

[doi.org/10.51452/kazatuvc.2023.2.\(002\).1427](https://doi.org/10.51452/kazatuvc.2023.2.(002).1427)

UDC 616.34:612:322.5:636.1

PREVALENCE OF GASTROINTESTINAL TRACT PATHOLOGY AND HELICOBACTERIOSIS IN HORSES

Mardan N. Julanov¹, Meruyert E. Alimbekova¹, Sabira B. Alimgazina¹, Laura S. Aubekerova¹, Kanat U. Koibagarov¹, Sandugach T. Ernazarova¹, Nursulu M. Julanova¹, Serik Khizat¹, Ostap Stephanik², Orynbay Tagayev³

¹Faculty of veterinary medicine, NJSC Kazakh National Agrarian Research University, Almaty, Republic of Kazakhstan

²Faculty of veterinary medicine, Lviv National University of Veterinary Medicine and Biotechnology, Lviv, Ukraine

³Agrarian-Technological University of West Kazakhstan Zhangir Khan

Corresponding author: Meruyert E. Alimbekova, e-mail: meruyert27@yandex.ru

Co-authors: Mardan N. Julanov, e-mail: mardan_58@mail.ru, Sabira B. Alimgazina, e-mail: sabira_alimgazina@mail.ru, Laura S. Aubekerova, e-mail: laura.aubekerova@gmail.com, Kanat U. Koibagarov, e-mail: kanat_ukan@mail.ru, Sandugach T. Ernazarova, e-mail: ersandu1977@yandex.ru, Nursulu M. Julanova, e-mail: nuramirayat@mail.ru, Serik Khizat, e-mail: seri83129@mail.ru, Ostap Stephanik, e-mail: ostapstefanyk@gmail.com, Orynbay Tagayev, e-mail: orynbay_tagayev@mail.ru

Abstract

This article presents information on the prevalence of helicobacteriosis in horses of different age groups. It has been found that gastrointestinal tract (GIT) pathology is widely prevalent in horses, ranging from 50% to 80%. The main conditions among GIT pathologies in horses are gastrophyllosis, erosions, ulcers, and helicobacteriosis. Helicobacteriosis is registered in 66.7% to 100% of the investigated adult population and in 20% to 66.7% of the young horses. Stomach examinations using endoscopy and video gastroscopy provide a clear picture of the mucous membrane's condition in different parts of the stomach and allow for the collection of biomaterials for additional research. The percentage of animals affected by helicobacteriosis increases with age. Animals suffering from helicobacteriosis experience significantly reduced productivity, delayed growth and development in young horses, leading to premature culling.

It is incorrect to only test suspicious animals with indications for helicobacteriosis, as not all carriers of *Helicobacter pylori* show symptoms of the disease.

The use of the drug Domosedan at a dose of 0.5 µg per kilogram of body weight, or Combistress at a rate of 0.5 cm³ per 100 kg of body weight, effectively calmed the animals, fully relaxed the GIT, and facilitated successful endoscopy and video gastroscopy examinations.

Key words: gastrointestinal tract pathology; helicobacteriosis; horses; *H. pylori*; video gastroscopy.

Basic position and Introduction

Equestrianism in Kazakhstan is developing at a moderate pace. However, there are several factors hindering the growth of this industry, primarily internal non-infectious pathologies that are not timely diagnosed, resulting in the absence of measures to address them.

Practitioners have observed a widespread occurrence of gastrointestinal tract (GIT) disorders in horses of unknown etiology. These disorders occur throughout the year, manifesting as weight loss due to poor appetite, inability to digest consumed feed, and the presence of painful symptoms and colic. All of this causes significant economic damage to equestrian establishments. Despite the research conducted by domestic and foreign scientists on GIT disorders in horses, this problem remains unresolved. Therefore, a detailed study of the causes of this pathology in equestrian establishments is essential.

The connection between *H. pylori* infection and chronic gastritis, gastric and duodenal ulcers, and malignant gastric tumors has been scientifically proven in human medicine [1].

In clinical veterinary practice, gastric diseases in horses are a common and widespread problem. Gastric diseases are

often accompanied by erosive and ulcerative changes in the mucous membranes, which can vary depending on the severity and type of gastric wall involvement [2, 3].

In modern veterinary practice, devices and equipment for diagnosing various animal pathologies are increasingly being used. Timely and accurate diagnosis allows for the selection of optimal treatment regimens and reduces treatment costs. Moreover, modern diagnostic devices are considered environmentally safe and do not harm the examined animals. One such device is the endoscope (ES) and video gastroscopy (VGS).

The authors note that endoscopy is a non-invasive method for examining the condition of the lumens and mucous membranes of the GIT, upper respiratory tract, urinary organs, and other body cavities [4, 5]. In addition to monitoring the condition of the examined organ, endoscopy allows for the collection of pathological material through biopsy for histomorphological, bacteriological, and other analyses. In some cases, endoscopy can be used for foreign body extraction or the administration of medications into the organ's lumen [6].

