

# Morphological characteristics of a placenta of a goat when it is normal and at a stillbirth

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**Abstract**—The article presents the results of histological examination of a placenta of a goat when it is normal and in the pathology of stillbirth. The experiments were carried out at the Department of Morphology, Examination and Surgery of the Ural State Agrarian University. The study has been carried out with placentas from 10 goats, which at the time of delivery had healthy posterity and stillborn foetuses. The morphological changes in three components of the placenta were estimated: epithelium of chorionic villi, connective tissue component and vascular component. It was found that in pathological pregnancy there is shortening of chorion villi, proliferative activity of the epithelium, vacuolization and necrosis of the villi. Vascular reaction was shown in overgrowth of blood vessels, mass diapedesis of red blood cells, endothelial cell exfoliation. From the side of the connective tissue component with stillbirth there were edema of the villous stroma and migration of polymorphonuclear leukocytes. Active perivascular reaction of mast cells was revealed.

**Keywords**—*histological examination, placenta, goats, stillbirth.*

## I. INTRODUCTION

Over the past 20 years the interest in small cattle increased in our country, particularly in goats, therefore a lot of studies of goat's milk and its benefits started to be carried out, so dairy goat breeding became really widespread. At large enterprises in Europe, Russia and the United States there are goats of Swiss (Alpine) dairy breed and their hybrids. Goats of these breeds are among the most productive ones in dairy goat breeding, their average productivity is 780-800 liters of milk per year [1].

At the moment there is a shortage of scientific literature on obstetric and gynecological pathologies and diseases of the reproductive system of goats.

For normal development of a fetus it is necessary to have constant coordination of functions of two organisms – of a mother and a fetus, that form a single morpho-functional system "mother-fetus". The main coordinating link of this system is a placenta [2].

A placenta, being a provisional authority, provides the development from embryo to viable offspring. The functions of a placenta are aimed at maintaining normal maternal-fetal relationships, consisting not only of the delivery of nutrients to a fetus and the excretion of metabolic products, but also of protection it from the harmful effects of a mother's body and the environment [2,3].

A placenta of a goat, according to the nature of the connection of the fetal placenta and the maternal placenta is desmochorionic, it does not fall off. The trophoblast of the chorion sometimes destroys the epithelial covering of the endometrium, resulting in the villi of the chorion in contact with the connective tissue structures of the lamina propria of the mucous membrane of the uterus. It should be noted that to date, the existence of this type of placenta is disputed by some researchers, since ultramicroscopic examination allowed them to detect on the surface of the endometrium very flattened epithelial cells, which are not detected at the light-optical level [4]. In desmochorionic placenta chorionic villi are located on the surface of the membranes in cotyledons, which from the side of the maternal part of a placenta correspond to a kind of bulges – carunculae. As a result of interaction of the contacting tissues of a fetus and a mother a complex combinations cotyledon-caruncula is formed that is called placentoma. Each placentoma is like a separate little placenta, so this placenta is called multiple or cotyledonary placenta [3, 1, 5, 6].

After the analysis of foreign literature sources we found out that there are more works describing the normal structure of goats placenta at different gestation periods [1, 5].

Classically the reasons of stillbirth are divided into two large groups: infectious and non-infectious. The main infectious reasons of abortion and stillbirth in case of goats are: campylobacteriosis, chlamydia, toxoplasmosis [7, 8]. It is interesting, that the most common reason from non-infectious ones is injuries, further toxicosis, fodders of bad quality, stress, incorrect presentation of a fetus [8, 9].

Studies on the histological structure of a goat placenta are rarely mentioned in Russian literature. In this regard the purpose of our study is to study the morphological structure of a goat placenta when it is normal and in the presence of stillbirth pathology.

## II. MATERIALS AND METHODS:

Studies were carried out at the Department of Morphology, Examination and Surgery of the Ural State Agrarian University (2018-2019).

