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HISTOLOGY OF UTERUS OF DUBSKA PRAMENKA DURING SEXUAL SEASON

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Abstract: Bosnia and Herzegovina has always had a developed sheep production, at least from the aspect of the number of sheep per capita. Today, the ratio is 1 sheep per 4 persons, because the cattle production, globally looking, is decimated by war. Thanks to the geographic location of the country, the quality of mountain pastures and environment that is still healthy, we believe that with increased investments in sheep production we could increase the number of heads, which would have positive effects on production of meat and milk of exceptional quality. The study involving the uterus of Dubska pramenka during sexual season under nomadic conditions of holding, demonstrated that, in adequate zoo hygiene conditions (holding, feeding, treatment of animal), the sheep showed increased reproductive parameters as well as parameters manifested in meat and milk production. In our studies, microstructure of uterus of Dubska pramenka during sexual season shows extremely positive characteristics for nidation of the egg cell and normal development of the embryo. Epithelium of the uterus is in a form of high-prismatic cells, which points to significant cell activity; perfusion and development of myometrium are visible. The uterine glands are extremely well developed and their histological structure indicates increased secretion and preparation of the uterus for gravidity.

Key words: Dubska pramenka, uterus, sexual season

Introduction

In Bosnia and Herzegovina, the share of domestic Pramenka in sheep breeding is 90%; it is bred in the extensive system, in the hill and mountain area. It should be emphasised that the domestic Pramenka breed, in struggles to sustain

itself, managed to keep its reproductive capacity relatively well, because under certain conditions it is possible to get 100 lambs from 100 sheep on a regular basis.

Sheep production in these areas (Central Bosnia Canton) represents a significant income and in some way it contributes to the development of these areas. Considering the vast pasture areas, B&H had substantial opportunities to increase the number of sheep. However, after the war, the huge losses are not even remotely covered, and the organisation of the sheep production has suffered many changes.

Sheep is a short-day animal, which means that oestrus occurs naturally in late autumn, when the number of daylight hours during the day is reduced. Sexual cycle lasts between 16 and 17 days. The signs of oestrus include mating readiness, growth and rupture of ovary follicles (ovulation), excretion of cervical secretion, hyperaemia and perfusion of the vaginal mucosa, redness and swelling of the vulva. Potential reproductive capacities of the Pramenka sheep are significantly higher under favourable feeding and holding conditions; it is not mono-seasonal animal, which is proven by off-season responsiveness of its ovaries and possibility to induce oestrus, fertility in the off-season phase. It should be underlined that success in inducing off-season oestrus and fertility is largely dependent on resolving the feeding problem.

Materials and Methods

The material required was taken in the field, Central Bosnia Canton, (Dubska Pramenka is indigenous sheep, village Dub, the Travnik area), and the study was done at the Faculty of Veterinary of the University of Sarajevo. The study of histological characteristics of Dubska pramenka was done during sexual season. The total number of animals involved is eight (8). Samples of uterus were taken from several places, closely paying attention not to crush the tissue of uterus. The samples were stored in plastic cups with lid, filled with 10% formalin, until the moment of moulding in paraffin blocks. Moulding in paraffin blocks was done in a way that the samples of uterus were placed in 70% of alcohol for two days, then in 96% of alcohol for one day, and in 100 % of alcohol for one day. The materials were then transferred to a mixture of 100% alcohol and toluol for two hours, and then only in toluol for four hours. The prepared samples were placed in paraffin I for five hours and paraffin II for twelve hours, and the paraffin moulding process was completed.

The paraffin blocks with the moulded samples of uterus were cut using digital microtome - several series cuts, 0.5 to 1.5 micron thick. The cuts were placed on glass slides, stained with haematoxylin eosin and azan, covered with cover glass and glued with Canada balsam. Histological assays were done using light microscope, under magnification of 100, 200 and 400 times. The microscopic

examination included the entire uterus in order to get a full picture of the organs examined over given periods of time. The results were presented using descriptive interpretation of histological preparations, making sure that the comparative presentation of histological preparations is representative of our studies.