Currently, *H. pylori* is one of the most extensively studied microorganisms globally due to its significance and social impact on diseases in which it plays a leading role. Two decades of studying *H. pylori* epidemiology have shown its widespread prevalence, with peptic ulcer disease being one of the most common gastrointestinal disorders in animal populations [7, 8].

Transmission of the microorganism usually occurs from one animal to another. Domestic cats and rhesus macaques have been proven to be reservoirs of *H. pylori* infection, and the most common modes of transmission are oral-oral and fecal-oral [9, 10].

According to several scientists, the prevalence of gastric ulcers in horses ranges from 60% to 90% in the adult

Materials and Methods

The research subjects included horses of different age groups, breeds, and physiological conditions. Samples for research included stomach mucus, biopsies, and blood serum. Some animals were kept in pasture conditions with access to water, while others were kept in stables.

The study material consisted of 32 horses from "Sunkar" Stud Farm (Thoroughbred English riding breed), 22 horses from "Kokbastau" Stud Farm (Arabian breed) in Zhambyl district, 26 horses from "Akhaevo" Stud Farm (Thoroughbred English riding breed) in Karasai district, 22 horses from "Akhal-Teke bishi" Stud Farm (Akhal-Teke breed), 65 horses from "Sarsibek" Stud Farm (American Standardbred breed) in Talgar district of Almaty region, 195 horses from "Azamat 2" collective farm

population and from 25% to 51% in young horses. Helicobacteriosis significantly reduces the productivity of affected animals, hinders the growth and development of young horses, and is a major cause of premature culling of horses [11].

Histological examination of gastric tissues is known to be an effective, informative, and highly accurate diagnostic method. It requires obtaining gastric tissue samples through biopsy and subjecting them to microscopic examination [12].

Based on the above, our objective was to determine the prevalence of helicobacteriosis among different age groups of horses in the southeastern region of Kazakhstan under various management and husbandry conditions.

in Beskaragai district (Mugalzharsk breed) of Abai region, and 30 horses from "Aqylbai" Eshkeldy district of Zhetysu region (Thoroughbred English riding breed). These farms had registered animals with frequent episodes of colic and signs of gastrointestinal tract diseases.

Out of the 392 horses, 273 suspicious and diseased animals (69.6%) were selected for the study on the prevalence of gastrointestinal tract diseases. This included 19 stallions, 91 mares, 34 colts born in 2019, 36 colts born in 2020, 46 fillies born in 2019, and 47 fillies born in 2020.

The research was conducted using the standard methodology for animal medical examinations. Special investigations were carried out using a SureVision™ VLS-150 D endoscope

(Digital Video System, USA, Figure 1) and an AGVE-68 HAL video

gastroscopy (VGS) with VIS-68 video processor (China, Figure 2)



Figure 1 - Endoscope VLS-150 D (USA)

Endoscopy and VGS were performed to study the prevalence of gastrointestinal tract pathology (GIT), along with histological examinations and blood tests using the *Helicobacter pylori* test (Figure 3). Anamnestic data was collected for all age groups of animals.



Figure 2 - Video gastroscopy AGVE-68HAL (China)

Horses for conducting endoscopy (ES) and video gastroscopy (HCV) studies were selected based on their medical history and clinical signs such as emaciation, colic, loss of appetite, and

the presence of unpleasant breath odor and abnormal feces. To prevent complications and ruptures of internal organs, the horses were kept on a fasting diet for 12 hours. Prior to ES and HCV,

horses from the Almaty and Zhetysu regions were administered premedication through intravenous injection of the drug Domosedan at a dose of 0.5 μg per kilogram of body weight. In the Abay region, Combistress (from Belgium) was

used at a dosage of 0.5 cm^3 per 100 kilograms of live animal weight. Subsequently, the animals were placed in a warm location without drafts and provided with soft bedding.



A
B
Figure 3 - A - Positive result of the Helpeel test;
B - Negative result of the Helpeel test.

During the examination of animals with gastric ulcers and erosive lesions, biopsies (Figure 4) were taken for further investigation. To diagnose helicobacteriosis, blood samples were collected from the jugular vein of horses, and laboratory tests were conducted within

2-4 hours. For early diagnosis of helicobacteriosis in horses and obtaining rapid results, the Helpeel test was used. It is designed for one-step, fast, and qualitative "in vitro" determination of antibodies against helicobacteriosis in whole blood.



Figure 4 - Stomach Biopsy.

