HUMAN AND ANIMAL PHYSIOLOGY

Comprehensive assessment of musculoskeletal pain in riding horses under different housing systems

**Angelika A. Ksenofontova, Polina V. Krasavina, Liubov V. Shorina,
Dmitry A. Ksenofontov**

Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow, Russia

Corresponding author: Liubov V. Shorina; shorinaliubov15@gmail.com

Abstract

The article focuses on the effect of housing systems on the development of musculoskeletal pain in horses working under different conditions (competitions, rentals, equestrian sports and tourism). The relevance of the work is due to the insufficient attention paid to the assessment of pain in horses, especially under conditions of intensive workload and limited movement. The aim of the study is to assess the degree of pain in horses depending on the housing conditions using several scientifically grounded methods: the Ridden Horse Pain Ethogram (RHpE), the Horse Chronic Pain Scale (HCPS) and the Horse Grimace Scale (HGS). The study analyzed the data collected from two equestrian enterprises in Russia and one in Qatar. The research methods included observations and the use of ethological scales to assess the condition of horses both in motion and at rest. In particular, the differences in the pain condition of horses in different housing conditions were studied: at the CSKA Equestrian Complex (with limited time outdoors), at Suhail Sports Center (where horses had almost no access to paddocks), and at Itkaya Horse Base (where horses had the opportunity to move freely for long periods). The results showed that horses in restricted movement conditions had high levels of chronic pain and lameness, while horses with regular exercise and more freedom of movement had fewer signs of pain. The conclusion of the study emphasizes the importance of providing horses with quality exercise, which prevents the development of musculoskeletal pathologies and contributes to the animal welfare. The results confirm the need to apply comprehensive assessment methods to improve housing and training conditions for horses and to increase attention to their welfare in professional equestrian sports.

Conflict of interests

The authors declare no relevant conflict of interests.

ФИЗИОЛОГИЯ ЧЕЛОВЕКА И ЖИВОТНЫХ

Комплексная оценка боли в опорно-двигательном аппарате у верховых лошадей при различных системах содержания

Анжелика Александровна Ксенофонтова, Полина Вячеславовна Красавина, Любовь Валентиновна Шорина, Ксенофонтов Дмитрий Анатольевич

Российский государственный аграрный университет – МСХА имени К.А. Тимирязева, Москва, Россия

Автор, ответственный за переписку: Любовь Валентиновна Шорина; shorinaliubov15@gmail.com

Аннотация

Статья посвящена изучению влияния систем содержания на развитие боли в опорно-двигательном аппарате у лошадей, работающих в различных условиях (соревнования, прокат, конный спорт и туризм). Актуальность работы обусловлена недостаточным вниманием к оценке болевого синдрома у лошадей, особенно в условиях интенсивной нагрузки и ограниченного движения. Исследование проводили с целью оценки степени болевых ощущений у лошадей в зависимости от условий содержания с помощью нескольких научно обоснованных методик: этограмма боли у верховых лошадей, шкала хронической боли у лошадей и шкала гримасы у лошадей. В ходе исследования были проанализированы данные, собранные на двух конных предприятиях в России и одном в Катаре. Методы исследования включали наблюдения и использование этологических шкал для оценки состояния лошадей в движении и покое. В частности, изучались различия в болевом состоянии лошадей в разных условиях содержания: на базе конно-спортивного комплекса ЦСКА (с ограниченным временем пребывания на улице), в спортивном центре «Сухайль» (где у лошадей практически не было доступа в паддоки) и на конной базе «Иткая» (где лошади имели возможность свободно двигаться в течение длительного времени). Результаты показали, что у лошадей, находившихся в условиях ограниченного движения, наблюдался высокий уровень хронической боли и хромоты, в то время как у лошадей с регулярными физическими нагрузками и большей свободой движения признаки боли были выражены в меньшей степени. Выводы подчеркивают важность обеспечения лошадей качественными физическими нагрузками, которые предотвращают развитие патологий опорно-двигательного аппарата и способствуют общему благополучию животных. Полученные данные подтверждают необходимость применения комплексных методов оценки болевых состояний для улучшения условий содержания и тренинга лошадей, а также повышения внимания к их благополучию в профессиональном конном спорте.