Results and Discussion

The womb is a hollow, muscular organ; it has mucosa -Tunica mucosa, *Endometrium*; the middle layer-Tunica muscularis, *Myometrium*, and the outer layer-tunica serosa with subserosa, *Perimetrium*.

Histological structure of the Dubska pramenka uterus during sexual season points to excellent characteristics for nidation of a fertilised egg cell and smooth development of the embryo. Epithelium is in a form of high-prismatic cells with clearly visible oval nuclei. Among the dominant high-prismatic cells, there are also stem- basal cells, and the full structure of the endometrial surface indicates excellent cell activity (Figure 1. Epithelium of the endometrium during sexual season; haematoxylin eosin; x 400). It is important to emphasise that our results are fully compatible with the results of *Miljkovic (1986); Mitic (1984); Katica et al. (2010),* who also highlight that sexual season in sheep, in terms of the uterine microstructure, is characterised by significant cell activity of the endometrium. Hyperplasia, an increase in number of cells and hypertrophy, an enlargement of the size of the cell components, occurs under the influence of estrogen *(Dellmann, Brown, 1976).*Perfusion is also pronounced, which is clearly seen in a well-developed connective tissue, while the uterine glands are clearly visible; they are of limited lumen with high-prismatic cells in a form of larger groups, which points to the increased secretion and the preparation of the uterus for gravidity. Progesterone induces hypersecretion, i.e. increased secretion (Figure 2. Uterine glands during sexual season; haematoxylin eosin x 200). Some sites in the lamina propria are well-vascularised; they do not contain glands; they represent the carunculae, *Kozarić Z., (1997)* to which, after insemination and development of placenta, cotyledons attach, forming the placentomes.

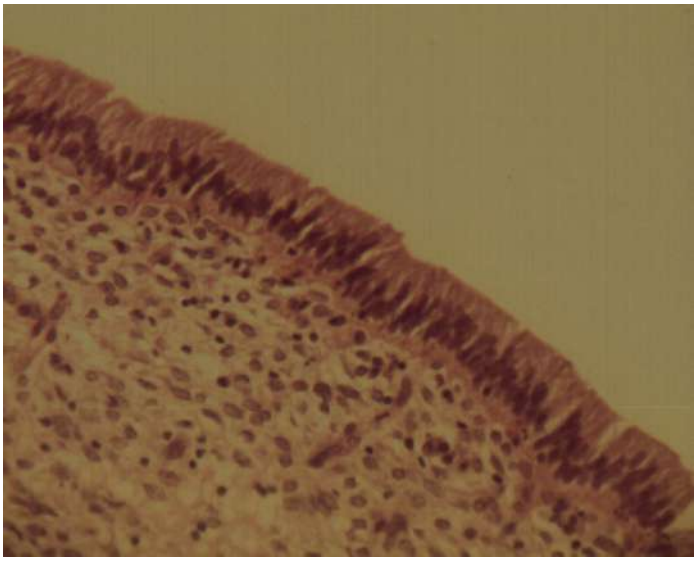

Figure 1. Epithelium of the endometrium during sexual season; haematoxylin eosin; x 400