The components of the kit and the specimens under study were kept at room temperature (+18-25°C) for 5-10 minutes before analysis. Then, the strip package was opened, and using a pipette, 2 drops (~80 µl) of venous blood were added to the sample tube, followed by 1 drop (~40 µl) of the diluent reagent. Afterward, the strip was vertically dipped into the sample tube, following the direction of the arrow. The results were visually evaluated after 10 minutes and within 20 minutes.

In the Abay region, out of 195

Results

This study is the result of interrelated clinical and laboratory investigations on the clinical and laboratory diagnosis of erosions and gastric ulcers associated with *H. pylori* in horses.

As known, helicobacteriosis is an infectious disease transmitted through the fecal-oral route, with a strong affinity for the gastric epithelium. Therefore, this pathogen plays an important role in the pathology of the digestive system in horses. Consequently, conducting scientific research involves monitoring the prevalence of helicobacteriosis in horses. Moreover, the diagnosis of this pathology requires special studies. For instance, obtaining gastric biopsies from horses with helicobacteriosis is only possible through endoscopy for confirmatory histological analysis.

During the monitoring studies on helicobacteriosis in horses, we collected data on the prevalence of gastrointestinal tract pathologies among the horse population. The results of the anamnestic

horses, 108 underwent VGS, which involved obtaining mucus and biopsies from different parts of the stomach. These samples were placed in a sterile 1.5 cm³ tube for subsequent histological and microbiological analysis. In the Almaty and Zhetysu regions, ES was performed on 143 horses.

The statistical analysis of data was conducted using "Microsoft Excel" software on a personal computer, calculating mean values (M), standard errors (m), and the significance of the compared parameters (P).

investigations indicated a wide distribution of gastrointestinal tract pathologies among horses. The conducted clinical studies confirmed the initial assumptions regarding the prevalence of gastrointestinal tract pathologies in horses (Table 1).

In the Abay region of the Beskaragay district, out of the total horse population (195 animals), 104 were selected for examination across different age and sex groups. Specifically, for clinical and specialized research, samples were taken from 6 stallions, 40 mares, and 58 young horses born in 2019 and 2020. Blood samples were collected from all selected animals from the jugular vein for rapid diagnosis using the HeliPil test.

Performing ES and VGS studies required pre-anesthesia to ensure relaxation of the esophagus, thereby reducing the risk of injury. Horses in the Almaty and Zhetysu regions were pre-medicated with Domosedan at a dose of 0.5 µg per kilogram of body weight,

while horses in the Abay region were administered Combistress at a dose of 0.5 cm³ per 100 kg of body weight. It should be noted that both drugs effectively calmed the horses, fully relaxed the gastrointestinal tract, and ensured successful research (Figure 5). Therefore, we recommend the wider application of these drugs for ES and VGS studies.

During the insertion of the ES and VGS probes, the trachea was maintained in a non-sleep state, necessitating stimulation of the swallowing reflex to facilitate the passage of the probe through the pharynx into the esophagus and then into the horse's.

Stomach. Therefore, we performed tracheal insufflation with sterile physiological solution, which induced the swallowing reflex and allowed for easy.

In healthy horses, the mucous membrane of the esophagus appears pale pink and shiny. In pathological conditions, various morphological changes are observed, including hyperemia (increased blood flow), epithelial desquamation (shedding of the epithelial layer), hemorrhages, and others (Figure 6, 7).

In a normal state, the mucous membrane of the stomach is grayish in color, while the glandular region appears dark pink, with folded and shiny surfaces. No blood vessels are visible beneath the mucous membrane. In pathological conditions, there may be hyperemia of blood vessels, grayish deposits of erosive nature on the mucous membrane, inflamed areas, and various types of ulcers.

Thus, conducting endoscopic examinations under visual control has allowed us to identify pathological changes in the esophagus and stomach of horses. We consider ES and VGS examinations to be valuable diagnostic procedures for visualizing the nasal cavity, trachea, pharynx, esophagus, and horse's stomach. The introduction of innovative devices into veterinary practice will enable precise diagnosis of gastrointestinal pathologies and expand the arsenal of diagnostic and therapeutic procedures.

During the process of conducting ES and VGS examinations in the stomachs of the majority of the studied horses, regardless of age, gender, and physiological condition, we observed erosive and ulcerative changes primarily in the pyloric region of the gastric mucosa. Our research confirms the data from literary sources that *H. pylori* causes chronic active gastritis in infected animals, which can lead to peptic ulcers and gastritis [13].

During ES and HCV studies, gastric contents and biopsy specimens were collected from the affected areas of the stomach. All collected samples were further subjected to research within two hours.

Of the selected population of horses of the Mugalzhar breed, gastrointestinal pathologies were detected in $60.0 \pm 1.10\%$ of stallions-producers, in $76.7 \pm 2.77\%$ of mares and replacement young animals born in 2019-2020 - in 53.8-68.4%.

