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THE AGE HISTOLOGY ADRENAL MEDULLA OF THE CATTLE

Abstract: *In the thesis describes a material on the morphology of the adrenal medulla of cattle in the postnatal development - from birth up to ten years. Installed topographic features adrenaline A-cells and noradrenaline N-cells cells, their comparative morphology and growth patterns. Before puberty the size of the adrenal cells decreases and reaches a maximum yearling animals. Contact pattern characteristic of noradrenaline cells that grow to puberty and then their growth is reduced and restored after puberty.*

Key words: *morphology, adrenal glands, medulla, adaptation, development, cattle.*

Language: *English*

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The lack of harmony between physiological state of the animal and the production technology is primarily reflected in the endocrine system. In its role as an integrating and adaptive systems, it ensures the integrity of the organism and its unity with the environment [1, 4, 6]. Currently, special importance has acquired a detailed study of the morphology, physiology and biochemistry of endocrine producing animals, since knowledge of the laws of the adrenal glands, as bodies directly providing the body's metabolism, is a biological basis for the development of full feeding and improving the productive qualities of farmed livestock. For a more complete understanding of the consequences of the impact of various external factors on the cattle adapted to different habitat conditions, the need for extensive morphological studies [2, 3, 10].

The adrenal glands - one of the leading units of the adaptive system. Produced by the adrenal gland hormones, provide the body's resistance to the stress of the situation, reduce vascular permeability, have anti-inflammatory properties have a positive effect parameters affect energy metabolism and activity of respiratory enzymes [5, 7, 8, 9].

Purpose - to determine the age characteristics and dynamics of the structural components of the adrenal medulla cattle.

Material for the study was selected from cattle in the Vitebsk Meat Packing Plant. For morphological studies adrenals were collected from the animals, weighed, cut a piece of the center gland and fixed in 10% neutral formalin solution.

Histological studies were performed at the Department of Pathological Anatomy and Histology Vitebsk State Academy of Veterinary Medicine. Morphological material was compacted by pouring in paraffin. Histological sections were prepared a thickness of 3 - 5 um on MS-2 microtome and stained with haematoxylin and eosin. Terminology described histological structures of the adrenal medulla are given according to the International histological nomenclature. Absolute measurements of the structural components of the adrenal gland was performed using a light microscope «Olympus» model BX-41 digital camera system «Altra20» and HR 800 spectrometer using the program «Cell A» and spent photographing color images (resolution of 1400 by 900 pixels). In addition to the Celestron Digital Microscope with LCD-screen PentaView, model # 44348 was carried out photographing, followed by analysis of color images (resolution of 1920 by 1080 pixels). All digital data obtained during the morphological studies, were treated with the help of computer software professional statistical package «IBM SPSS Statistics 21».

In the center of the adrenal medulla is A- and N-cells. Form of brain substance is more or less repeats in a moderate amount of body shape. Adrenal medulla of newborn calves has a structure indistinguishable from the typical structure of the medulla of adult animals. In a supportive framework medulla consisting of loose connective tissue, are numerous vascular cavity - venous sinuses. Medullar cells of large size, light colored, with large spherical

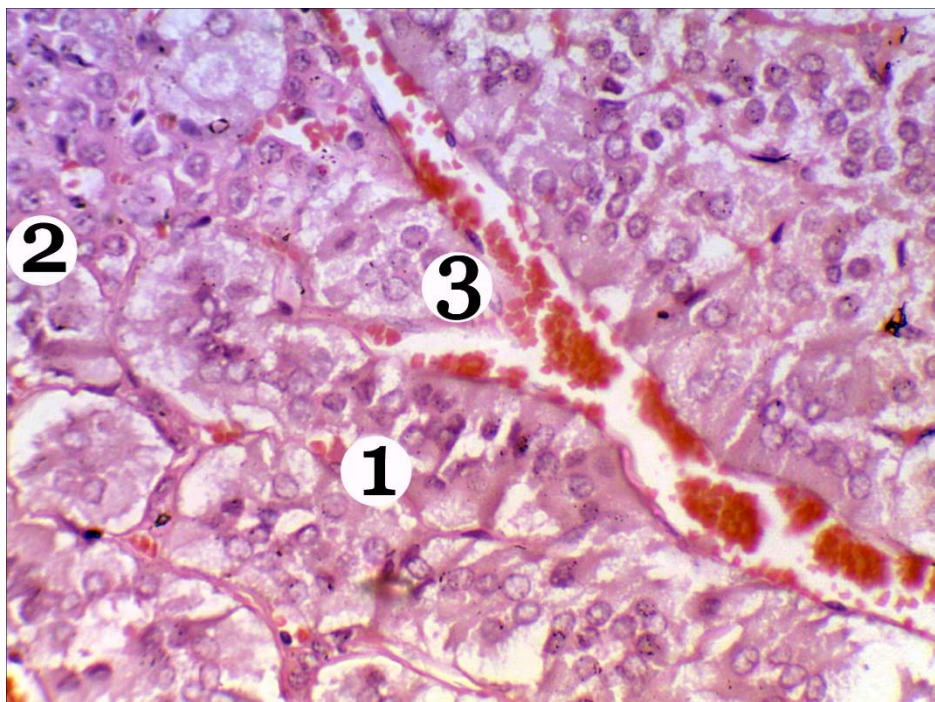
basophilic nuclei. The nuclei are located mainly eccentric nucleolus and well expressed. The cytoplasm contains grains, granules. A-cell disposed under the mesh zone of the cortex in the form of long strands extending in different directions, and the N-aggregation of cells localized in the central part of the adrenal medulla A-cells include. A-cells prismatic, with distinct boundaries, spherical nuclei and slightly basophilic cytoplasm (Fig. 1). N-cells often polygonal shape, arranged in groups or islands, surrounded by a thin connective tissue layers, forming a continuous network of the adrenal