A placenta from goats ( $n = 10$ ) of Alpine breed was used as the object of the study. The fetal placenta and the maternal placenta were selected. At the time of the delivery period 3 goats had a pathology of stillbirth, 7 females had a normal course of delivery and the postpartum period.

Placenta was fixed in 10% aqueous solution of neutral formalin. Preparations with size 1.5×1.0×0.5 were made from the material, they were dehydrated in alcoholic solutions of ascending concentration and xylenes, then poured into paraffin. The thickness of the sections was 5-7 microns. Sections were prepared on a microtome MC-3.

Staining of the preparations was done according to traditional methods. Staining with hematoxylin and eosin was used for general evaluation of the complete development and morphological state of tissue of a placenta. Van-Gieson staining was also done for the best visualization of the connective tissue component.

### III. RESULTS

Morphological changes in placental tissues were estimated according to three main components: changes of the epithelium of chorionic villi, connective tissue component and vascular component.

The morphological structure of the placenta of goats without pathology of the birth period shows the preservation of the integrity of the epithelial covers of chorionic villi.

A small number of empty vessels, which is physiological for the aging organ.

During the histological study of a placenta of goats with the presence of stillborn fetuses in the birth period, a general shortening of chorionic villi was shown. The epithelium of the villi of some areas was exposed and desquamation.

On the side of the epithelium of villi proliferative activity of the epithelial layer, cell hyperplasia, necrotic exfoliation and, as a consequence, local necrosis of the villi were observed (Fig. 1).

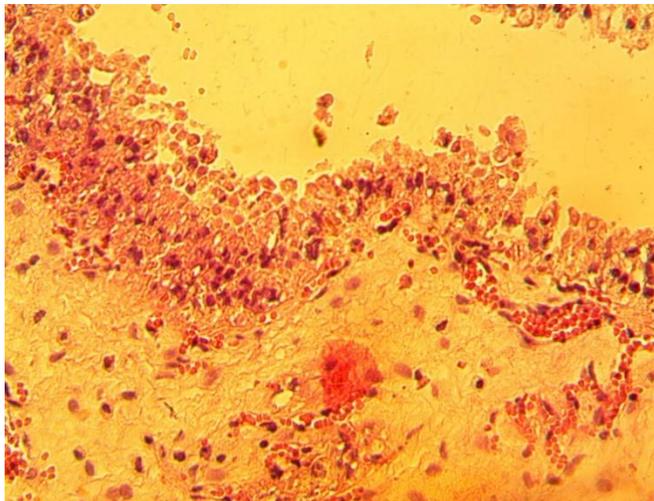


Fig. 1. A placenta of a goat. Necrosis of the villi epithelium. Stained with hematoxylin and eosin. Zoom in. 400X

Groups of cells with hyperchromic nuclei were found in chorion villi. On the surface of the villi, you can see the decay of individual epithelial cells, or the epithelium of entire villi was subjected to vacuolar dystrophy.

Cytoplasmic inclusions, in most cases, are vacuolar. In some cases there was a simultaneous vacuolation of cytotrophoblast components and epithelial cells (Fig. 2).

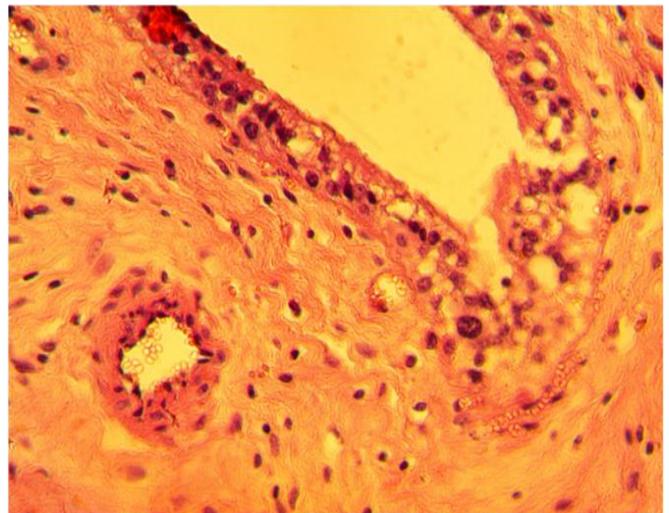


Fig. 2. A placenta of a goat. Vacuolation of cytotrophoblast components and epithelial cells. Stained with hematoxylin and eosin. Zoom in. 400X