The results of laboratory diagnostics on Helpil-test testified to a significant susceptibility helicobacteriosis of horses. Moreover, from the number of

patients with pathologies of the gastrointestinal tract, helicobacteriosis was confirmed in $66.7 \pm 0.82\%$ of

stallions and $69.7 \pm 0.82\%$ of mares, and in replacement young animals - in 41.7 to 60.0%.

Table 1 - Incidence of gastrointestinal tract diseases and manifestation of helicobacteriosis in horses of different breeds depending on conditions of use and maintenance

Age and gender groups	Total number of animals	Number of heads examined	Gastrointestinal tract diseases		Horses affected by helicobacteriosis		
					From the number of animals with gastrointestinal tract pathologies		Throughout the herd
			quantity	%	quantity	%	%
Mugalzhar breed, Abay region							
Stallions	7	5	3	60.0 ± 1.10	3	66.7 ± 0.82	$60.0 \pm 1.10^*$
Mares	70	43	33	$76.7 \pm 2.77^*$	23	69.7 ± 2.64	53.5 ± 3.27
Colts born in 2019	15	8	5	$62.5 \pm 1.37^{**}$	3	$60.0 \pm 1.10^{**}$	$37.5 \pm 1.37^{**}$
Colts born in 2020	25	13	7	53.8 ± 1.80	3	42.9 ± 1.31	23.1 ± 1.52
Fillies born in 2019	38	19	13	$68.4 \pm 2.03^{**}$	7	$53.8 \pm 1.80^{**}$	$36.8 \pm 2.10^{**}$
Fillies born in 2020	40	20	12	60.0 ± 2.19	5	41.7 ± 1.71	$25.0 \pm 1.94^*$
Thoroughbred English riding breed, Almaty and Zhetysu regions							
Stallions	7	5	4	80.0 ± 0.89	4	100*	$80.0 \pm 0.89^*$
Mares	29	16	13	81.3 ± 1.56	10	76.9 ± 1.52	62.5 ± 1.94
Colts born in 2019	12	7	5	$71.4 \pm 1.20^{**}$	4	$80.0 \pm 0.89^{**}$	$57.1 \pm 1.31^{**}$
Colts born in 2020	14	6	4	66.7 ± 1.15	3	75.0 ± 0.87	50.0 ± 1.22
Fillies born in 2019	14	7	5	$57.1 \pm 1.31^{**}$	3	$50.0 \pm 1.00^{**}$	$28.6 \pm 1.20^{**}$
Fillies born in 2020	12	6	4	50.0 ± 1.22	2	33.3 ± 0.82	16.7 ± 1.15
Arabian breed, Almaty region.							
Stallions	2	2	1	50.0 ± 0.71	1	100*	50.0 ± 0.71
Mares	5	5	4	80.0 ± 0.89	3	75.0 ± 0.87	$60.0 \pm 1.10^*$
Colts born in	4	4	3	75.0 ± 0.87	2	66.7 ± 0.82	50.0 ± 1.00

2019							
Colts born in 2020	3	3	2	66.7±0.82	2	100.0**	66.7±0.82**
Fillies born in 2019	4	4	3	75.0±0.87	2	66.7±0.82**	50.0±1.00**
Fillies born in 2020	4	4	2	50.0±1.00	1	50.0±0.71	25.0±0.87
Akhal-Teke breed, Almaty region							
Stallions	2	2	1	50.0±0.71	1	100*	50.0±0.71*
Mares	7	7	4	57.1±1.31*	3	75.0±0.87	42.9±1.31
Colts born in 2019	4	4	3	75.0±0.87**	2	66.7±0.82	50.0±1.00
Colts born in 2020	3	3	2	66.7±0.82	2	100.0**	66.7±0.82**
Fillies born in 2019	3	3	2	66.7±0.82**	1	50.0±0.71	33.3±0.82
Fillies born in 2020	3	3	1	33.3±0.82	-	-	-
American Standardbred breed, Almaty region							
Stallions	3	3	2	66.7±0.82	2	100.0*	66.7±0.82*
Mares	23	15	12	80.0±1.55*	9	75.0±1.50	60.0±1.90
Colts born in 2019	8	7	5	71.4±1.20**	3	60.0±1.10**	42.9±1.31**
Colts born in 2020	9	8	5	62.5±1.37	2	40.0±1.10	25.0±1.22
Fillies born in 2019	11	9	6	66.7±1.41**	3	50.0±1.22**	33.3±1.41**
Fillies born in 2020	11	10	5	50.0±1.58	2	40.0±1.10	20.0±1.26

Note: * - significance of disease prevalence in stallions and mares;

** - significance of disease prevalence between colts born in 2019 and 2020



Figure 5 – Insertion of the endoscope probe into the stomach.