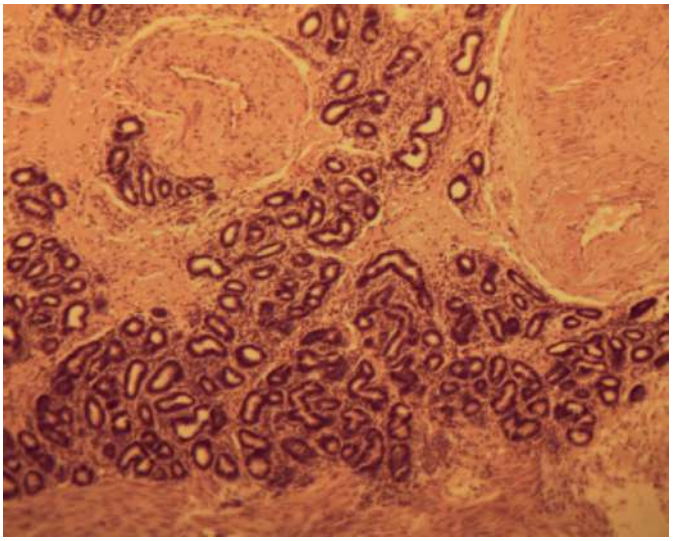

Figure 2. Uterine glands during sexual season; haematoxylin eosin x 200

Myocyte - myometrium is well developed, and spindle-shaped smooth muscle cells are arranged in longitudinal and circulatory layer, with clearly visible nuclei and tapered ends adding on to each other (Figure 3. Myometrium during sexual season; haematoxylin eosin x 200). The studies of other authors correspond to these results *(Gutic M. et al. 2006.; Okljesha B., 1957., Mutevelic A. et al. 2003.)*, who highlight the significant development of the muscle layer of the uterus

in sexual season, not only in sheep but in other ruminants, bovine or goat, for instance.

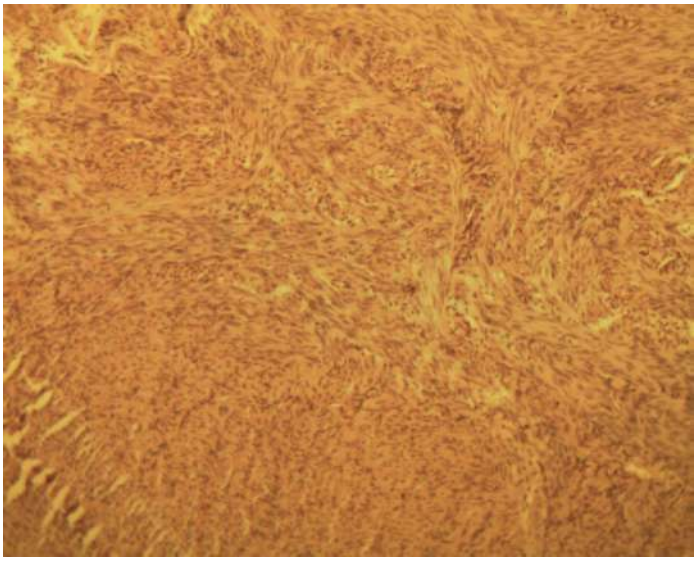

Figure 3. Myometrium during sexual season; haematoxylin eosin x 200

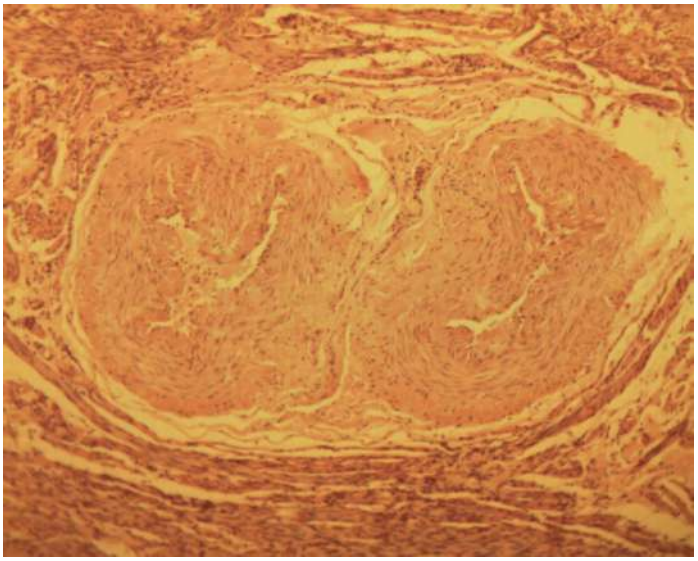

Figure 4. Ligamenta viva uteri; haematoxylin eosin x 200

The studies also showed clearly visible so called "ligamenta viva", *ligamenta viva uteri*, i.e. branches of art. uterine, *arteriae arcuatae*, located in the

muscle layer of the uterus, in larger or smaller groups and with rather thick walls, with not so visible lumen due to thickness of the blood vessel wall, i.e. there is an increased number of smooth muscle cells in the walls of the blood vessels, and their contraction is increased and under the influence of estrogen. (Figure 4. Ligamenta viva uteri; haematoxylin eosin x 200), with which other authors such as *Sobotta (2004); L.C. Junquera, J. Carneiro (2005)* are also concurrent.