In the connective tissue component of chorionic villi, edema of the stroma and the formation of cystic cavities were found in most animals (Fig. 3).

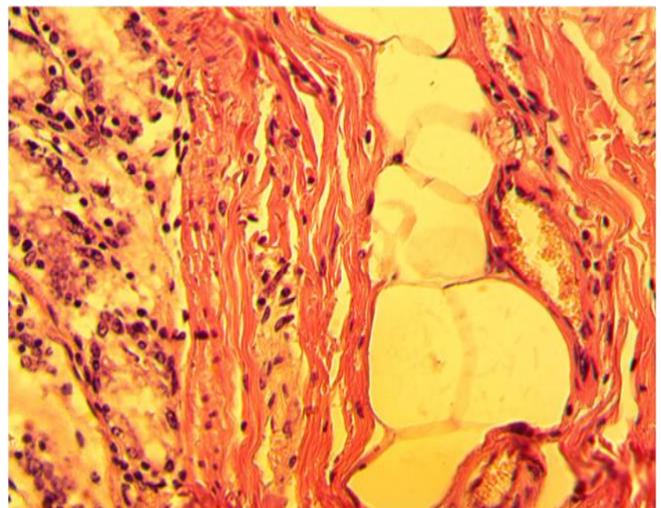


Fig. 3. A placenta of a goat. Formation of cystic cavities. Stained with hematoxylin and eosin. Zoom in. 400X

In the areas of the stroma of villi, along with fiber edema (Fig. 5), migration of polymorphonuclear leukocytes, their decay into purulent corpuscles, the state of hyperemia and dissection of the vascular wall are pronounced (Fig. 4).

Fibrinoid deposits, (marker of immune conflict) in the interstitial space, in large quantities.

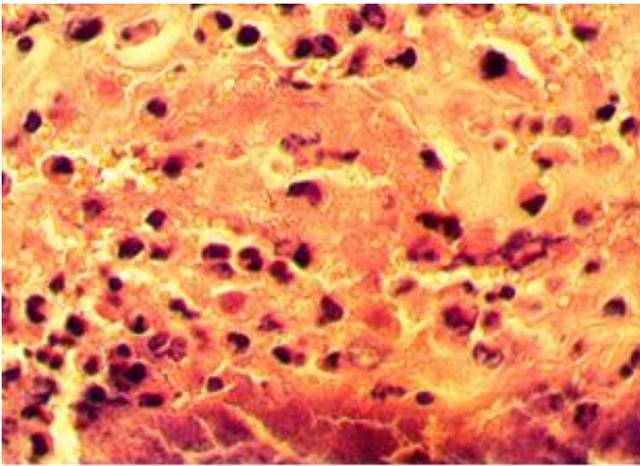


Fig. 4. A placenta of a goat. Reaction of polymorphonuclear leukocytes. Stained with hematoxylin and eosin. Zoom in. 1000X

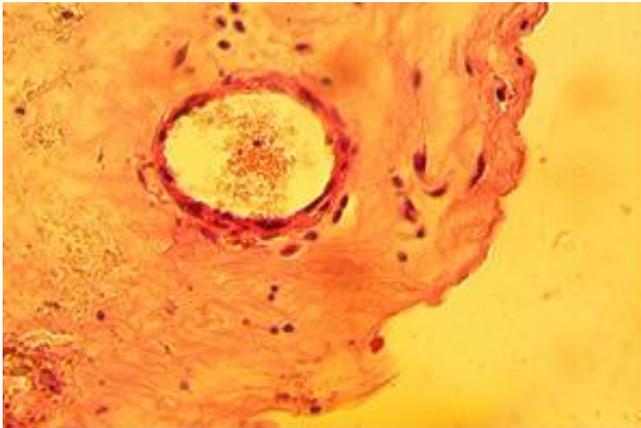


Fig. 5. A placenta of a goat. Stroma edema, diapedesis of erythrocytes, perivascular mast cells. Stained with hematoxylin and eosin. Zoom in. 400X

