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CLINICAL AND MORPHOLOGICAL MANIFESTATION OF KETOSIS OF DAIRY COWS

Abstract. The study addressed pathomorphological changes in dairy cows with ketosis in Bayserke Agro LLP. It was determined that deep pathological processes develop in organs and tissues of cows with ketosis in the setting of disorders of carbohydrate, protein and fat metabolism.

Keywords: ketosis, metabolism, pathoanatomical changes, granular and fatty degeneration, liver.

Introduction. Currently, conditions for dairy cattle husbandry has dramatically changed in the Republic of Kazakhstan. Against the background of livestock husbandry intensification, a shift in traditional type of feeding of dairy cows has taken place in large livestock breeding complexes and farms. Genetic potential and milk productivity of the milking herd has sharply increased. Great milk productivity determines sharp increase in metabolic processes in the body of dairy cows. A large concentration of animals in limited areas enhanced adverse impact on animal body of such factors as hypodynamia, lack of insolation and aeration.

Haylage, silage and concentrated feed became main types of feed for dairy cows with simultaneous sharp decrease in hay and tuberous root feeding [1]. Similar changes in milk productivity and in the diet structure also took place in the farming enterprise Bayserke Agro LLP located in the Almatinskaya oblast. On the basis of complex research covering symptoms of clinical and anatomical manifestations of the disease, biochemical and laboratory data, we have classified the disease of cows in this farm as acute ketosis.

Ketosis is a metabolic disorder accompanied by accumulation of ketone bodies (beta-hydroxybutanoic, acetacetic acids, acetone) in the body of a high-yielding cow with simultaneous damage to the endocrine system organs, liver, heart, kidneys, autointoxication of the body followed by impairment of the reproductive function of cows. First description of ketosis as a disease occurred at the beginning of the last century, but wide spread occurrence of ketosis took place in recent decades. According to national and foreign scientists, ketosis occurs in 12-80% of high-producing cows [2]. The disease is mainly observed in the first 1-2 months after calving, predominantly in high-producing cows, with the productivity level of 4,000 kg of milk during lactation, however, there are common cases when onset of the disease occurs in the interlactation period of cows.

Ketosis in dairy cows bring their owners big economic losses due to 10- 15% decrease in the milk productivity, reproductive function disorder, death of cows, reduction of terms of use of a high-producing cow, cow disposal for meat production and mortality of born calves [3, 4].

Methods of this work was investigation of features of pathomorphological changes in cows with acute ketosis in Bayserke Agro LLP located in the Almatinskaya oblast.

Results. As the results of clinical and laboratory studies performed, it was established that ketosis has high prevalence among dairy cows of Bayserke Agro LLP. Hyperreaction to external stimuli was observed in affected animals in the early stages of the disease, there were cases of attacks on people,

Table

TN	Inventory number	Ca	Protein	Glucose	Alkaline reserve	Ketone bodies
1	25400	11,75	6,41	11,0	45,70	25
2	26740	11,75	7,0	11,0	23,30	27
3	13425	11,75	7,0	11,0	23,30	42
4	23543	12,50	6,41	11,0	36,74	35
5	23096	12,50	6,41	11,0	36,74	31
6	12677	11,75	7,0	11,0	14,34	67
7	03457	11,75	7,0	11,0	14,34	35
8	03656	11,75	7,0	11,0	25,09	42
9	1243	10,50	5,83	11,0	18,82	63
10	6574	12,50	6,41	11,0	36,74	35
11	6547	11,75	6,41	11,0	36,74	35
12	5463	11,75	6,41	11,0	45,70	42
13	3245	11,75	7,0	11,0	23,30	27
14	54632	11,75	7,0	11,0	23,30	27
15	7564	12,50	6,41	11,0	36,74	36
16	3245	12,50	6,41	11,0	36,74	36
17	03656	11,75	7,0	11,0	14,34	67
18	1243	11,75	7,0	11,0	14,34	67
19	6574	11,75	7,0	11,0	25,09	27
20	6547	10,50	5,83	11,0	18,82	90
22	5463	12,50	6,41	11,0	36,74	31
23	3245	11,75	6,41	11,0	36,74	31
	Norm	48 mg%	45 g%	40-60 mg%	46-66 O.%CO_2	1-6 mg%

frightened look, frequent self-licking, ruminative chewing, teeth-grinding, muscle tremor, lowing, excessive salivation and uncoordinated movements.

Then, excitement was replaced by depression, which was characterized by weak reaction to environment, and frequently by comatose state. Visible mucous membranes were bile-stained. Results of laboratory studies have shown increase in the number of ketone bodies, decreased blood glucose level and alkaline reserve. All compulsorily slaughtered animals had average fatness, except for 3 cows, whose fatness was above average with significant fat deposition in fat depots. In all cases, skeletal muscles had soft consistency, were light-colored, with abundant fat deposition in the intermuscular tissue.