Ключевые слова

лошадь, благополучие, боль, боль в опорно-двигательном аппарате, этограмма, этограмма боли у верховых лошадей, шкала хронической боли у лошадей, шкала гримасы у лошадей, стойловое содержание, упражнения, хромота, конные предприятия, психическое благополучие

Introduction
Введение

Man domesticated horses around 5,000 years ago, but have not managed yet to fully meet their needs without causing harm – the five freedoms of animal welfare are violated everywhere, whether a horse is kept in a stable or is performing the Olympic dressage with a rider on its back. Freedom from disease, injury and pain is one of the most critical aspects of welfare, but appropriate feeding and housing conditions and the ability to express social behaviors are also important components. Although significant progress has been made in understanding the physiology and treatment of pain in animals over the past 20 years, the assessment of pain in horses during training for competitions, as well as those used in rentals, riding schools and tourism, is often overlooked and not considered due to a lack of awareness of its benefits among the broader equestrian community. Currently, leading trainers, riders and veterinarians are combining efforts to address welfare issues in equestrian sports, as the mistreatment of horses and obvious signs of animal pain can no longer be ignored. Pain is one of the most significant challenges in international equine clinical

veterinary medicine, as it results from various factors depending on the nature of training, its frequency and the trainer's competence. Incorrect care, a sedentary lifestyle or excessive physical load can lead to musculoskeletal pathologies in horses, accompanied by chronic pain of varying intensity, which significantly reduces the animals' welfare [1]. The expression of discomfort or pain is often overlooked or misinterpreted by humans, because horses, as prey animals, instinctively try to hide their suffering. Therefore, it is necessary to apply objective methods for assessing the physical welfare of sport horses during work and at rest. However, those who work with horses are often unaware of the signs of pain expressed during movement or in the animal's facial expressions. Even at international competitions, a horse showing obvious signs of pain and discomfort may still be scored highly, which allows the owner to remain unconcerned about the horse's welfare.

One of the factors contributing to the development of musculoskeletal pathologies in horses, accompanied by pain, is the lack of quality exercise, which should fully satisfy the horse's natural need for a wide range of movements except for training hours, which are often insufficient in modern stables. For horses living in the wild, it is considered normal to be in motion for 16 hours a day, while in stabling conditions, their movement is limited to 1-3 hours, which negatively affects not only the musculoskeletal system, but also the functioning of the cardiovascular system. This results in limb swelling, tendon strains and minor tears, and since it is psychologically challenging for the horse to remain stationary, abnormal behaviors (crib-biting, weaving) may develop.

As a result, a horse that spends most of its time in the confined space of a stall is unable to follow its natural movement patterns, resulting in muscle spasms that cause pain, which, if not diagnosed and treated in a timely manner, clinically manifests itself as lameness that hinders the animal's working potential and requires veterinary assistance.

However, the mental welfare of horses has only recently received attention; the animal's emotions and movement patterns are indicators that can be used to assess its mental and physical well-being. Research into the mental state of horses, based on the assessment of facial expressions, the nature of movements during training, communication with conspecifics and their general condition, has proved useful and is particularly relevant as it may indicate non-obvious skeletal muscle pain due to excessive loading and possible inconsistencies in training approaches before the appearance of obvious pain sites and subsequent lameness.

The research aim is to determine the effect of equine housing systems on the development of musculoskeletal pain.

The objectives of the article are to:

1. determine the presence/absence of pain during exercise using the Ridden Horse Pain Ethogram;

2. assess pain in a static position using the Horse Chronic Pain Scale;

3. assess the presence of pain using the Horse Grimace Scale.

Equine Welfare. In recent years, the welfare of domestic horses has received considerable attention from the scientific community. It has been recognized that traditional riding and stable housing methods are inconsistent with the physical and behavioral adaptations of horses. Therefore, there is a need to understand how modern housing affects their welfare, specifically their physical and emotional states.

To understand why horses might experience elevated stress and anxiety levels in human-made stable environments, as well as during training and under saddle, it is important to consider their ethology and physiological characteristics [2]. The evolution of the modern horse began about 65 million years ago. Horses grazed on open plains, traveling long distances to different pastures, and lived in herds with clear hierarchies. The social community within the herd and the distribution of functions among individuals, as well as communication among conspecifics, played a key role in ensuring that horses felt comfortable and relatively safe, while at the same time being able to send danger signals and defend themselves against predators[1]. A well-defined complex social structure within the herd, maintained by subtle behavioral interactions that evolved over time, is impossible in modern stables due to the stall-based confinement that severely limits their communication [3].