Eosinophils, macrophages, lymphocytes and plasma cells are present in different amounts.

Active mast cell reaction was observed at the border with pathological foci, at the same time a large number of mast cells were registered in perivascular space. The functional activity of mast cells varied (Fig. 6).

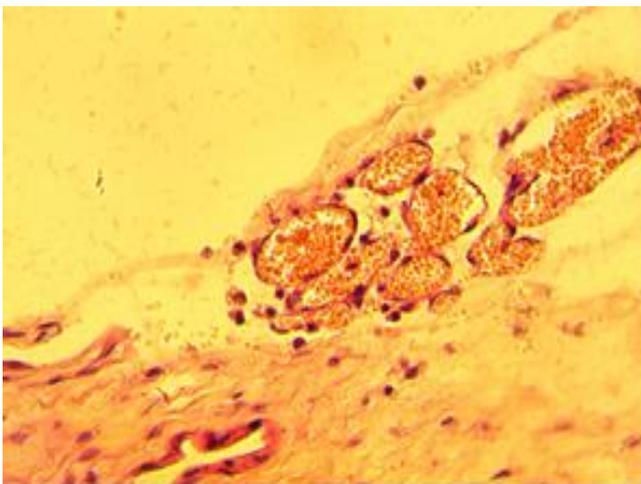


Fig. 6. A placenta of a goat. Active mast cell reaction. Stained with hematoxylin and eosin. Zoom in. 400X

In the lumen of blood vessels there was observed desquamation of endothelial cells, dissection of the vessel wall, intravascular hemolysis of erythrocytes and deposition of hemosiderin, mass diabetes of red blood cells (Fig. 7).

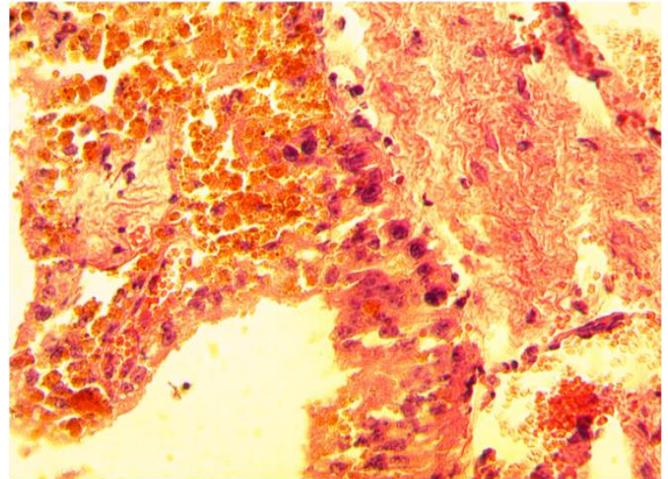


Fig. 7. A placenta of a goat. Deposition of hemosiderin. Stained with hematoxylin and eosin. Zoom in. 400X

#### IV. CONCLUSION

Analysis of the data obtained by us indicates a bright response of the organism, manifested as pathological and compensatory-adaptive processes.

The complex of changes in a placenta of goats revealed by us in the presence of stillbirth pathology is characterized by chronic, dystrophic, necrobiotic and vascular-stromal processes, what indicates the development of a complex of compensatory adaptive changes. Stromal vascular disorders, which were identified in the course of our study, allow us to talk about the development of fetoplacental insufficiency syndrome.

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