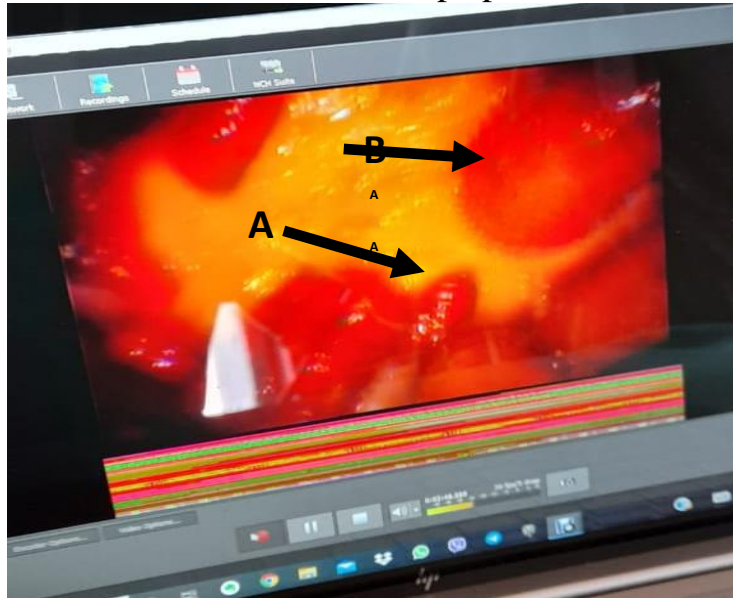


Figure 6 - Gastric ulcers and Gastrophilosis (stomach bots) caused by the larvae of bot-flies (*Gasterophilus spp.*)

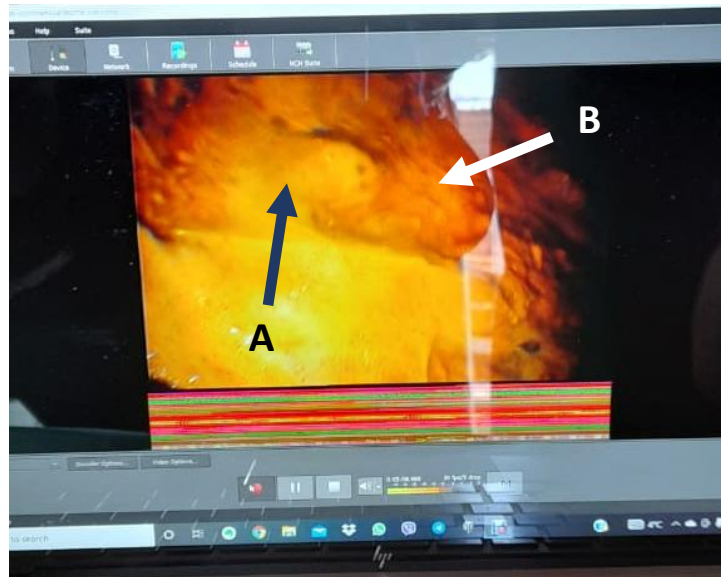


Figure 7 - Neoplasms in the gastric wall.

Our research supports the opinions Murray M.J. et. al. about the significant prevalence of this pathology among the adult population of horses and young animals [14].

Helicobacteriosis was confirmed in 40.0 ± 1.10 percentage of stallions and 53.5 ± 3.27 percentage of mares from the number of the studied livestock. Moreover, the differences in indicators between

the sexes in adult animals were significant $P \leq 0.001$.

The incidence among young animals was 23.1-37.5%. At the same time, the differences in the incidence rates between the age groups of replacement young animals were also significant ($P \leq 0.001$). Consequently, the susceptibility to helicobacteriosis significantly increased with age.

From the pathology of the gastrointestinal tract, gastrophylles, erosions and ulcerative lesions of the gastric mucosa were recorded. The greatest changes were observed in the pyloric part of the stomach. The conditions for keeping these animals were around the clock grazing, watering - in the wild without additional feeding.

The dependence of the susceptibility of horses to pathologies of the gastrointestinal tract, including helicobacteriosis, on the conditions of operation and maintenance has been established. Thus, studies conducted in a number of farms in Almaty, Zhetysu regions indicate that this pathology is widespread in horses of the English thoroughbred-riding breed. These horses were in training and participated in racetrack trials. At night, the horses were kept in stalls, and during the daytime - in levada or were in training. Horses were fed according to the approved diet and schedule. Thus, in adult horses of the English Thoroughbred riding breed, gastrointestinal pathologies were observed in 80.0-81.3%, and in replacement young animals - 50.0-71.4%. At the same time, in 76.9-100.0% of adult animals with pathologies of the gastrointestinal tract, the *Helicobacter pylori* test was positive and in

replacement young animals 33.3-80.0%. Of the number of examined horses of this breed, helicobacteriosis was confirmed in 62.5-80% of adults and in 16.7-57.1% of replacement young animals. Apparently, stress and sports loads during training and competition, to a certain extent, were reflected in the morphofunctional state of the gastrointestinal tract, and the whole organism as a whole.

