of the female reproductive organs and thyroid glands at different physiological stages of postnatal ontogenesis.

The uterine horns in goats exhibit the most rapid growth from the neonatal period to 6–7 months of age.

The uterus (uterus, histera, metra), the primary female reproductive organ, is the organ in which the fetus develops. Based on its anatomical structure, particularly the presence of the uterine body and vagina and the degree of bifurcation, the uterus is classified into the following anatomical types: simple, bicornuate, bipartite, and duplex. The structure of the uterus varies among different animal species. In primates, the uterus is simple and pear-shaped and functions to maintain pregnancy. In ungulates, carnivores, and cetaceans, the uterus is bicornuate and consists of the uterine horns, body, and cervix. For example, all parts are well developed in horses; the uterine horns are long in pigs and wild boars; the cervix is broad in cattle; the cervix is narrow in goats and sheep; the uterus and vagina are long in elephants; and in cetaceans, the vagina is narrow but expands during parturition [1, p. 76].

The uterus of goats consists of two horns, a body, and a cervix. The uterine body and horns are suspended by the broad ligament of the uterus and covered by the visceral layer of the peritoneum. In non-pregnant goats, the uterine horns are 8–15 cm long, the uterine body is 3–5 cm, and the cervix reaches 5–7 cm in length. The weight of the uterus ranges from 80 to 150 g depending on the size and age of the goat. The uterine horns are responsible for receiving and supporting the developing fetus. The organ is covered by a serous membrane, while its muscular layer is primarily composed of outer longitudinal and inner circular smooth muscle fibers. The inner layer is a mucous membrane lined with columnar epithelium and containing tubular and branched glands. Numerous connective tissue caruncles are present in the mucosa of the uterine horns, and their number increases during pregnancy [2, p. 272].



According to the authors, in Arbia breed goats from Algeria aged 6–12 months, the length of the right uterine horn was 6.205 cm and its width was 0.963 cm, while the length of the left uterine horn was 6.68 cm and its width was 0.925 cm. Nevertheless, the right and left uterine horns of Black Bengal goats aged 7–12 months have also been described as relatively longer and wider. In Arbia goats aged 12–36 months, the length of the uterine horns was 7.97 cm on the right side and 8.483 cm on the left side. Comparative analysis showed that these values were greater than those reported for Red Sokoto and Black Bengal goats but lower than those observed in Anatolian goats. At the same time, the width of the uterine horns in Arbia goats aged 12–36 months was reported to be lower than the corresponding measurements recorded in Red Sokoto, Black Bengal, and Anatolian goats [3, pp. 345–358].

The author determined that in Saanen goats, caruncles are arranged in four rows on each uterine horn, whereas they form eight rows in the uterine body. The diameter of the caruncles was greatest in the region of the uterine body, with a gradual decrease in this morphometric parameter toward the cranial direction [69, p. 20].

Materials and methods. The research was conducted on the reproductive organs of local-breed goats from the “Tog‘aymurodov Burxon” farm in Boysun district and the “Vaxshivor Tapa”, “Bobo-Zangi”, and “Jo‘ra Cho‘pon” farms in Oltinsoy district, Surkhandarya region. Scientific investigations were carried out on the reproductive organs of animals at 3 days, 3, 6, 12, 18, 36, 48, and 60 months of postnatal ontogenesis.

The study was conducted using 40 samples obtained from the reproductive organs of 40 goats. Animals corresponding to the studied age groups were selected based on uniform coat color, constitutional type, clinical health, and moderate body condition. The live body weight of the goats was measured before slaughter.



For examination, the uterine body was anatomically dissected, and its length, width, and thickness were measured. The weight was determined using a KEPN 620 g electronic balance with an accuracy of 0.01 mg.

General morphological methods developed and introduced by N.P. Chirvinsky were used for processing the reproductive organs and determining their morphometric parameters. Laboratory analyses were conducted at the Department of Zootecology, veterinary and sericulture of the Termiz institute of agrotechnologies and innovative development, as well as at the laboratory of the state center for diagnosis of animal diseases and food safety of Surkhandarya region.

All numerical data obtained from the scientific investigations were subjected to mathematical processing according to the method of V.K. Merkurieva.

To determine age-related changes in the reproductive organs of goats, the growth coefficient was calculated. The growth coefficient was determined by dividing the length, width, thickness, and weight of the right uterine horn in older animals by the corresponding parameters of the female reproductive organs in younger animals. The entire studied period of postnatal ontogenesis was determined using the formula developed by K.B. Svechin:

$$K = \frac{V_t}{V_o}$$

K – growth coefficient;

V_t – absolute value of the reproductive organ in an adult animal;

V_o – initial value of the reproductive organ.

Mathematical and statistical analysis was performed using Student's t -test and Fisher's test in Microsoft Excel spreadsheet software.