As most animals under human control are selected on the basis of specific traits that can affect their behavioral repertoire, it is necessary to have an ethogram to analyze their behavior for signs of possible discomfort in living conditions. The Animal Welfare Indicator (AWIN) welfare assessment protocol for horses developed in 2015 by specialists from leading European and American universities, institutions, and colleges, highlights aspects to consider when assessing welfare and can stimulate solutions to future problems in equestrian development [4]. Welfare assessment protocols provide a set of practical indicators for assessing horse welfare. A scheme has been developed whereby the needs of animals, including horses, are characterized by four principles: "Good feeding", "Good housing", "Good health", and "Proper behavior", each comprising several criteria.

The AWIN methodology is based on the concept of the "Five Freedoms", although initially it focused primarily on physical health; the concept of welfare has gradually evolved to include psychological well-being and ethological behavioral signs. Currently, the welfare of horses is a complex discipline that encompasses their physical health, psychological comfort, housing conditions,

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[1] What does a horse's body say? URL: https://equiflow.ru/horsebodytalk (accessed on: May 5, 2024)

nutrition, and relationships with humans and that is based on the Five Freedoms.

The Pain Issues. The correct methods of training horses and pain issues have become pressing concerns, easily noticeable in the animal's movements and facial expressions that violate the welfare principle of "freedom from pain and discomfort" and cannot be ignored. The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage". Pain is one of the key issues in international clinical veterinary medicine for horses, as it results from numerous factors related to training nature, its frequency, the amount of daily movement of the horse, the housing conditions and the satisfaction of the specific needs of the animal. The experience of pain hinders the achievement of the goals set for horses in competitions of various levels, trials in breeding farms, and directly influences the animals' welfare and their mental and physical health [5].

Since the horse is a prey animal by nature, it typically does not show signs of pain or discomfort to avoid predation, making early diagnosis difficult. Consequently, riders and trainers must use methods that help preventively identify possible sources of pain, as many factors influence pain occurrence, from the choice of tack to the rider's style. Prolonged pain experienced by the animal leads to changes in behavior, relationships with conspecifics and humans [6].

To achieve the desired results in any equestrian sports discipline, horses must meet both physical and emotional criteria. However, the demands placed on horses in modern equestrianism have significantly increased the physiological stress on their bodies, resulting in a significantly higher risk of injury and the development of musculoskeletal pathologies. If an animal experiences pain for an extended period, the immune, endocrine and nervous systems may begin to malfunction, causing the body to struggle with environmental stressors. Chronic exposure to factors causing anxiety and pain provokes physiological responses, such as tachycardia, decreased immunity, increased respiratory rate and longer recovery times after exertion, which is often accompanied by characteristic changes in emotional states, specifically changes in the horse's facial expression. Even minor human maneuvers can provoke aggression in the animal. Thus, anxiety (stress) and pain directly affect the body's homeostasis.

To diagnose pain or prevent lameness, one must analyze the character of the horse's movements, how rhythmic they are, and whether there is stiffness in various gaits and on different types of ground during turns and transitions from trot/step to gallop/trot. Careful palpation of the back muscles and lower limbs, including assessing pain during flexion, is essential. Monitoring the animal's behavior and its responses to human manipulations is also critical, as some problems can only be observed during saddle work, allowing for proactive adjustments to eliminate actions that are detrimental to the horse's health. It is vital to remember that certain aspects of the horse's movement may indicate discomfort, that, if not addressed, can escalate into pain; for example, tail swishing and very slow, stiff trots, as well as attempts to throw the head back, can lead to the development of facial wrinkles due to muscle tension, psychological discomfort and reluctance to approach humans in the stall.

Often, inactive or aggressive behavior in a horse, identified as undesirable, may be an indicator of pain, which is always crucial to consider. It is advisable to perform a pain assessment using ethograms, which can help diagnose the presence of ongoing or chronic pain that has not yet manifested itself as clinical signs such as obvious lameness or other problems related to acute pain caused by improper training methods or poorly fitted tack that heavily influences the character of the horse's movements under a rider.

The use of horses in different equestrian sports is conditioned by their anatomical and physiological characteristics, formed through evolutionary processes, which enable these animals to utilize a very broad speed range in daily life. Any improperly utilized tack elements that ensure the swiftness and efficiency of horse's movements can also make them more susceptible to injuries.

The most commonly diagnosed pain in the athletic horse is back pain. Most veterinary recommendations usually include comments on strengthening and relaxing the back muscles. Therefore, one must be proactive about the quality of the horse's training for long-term comfort and performance without pushing it for swift results, which is a common issue in the equestrian field [5, 7].