In the adult stock and replacement young stock of horses of the Arabian breed, there was also a widespread pathology of the gastrointestinal tract, respectively 50-80% and 50-75%. A large percentage of helicobacteria in horses with gastrointestinal pathologies of 75-100% and 50-100% has also been established. The specified number of horses were also used in sports - a smooth race. The difference between the incidence in sex and age groups was significant. A similar pattern of gastrointestinal diseases and helicobacteriosis was observed in Akhal-Teke and American Standardbred horses from the entire studied population. These findings were confirmed by the results of bacteriological studies. The incidence rates differed significantly among adult and young horses.

During gastroscopic examinations of 124 horses from Almaty region, small erosions and mucosal hyperemia were detected in the stomachs of 68 horses (54.8%), no changes were observed in 16 horses (12.9%), and hyperemia was present in 36 horses (29.0%). A similar picture was observed during gastroscopic examinations of horses from the Zhetysu region. Specifically, 16 horses showed erosions and mucosal hyperemia

(53.3%), hyperemia was present in 10 horses (33.3%), and no changes were observed in 4 horses (13.3%). In the Abay region, small erosions and mucosal hyperemia were detected in the stomachs of 45 horses (41.7%), no changes were observed in 33 horses (30%), and hyperemia was present in 30 horses (27.8%).

Thus, helicobacteriosis is an infectious disease transmitted through contaminated water and feed. The causative agent, *H. pylori*, has a strong affinity for the gastric epithelium, playing an important role in the pathology of the digestive system in horses. Therefore, special attention should be given to animals with frequent colic episodes, decreased appetite, and poor body condition during

Discussion

The conditions of horse husbandry to some extent influenced the morpho-functional state of the gastrointestinal tract (GIT). From the above data, it can be seen that pasture-based management (in the case of Mugalzhar breed horses) resulted in significantly fewer GIT pathologies compared to stable-based management (in the case of horses of other breeds). There was also a significantly lower prevalence of helicobacteriosis.

Thus, both training and husbandry conditions have a negative impact on the prevalence of gastrointestinal tract (GIT) pathologies, both in adult horses and in young stock. In our research, we frequently diagnosed gastric erosions and ulcers in horses of sport breeds and those involved in competitive activities such as

Conclusion

Gastrointestinal tract (GIT) pathologies in horses have a wide prevalence ranging from 50% to 80%. The

the diagnosis of helicobacteriosis.

Foreign scientific data indicate a high prevalence of ulcers among horses and foals [15, 16].

In some cases, infected carriers of *Helicobacter pylori* do not show any symptoms of the disease. Therefore, it is erroneous to only investigate suspicious animals with indications for helicobacteriosis.

Thus, the results of our research indicate that gastrointestinal pathologies are widely spread among horses. Helicobacteriosis in horses occupies a prominent place among gastrointestinal pathologies, necessitating further study and the development of treatment and prevention measures.

racing, dressage, show jumping, etc. Our findings support the data from various authors indicating that the prevalence of GIT pathologies, including helicobacteriosis, can reach up to 80% during intensive training periods. This is likely associated with stress factors related to transporting the animals to competition venues, intensified training, changes in diet, as well as individual characteristics of the animal's nervous system.

The obtained data indicate that in horses used for training and competitive events and housed in a stable environment, *H. pylori* is significantly more prevalent than in horses of productive direction that are kept on pasture round the clock.

main pathologies in the equine GIT include gastrophilosis, erosions, ulcers, and Helicobacteriosis. Helicobacteriosis

is registered in 66.7% to 100% of the examined adult population and in 20% to 66.7% of the young horses.

Endoscopic and gastroscopic examinations provide a clear picture of the condition of the mucous membrane in different parts of the stomach and enable the collection of biomaterials for further investigations. The percentage of Helicobacteriosis increases with age in animals.

It is incorrect to only test suspicious animals or those with symptoms

Information on funding

The work was carried out as part of applied scientific research in the field of agro-industrial complex for the years 2021-2023 under the budget program 267 "Improving Access to Knowledge and Scientific Research" subprogram 101 "Targeted Program Financing for Scientific Research and Activities" according to specification 154 "Payment for Consulting Services and Research" dated September 7, 2021, on the topic: "Developing and proposing diagnostic methods, disease prevention, therapy for infected animals, and soil disinfection of Siberian ulcerative foci", with the task "Development of a test system for the diagnosis of horse helicobacteriosis".