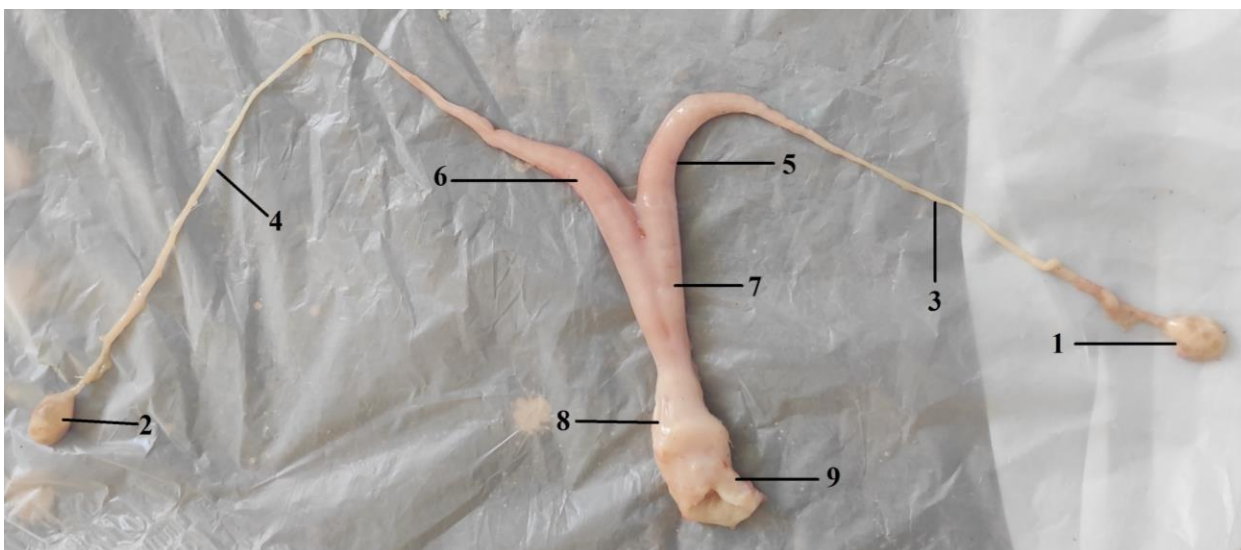


Figure 1. Female reproductive organs of a 6-month-old goat:

1 – right ovary; 2 – left ovary; 3 – right oviduct; 4 – left oviduct; 5 – right uterine horn; 6 – left uterine horn; 7 – uterine body; 8 – cervix; 9 – vagina.

Research results. The absolute value of the length of the right uterine horn was 0.93 ± 0.02 cm during the first 3 days of postnatal ontogenesis in goats. At 3 months of age, this parameter increased to 1.5 ± 0.05 cm ($K=1.61$; $p<0.04$). At 6 months of age, a rapid increase was observed, reaching 3.03 ± 0.07 cm ($K=2.02$). At 12 months of postnatal ontogenesis, a slight decrease was observed, with the value reaching 4.66 ± 0.1 cm ($p<0.03$). From 12 to 18 months of age, a rapid increase was observed, reaching 12.2 ± 0.2 cm ($K=2.62$) at 18 months. At 36 months, the parameter decreased considerably to 6.8 ± 0.1 cm ($K=0.56$). From 48 to 60 months of age, another rapid increase was observed: the value reached 8.06 ± 0.1 cm ($K=1.18$) at 48 months and increased to 13.4 ± 0.2 cm at 60 months, with a growth coefficient of 1.66. The overall growth coefficient of the absolute length of the right uterine horn from 3 days to 60 months of postnatal ontogenesis was 14.4-fold.

The absolute value of the width of the right uterine horn from the first 3 days to 3 months of postnatal ontogenesis remained unchanged, increasing from 0.2 ± 0.00 cm to 0.2 ± 0.00 cm ($p<0.03$). At 6 months of age, this parameter increased rapidly,



reaching 0.58 ± 0.01 cm ($K=2.9$), while at 12 months it decreased to 0.6 ± 0.01 cm ($p < 0.02$). A rapid increase in this parameter was observed from 18 months of postnatal development, reaching 1.56 ± 0.02 cm ($K=2.6$) at 18 months. At 36 months, a slight decrease to 1.33 ± 0.02 cm was observed, followed by a considerable decrease to 1.06 ± 0.02 cm at 48 months ($K=0.80$; $p < 0.02$). At 60 months, the value increased slightly to 1.31 ± 0.03 cm ($K=1.23$). The overall growth coefficient of the width of the right uterine horn from the first 3 days to 60 months of postnatal ontogenesis was found to be 6.55-fold.