Most pronounced dystrophic and hemodynamic changes were detected in parenchymal organs, especially in the liver, kidneys and heart.

The liver was constantly increased in volume with blunt edges, loose consistency, and yellowish-brown color. There was no lobular pattern on the cut section. The surface of the section is constantly greasy, fatty plaque remains on a knife when cutting the organ. The gall bladder is stretched, bile is thick and sticky.

Kidneys are frequently enlarged, the border between layers is indistinct, the cortical layer is yellowish, vessels in the medulla are overfull with blood. Significant fat deposits are observed under the epicardium, at the cardiac base along coronary vessels.

However, fat is rather peculiar in terms of its consistency and often is sort of slightly edematous.

The myocardium is flaccid, anemic, with a different degree of myogenic dilatation of ventricles. On the cut section lymph nodes are juicy, grayish, often slightly enlarged. The spleen is not enlarged. In forestomachs, especially in the booklet of animals with clinically apparent atony, feed masses are dry and thick. A picture of subacutecatarrhuswas revealed in the fourth stomach and small intestine. In adrenal glands the cortical layer is more developed and has grayish-yellow color, the parenchyma of the organ is slightly flaccid (figure 1, 2, 3).

Figure 1 –
Fat deposits under the epicardium

Figure 2 –
Fatty degeneration of the liver

Figure 3 –
Atony of the booklet

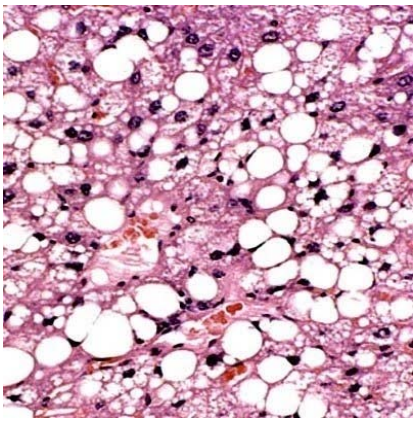

Figure 4 – Fatty degeneration of the liver.
Hematoxylin-eosin staining. x200

Microscopic changes. Liver damage on our material was noted in all cases. Diffuse macrovesicular fatty degeneration was noted in hepatocytes combined with carbohydrate and granular degeneration. These changes are most pronounced in the centrolobular area of the organ. Stellate reticuloendothelial cells and Ito cells were also subjected to fatty degeneration. Cell proliferation in the reticuloendothelial and mononuclear-macrophagal systems with formation of clusters or nodules of reticular and lymphoid cells should be noted as a constant sign (Figure 4). In all cases we noted kidney damage. Degenerative and necrobiotic changes in epithelial cells of straight tubules were typical. Many epithelial cells of straight tubules were predominantly in the state of protein and microvesicular fatty degeneration. Necrobiotic process is observed in the epithelium of some tubules. There is polymorphocellular infiltration in the interstitial connective tissue. A small quantity of glycogen was observed in the tubular epithelium. There are vascular disorders, atrophic and degenerative changes in the ventricular myocardium: Histochemical studies revealed dramatic reduction and even disappearance of glycogen and microvesicular lipid infiltration of hepatocytes.

Conclusions. Thus, these pathomorphological studies suggest occurrence of deep pathological processes in organs and tissues of cows with ketosis in the setting of disorder of carbohydrate, protein and fat metabolism.

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САУЫНДЫ СИЫРЛАРДЫҢ КЕТОЗ КЕЗІНДЕГІ КЛИНИКА-МОРФОЛОГИЯЛЫҚ СИПАТЫ

Аннотация. Сауынды сиырлар кетозының клиника-морфологиялық өзгерістері зерттелген.Зерттеулер нәтижелері бойынша, кетозбен ауырған сиырларда көмірсу, белок,май алмасуларының бұзылуы нәтижесінде ұлпаларда және мүшелерде терең патологиялық өзгерістер дамығаны анықталған.

Түйін сөздер: кетоз, зат алмасу, патологоанатомиялық өзгерістер, түйіршектелген және майланған дистрофия, бауыр.

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КЛИНИКО-МОРФОЛОГИЧЕСКОЕ ПРОЯВЛЕНИЕ КЕТОЗА МОЛОЧНЫХ КОРОВ

Аннотация. Изучены патоморфологические изменения кетоза у дойных коров в ТОО «Байсерке Агро». Установлено, что у коров больных кетозом на почве нарушения углеводного, белкового, жирового обмена веществ в органах и тканях возникают глубокие патологические процессы.

Ключевые слова: кетоз, обмен веществ, патологоанатомические изменения, зернистая и жировая дистрофия, печень.

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