Referenses

1 James K. Global Prevalence of Helicobacter pylori Infection: Systematic Review and Meta-Analysis [Text] / K. James, Y. Wan, K. Wee, M. Michael, E. Fox, M. Peter, Y. David, W. Vincent, C. Justin, K. Francis, J. Joseph, G. Gilaad, C. Siew // Gastroenterology. -2017. - No153 (2). - P. 420-429.

2 Nagy P. Systematic review of time trends in the prevalence of Helicobacter pylori infection in China and the USA [Text] / P. Nagy, S. Johansson, M. Molloy-Bland // Gut Pathogens. -2016. - No8:8. - P.2-14.

3 Contreras M. Detection of Helicobacter-like DNA in the gastric mucosa of thoroughbred horses [Text] / M. Contreras, A. Morales, M. García, M. Devera, V. Bermúdez, P. Gueneau // Letters in Applied Microbiology. -2007. - No45(5). - P. 553-557.

4 Rich A. Endoscopic and Histological grading of equine glandular gastric fibrinosuppurative, exudative and ulcerative gastritis [Text] / A. Rich, B. Greatrexy, R. Blundell, R. Hepburn // Journal of Comparative Pathology. -2020. - No174:179. - P. 157-198.

for Helicobacteriosis since not all carriers of Helicobacter pylori show signs of the disease.

During endoscopic and gastroscopic examinations, it is recommended to use Domosedan at a dose of 0.5 mcg per kilogram of body weight or Combi stress at a rate of 0.5 cm³ per 100 kg of body weight. These medications effectively calm the animals and fully relax the GIT, ensuring successful examination procedures.

5 Mira M. Evaluación por gastroscopia simple y cromoendoscopia convencional de la superficie gastroesofágica y duodenal proximal del equino. Estudio piloto. [Text] / M. Mira, J. Sánchez, J. Martínez // Revista de la Facultad de Medicina Veterinaria y de Zootecnia. -2020. - No67(2). - P.136-148.

6 Gomez F. Evaluación de algunos factores de riesgo para la presentación de síndrome de úlceras gástricas (SUGE) en el Caballo Criollo Colombiano en el Valle de Aburrá, Antioquia (Colombia) [Text] / F.Gomez, J.Ruiz, D.Balvin // Revista de la Facultad de Medicina Veterinaria y de Zootecnia. -2020. - No67(2). - P.123-135.

7 Perry E. Effect of road transport on the equine cecal microbiota [Text]/ E. Perry, T. Cross, J. Francis, H. Holscher, S. Clark, K. Swanson // Journal of Equine Veterinary Science. - 2018. -No68. - P.12-20.

8 Padalino B. Effects of transportation on gastric pH and gastric ulceration in mares [Text] / B.Padalino, G.Davis, S.Raidal // Journal of Veterinary Internal Medicine. -2020. -No34(2). - P.922-932.

9 Banse H. Equine glandular gastric disease: prevalence, impact and management strategies [Text] / H.Banse, F.Andrews // Veterinary medicine. - 2019. -No10. P.69-76.

10 Sauer F. Diagnostic accuracy of post-ACTH challenge salivary cortisol concentrations for identifying horses with equine glandular gastric disease [Text] / F. Sauer, R. Bruckmaier, A. Ramseyer, B.Vidondo, M.Scheidegger, V.Gerber // Journal of Animal Science. -2018. -No96(6). - P.2154–2161.

11 Kurdeko A. Sostoyanie i perspektivy volokonno-opticheskogo endoskopicheskogo issledovaniya zhiivotnyh [Text] / A. Kurdeko // Mezhdunarodnaya nauchno-prakticheskaya konferenciya, posvyashchennoj 70-letiyu kafedry zoogigieny VGAVM Vitebsk. -2003. -S.57-61.

12 Husted L. Examination of equine glandular stomach lesions for bacteria, including *Helicobacter* spp. by fluorescence in situ hybridization [Text]/ L.Husted, T. Jensen, S. Olsen, L. Molbak // BMC Microbiology. -2010. -No19. -P.10-84.

13 Hewetson M. Diagnostic accuracy of blood sucrose as a screening test for equine gastric ulcer syndrome (EGUS) in adult horses [Text] / M.Hewetson, B.Sykes, G.Hallowell, R-M. Tulamo // Acta Veterinaria Scandinavica. -2017. -No59(1). - P.15-24.

14 Murray M. Factors associated with gastric lesions in Thoroughbred racehorses [Text] / M. Murray, G. Schusser, F. Pipers, S. Gross // Equine Veterinary Journal. -1996. -No28. - P.368–374.

15 Khaled F. Novel detection of *Helicobacter* species in gastric problems in Equine in Egypt [Text] / F. Khaled, M. Dessoky, S. Ahmed, A.E. Naglaa, A. Dina // Systematic Reviews in Pharmacy. -2020. -No11(11). - P.553-557.