In our case, the perimetrium was clearly separated from the myometrium; it is of somewhat lighter colour and is somewhat thicker than usual**.** There is a clear layer of connective tissue and a layer of squamous cells separated from each other with their edges (Figure 5. Perimeterium; haematoxylin eosin x 100).

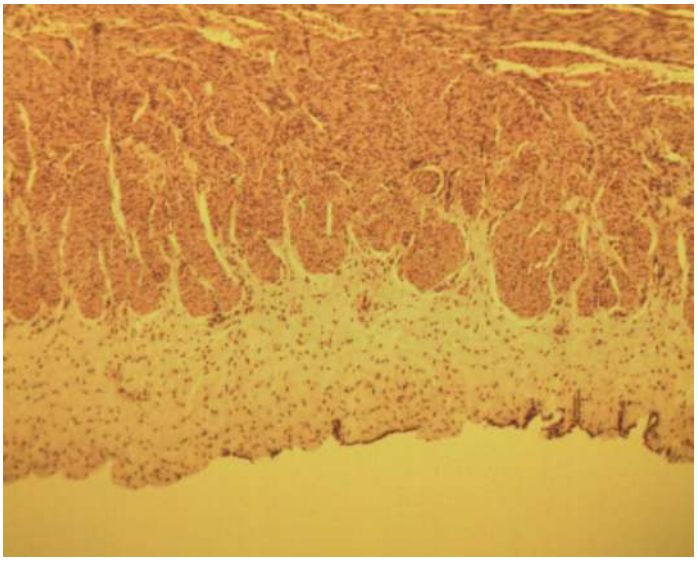

Figure 5. Perimeterium; haematoxylin eosin x 100

Conclusion

The descriptive histological assays of the Dubska pramenka uterus during sexual season concludes that, regardless of nomadic holding of the indigenous breed of the sheep Dubska pramenka, but with adequate feeding and care, the microstructure of the uterus shows favourable conditions that allow for proper development of a healthy embryo. The conditions include:

- High-prismatic epithelium indicating an increased secretion and significant hormonal activity;
- Presence of carunculae, protrusion of mucosa, the embryo nidation site;
- Development of the uterine glands, which is closely related to the progesterone phase of the sexual cycle, i.e. preparation of the uterus for

embryo nidation Developed muscle layer of uterus with significant strong musculature that ensures gravidity, injected lig. lata uteri

Histologija uterusa dubske pramenke u polnoj sezoni

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Rezime

Bosna i Hercegovina je uvek imala razvijenu ovčarsku proizvodnju, bar gledano na osnovu broja ovaca na ukupan broj stanovnika. Danas je odnos 1 ovca na 4 čoveka, jer je stočarska proizvodnja, globalno gledajući , ratom desetkovana. Zahvaljujući geografskom položaju naše države, te kvalitetu planinskih pašnjaka i još uvek zdravoj okolini, smatramo da povećanim ulaganjem u ovčarsku proizvodnju, možemo povećati i ukupan broj grla, što bi se pozitivno reperkutiralo na proizvodnju mesa i mleka, izuzetnog kvailteta.

Naša istraživanja uterusa dubske pramenke u polnoj sezoni u nomadskom načinu držanja, pokazala su da ovca uz adekvatne zoohigijenske uslove (držanje, ishrana, odnos prema životinji) znatno pakazuje povećane reproduktivne parametre kao i parametre iskazane u proizvodnji mesa i mleka.

Mikrostruktura uterusa pramenke u polnoj sezoni, našim istraživanjima, pokazuje izuzetno pozitivne karakteristike za nidaciju jajne ćelije i normalan razvoj ploda. Epitel uterusa je u formi visokoprizmatičnih ćelija, što ukazuje na znatnu ćelijsku aktivnost, prokrvljenost je uočljiva i razvijenost miometrijuma. Glandule uterine su izvrsno razvijene i po svojoj histološkoj strukturi ukazuju na pojačanu sekreciju i pripremu uterusa za graviditet.

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