medulla. Connective tissue layer between the cell clusters are well developed in the glands of the newborn, and layer is absent. Three monthly animals in the adrenal medulla expanding venous sinuses formed connective frame without layer. In adult calves between strands A- and N-cells medulla has a wide capillary sinusoids so numerous that all cells are in contact with the endothelium of blood capillaries. Among A- and N-cells adrenal medulla localized nerve cells, whose axons terminate between endocrine cells.

Table 1

Parameters of the adrenal medulla cattle in postnatal ontogenesis

Age	Diameter of A-cells, um	Volume of nucleus A-cells, um ³	Diameter N-cell, um	Volume of nucleus N-cells, um ³
Newborn	10,62±0,71	103,23±2,02	8,46±0,40	80,74±1,25
1 month	15,66±0,51	118,34±0,67	10,59±0,39	102,07±1,29
3 month	16,13±0,32	119,20±0,56	10,70±0,22	104,67±0,71
6 month	12,86±0,26	109,94±0,62	10,77±0,33	105,14±0,22
1 year	18,56±0,38	136,43±0,87	9,70±0,33	100,09±0,64
2 years	19,11±0,16	127,86±0,51	13,03±0,54	107,19±0,24
4 years	15,11±0,21	110,89±0,52	9,77±0,40	112,85±0,42
10 years	14,59±0,24	102,72±1,07	10,04±0,20	90,96±2,08



1 - A-cells, 2 - N-cell, 3 - sine wave

Figure 1 - Advanced sinusoid and major A-cells in the adrenal medulla of 3 month old calf

In newborn calves diameter A-cells of the adrenal medulla is $10,62 \pm 0,71$ um, and N-cells - $8,46 \pm 0,40$ um. At monthly calves the size of A-cells

is increased by 32,18%, and 3-month animal figure is stable and equal to $16,13 \pm 0,32$ um (Table 1). In the adrenal medulla six-month animal figure had

decreased by 20,27% and yearling - index increased by 30,71%. Up to 2 years diameter of accessory cells did not change significantly, but of all age periods is the maximum value ($19,11 \pm 0,16 \mu\text{m}$). For the 4th year in animals medulla gland size of accessory cells is reduced by 20,93% and to 10 years and amounts to $14,59 \pm 0,24 \mu\text{m}$. Consequently, the diameter of A-cell to 2 years increased 1,80 times, and then a 10-year decreases 1,31 times. The volume of the nuclei A-cell in the first month increased by 1,15 times, and at 6 months and reduced to $109,94 \pm 0,62 \mu\text{m}^3$. The maximum volume of the nucleus is at the age of 1 year and is $136,43 \pm 0,87 \mu\text{m}^3$. Consequently, the volume of the nucleus of A-cells of the adrenal medulla to a year increased 1.32 times, and then for 10 years and is reduced by 1,33 times.

Growth N-cells adrenal medulla differ significantly from growth A-cells. At monthly calves the size of the N-cells is increased by 20,11% and at 6-monthly animal figure is stable and $10,77 \pm 0,33 \mu\text{m}$. At year-old animal figure drops to 2nd year increased to $13,03 \pm 0,54 \mu\text{m}$. It is noted that before puberty A-cell size decreases and yearling animals becomes maximal, N-cells grow before puberty, and

then decreases and their growth is restored after puberty. The volume of the nuclei N-cells has the same pattern of growth as the cell itself, but the maximum rate stands at the 4-year-old cattle and is $112,85 \pm 0,42 \mu\text{m}^3$. Consequently, the amount of nuclei of N-cells of the adrenal medulla is increased 1,40 times, and then reduced to 1,24 times. During the period we studied the age A-cells and the amount of their nuclei prevail over N-cells and their nuclei in the medulla of the adrenal gland of cattle.

Conclusion. In the neonatal period the adrenal medulla has little definitive structure of the parenchyma and a well developed connective tissue framework. Vasculature becomes medulla formed by 3 months of age, calves. During the period we studied the age A-cells and the amount of their nuclei prevail over N-cells and their nuclei in the medulla of the adrenal gland of cattle. During puberty, adrenal medulla in the A-cells reaches their maximum size, and N-cells and their nuclei are reduced in size and maximum are after puberty. All these data indicate growth and increased activity A- and N-cells in the first months of life and during puberty.

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