16 Pedersen S. Phenylbutazone induces equine glandular gastric disease without decreasing prostaglandin E2 concentrations [Text]/ S. Pedersen, A. Cribb, E. Read, D. French, H. Banse // Journal of Veterinary Pharmacology and Therapeutics. -2018. - No41(2). -P.239-245.

Referenses

- 1 James, K., Wan, Y., Wee, K., Michael, M., Fox, E., Divine., Peter, M., David, Y., Vincent, W., Justin, C., Francis, K., Joseph, J., Gilaad, G., Siew, C. (2017). Global Prevalence of *Helicobacter pylori* Infection: Systematic Review and Meta-Analysis. *Gastroenterology*, 153(2), 420-429.
- 2 Nagy, P., Johansso, S., Molloy-Bland, M. (2016). Systematic review of time trends in the prevalence of *Helicobacter pylori* infection in China and the USA. *Gut Pathogens*, 8:8 doi:10.1186/s13099-016-0091-7.
- 3 Contreras, M., Morales, A., García, M., Devera, M., Bermúdez, V., Gueneau, P. (2007). Detection of *Helicobacter*-like DNA in the gastric mucosa of thoroughbred horses. *Letters in Applied Microbiology*, 45(5),553–7.
- 4 Rich, A., Greatrexy B., Blundell R. and Hepburn, R. (2020). Endoscopic and Histological grading of equine glandular gastric fibrinosuppurative, exudative and ulcerative gastritis. *Journal of Comparative Pathology*, 174,179 DOI:10.1016/j.jcpa.2019.10.129
- 5 Mira, M., Sánchez J., Martínez J. (2020). Evaluación por gastroscopia simple y cromoendoscopia convencional de la superficie gastroesofágica y duodenal proximal del equino. Estudio piloto. *Revista de la Facultad de Medicina Veterinaria y de Zootecnia*, 67(2), 136-148.
- 6 Gomez, F., Ruiz, J., Balvin, D. (2020). Evaluación de algunos factores de riesgo para la presentación de síndrome de úlceras gástricas (SUGE) en el Caballo Criollo Colombiano en el Valle de Aburrá, Antioquia (Colombia). *Revista de la Facultad de Medicina Veterinaria y de Zootecnia*. 67(2), 123-135.
- 7 Perry, E., Cross, T., Francis, J., Holscher, H., Clark, S., Swanson, K. (2018). Effect of road transport on the equine cecal microbiota. *Journal of Equine Veterinary Science*. 68, 12-20.
- 8 Padalino, B., Davis, G., Raidal, S. (2020). Effects of transportation on gastric pH and gastric ulceration in mares. *Journal of Veterinary Internal Medicine*. 34(2), 922-932.
- 9 Banse, H., Andrews, F. (2019). Equine glandular gastric disease: prevalence, impact and management strategies. 10, 69-76.
- 10 Sauer, F., Bruckmaier, R., Ramseyer, A., Vidondo, B., Scheidegger, M., Gerber, V. (2018). Diagnostic accuracy of post-ACTH challenge salivary cortisol concentrations for identifying horses with equine glandular gastric disease. *Journal of Animal Science*. 96(6), 2154–2161.
- 11 Kurdeko, A.P. (2003). Sostoyanie i perspektivy volokonno-opticheskogo endoskopicheskogo issledovaniya zhiivotnyh: Mezhdunarodnaya nauchno-prakticheskaya konferenciya, posvyashchennoj 70-letiyu kafedry zoogigieny, Vitebsk. 23-24 oktyabrya. VGAVM.

12 Husted, L., Jensen, T., Olsen, S., Molbak, L. (2010). Examination of equine glandular stomach lesions for bacteria, including *Helicobacter* spp. by fluorescence in situ hybridisation. *BMC Microbiology*. 19, 10-84.

13 Hewetson, M., Sykes, B., Hallowell, G., Tulamo, R-M. (2017). Diagnostic accuracy of blood sucrose as a screening test for equine gastric ulcer syndrome (EGUS) in adult horses. *Acta Veterinaria Scandinavica*. 59(1), 15-24.

14 Murray, M., Schusser, G., Pipers, F., Gross, S. (1996). Factors associated with gastric lesions in Thoroughbred racehorses. *Equine Veterinary Journal*. 28, 368–374.

15 Khaled, F., Dessoky, M., Ahmed, S., Naglaa, A.E., Dina, A. (2020). Novel detection of *Helicobacter* species ingastricproblems in Equine in Egypt. *Systematic Reviews in Pharmacy*. 11(11), 553-557.

16 Pedersen, S., Cribb, A., Read, E., French, D., Banse, H. (2018). Phenylbutazone induces equine glandular gastric disease without decreasing prostaglandin E2 concentrations. *Journal of Veterinary Pharmacology and Therapeutics*. 41(2), 239-245.