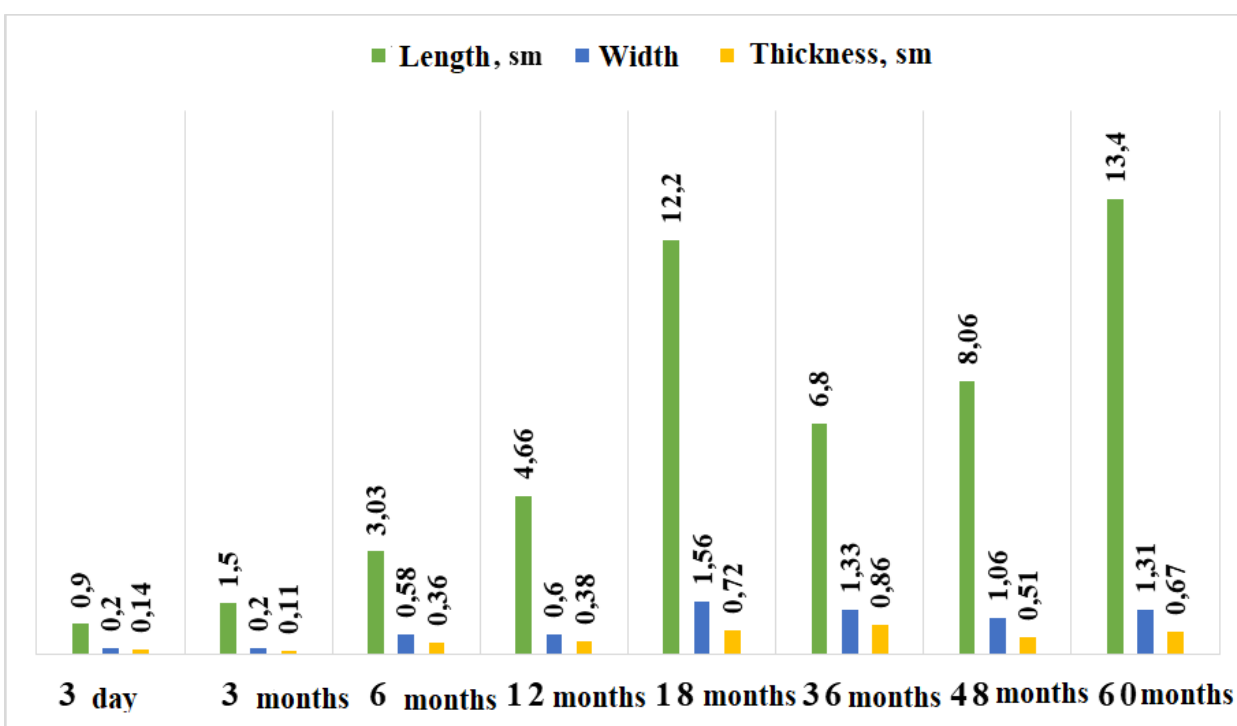


Figure 2. Morphometric parameters of the right uterine horn in local-breed goats (M).

The absolute value of the thickness of the right uterine horn increased in proportion to its linear dimensions from 3 days to 60 months of postnatal development. From 3 days to 3 months of age, this parameter slightly decreased from 0.14 ± 0.00 cm to 0.11 ± 0.002 cm ($K=0.78$; $p < 0.02$). Subsequently, it increased



up to 6 months, reaching 0.36 ± 0.01 cm ($K=3.27$; $p<0.04$). At 12 months, a significant decrease was observed, with the value reaching 0.38 ± 0.01 cm ($p<0.03$). From 18 to 36 months, the parameter increased again, from 0.72 ± 0.01 cm to 0.86 ± 0.018 cm. At 48 months, it decreased to 0.51 ± 0.009 cm ($K=0.60$; $p<0.02$), whereas at 60 months it increased slightly, reaching 0.67 ± 0.11 cm.

The overall growth coefficient of the absolute thickness of the right uterine horn from 3 days to 60 months of postnatal ontogenesis was 4.78-fold.

Conclusion

1. During postnatal ontogenesis in goats, the morphometric parameters of the right uterine horn-length, width, and thickness-changed depending on age and demonstrated an overall growth tendency throughout the developmental process.

2. The length of the right uterine horn was 0.93 ± 0.02 cm during the first 3 days of postnatal ontogenesis and reached 13.4 ± 0.2 cm at 60 months of age. Overall, this parameter increased 14.4-fold from 3 days to 60 months of age.

3. The most intensive growth of the length of the right uterine horn was observed at 3–6 months and 12–18 months of age. A decrease in the length parameter was recorded at certain age stages, particularly at 36 months, indicating an uneven pattern of uterine horn development.

4. The width of the right uterine horn increased from 0.2 ± 0.00 cm during the first 3 days to 1.31 ± 0.03 cm at 60 months of age, representing a 6.55-fold increase throughout postnatal ontogenesis. The most intensive increase in width was observed between 6 and 18 months of age.

5. The thickness of the right uterine horn was 0.14 ± 0.00 cm during the first 3 days of postnatal ontogenesis and reached 0.67 ± 0.11 cm at 60 months of age. The overall growth coefficient of this parameter was 4.78-fold.

6. It was established that changes in the length, width, and thickness of the right uterine horn during postnatal ontogenesis did not occur at the same rate. The decrease in certain morphometric parameters at some age stages, followed by an



increase at subsequent stages, indicates that the postnatal development of the right uterine horn is a complex and differential morphofunctional process.

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