Research method
Методика исследований

The research was conducted in 2023 at three equestrian enterprises:
1. CSKA Equestrian Complex (Russia);
2. Suhail Sports Center (Qatar);
3. Itkaya Horse Base (Russia).

CSKA Equestrian Complex. Located in Moscow, it specializes in providing services for equestrian training and preparation for competitions in classical equestrian disciplines: a riding competition, dressage and eventing. Some horses belong to the CSKA Children and Youth Sports School of the Olympic Reserve and their training is supervised by qualified specialists in specialized facilities. The base includes paddocks. The study was conducted on 27 adult sport horses, which are always in regular work under saddle and are owned by the riding school.

Suhail Sports Center. This equestrian center is located in Qatar, 20 km from Doha, and specializes in riding lessons for children and adults, as well as

rentals. Training is supervised by trainers. The stable has no designated areas for exercising horses or facilities for walking them. The study was conducted on 33 horses in daily work.

Itkaya Horse Base. Located in the Chemal district of the Altai Republic, its primary focus is horse tourism, providing horseback rides along routes of varying difficulty based on the terrain and duration. Horses are used for horseback rides for 5-6 months a year, depending on weather conditions. Horses graze for at least 12 hours a day. During the remaining 6-7 months, outside of the tourist season, the horses are kept in a herd on pasture forage, except during harsh winters when they are fed on pre-prepared hay. The study was conducted on 33 horses in daily work.

Currently, there are several scientific methods for assessing pain in horses, each recommending specific pain indicators. However, only a comprehensive assessment of the animal's condition will provide convincing data on the presence and intensity of pain, specifically assessing the presence of pain in the horse during movement, at rest, and through facial expressions.

Ridden Horse Pain Ethogram. One of the most significant inventions and studies is the Ridden Horse Pain Ethogram, which most clearly represents changes in horse behavior when in pain. The Ridden Horse Pain Ethogram consists of a list of 24 behavioral patterns, many of which are observed ten or more times more frequently in horses with musculoskeletal pain. Research has shown that if a horse exhibits seven or more of the 24 behaviors listed in the Ridden Horse Pain Ethogram, it is likely suffering from musculoskeletal pain [8].

Horse Chronic Pain Scale. The Horse Chronic Pain Scale, developed by leading European universities, is used to assess the presence of pain and the quality of life of horses at rest and during relaxation. The Horse Chronic Pain Scale is a validated method consisting of 15 questions that assess various aspects of the horse's behavior on a numerical rating scale. The total pain score ranges from zero (no signs of pain) to 45 (maximum pain score). Seven questions assess the effect of pain on overall activity and enjoyment of life, including interactions with conspecifics, attitude towards food, changes in behavior towards peers, reactions to humans, skin sores, ability to easily bite carrots/apples, and head position. Five questions assess pain severity based on body position, weight distribution, weight shift between the fore and hind limbs, and pain responses to standard flexion and movement of the fore and hind limbs. In addition, three questions assess body condition, muscle status, and pressure points on the skin [7].

The horses most frequently demonstrated pain based on the following indicators: "General Appearance" (rated on a scale: the animal interacts calmly with conspecifics (zero points); the animal shows mild depression and/or anxiety and/or reduced interaction with other horses (one point); the animal is moderately depressed and/or aggressive or unresponsive to members of its species (two points); the animal is severely depressed – unresponsive to very clear and obvious signals such as movement or sound (three points)), indicating indifference that characterizes the animal's mental state in relation to its environment; "Head Position" (rated on a scale: ear base above the level of the withers or eating/drinking from the ground (zero points); ear base at the level of the withers (one point); ear base below the level of the withers (two points); horse's nose on the ground, no eating activity (three points)), indicating the presence/absence of pain; "Reaction to Observer" (Reaction to the observer and ear movements towards the observer (zero points); slight decrease in reaction or ear movements towards the observer (one point); moderate decrease in reaction or ear movements towards the observer (two points); no reaction or ear movements towards the observer (three points)), reflecting the animal's loyalty and interest in humans; "Pain Reaction to Back Palpation" (no reaction to deep palpation (zero points); weak reaction to superficial palpation (one point); moderate reaction to superficial palpation (two points); strong reaction to superficial palpation – ears turned back, tendency to bite (three points)), characterizing the condition of the spine and back muscles. Pain indicators include "Body Condition Score" evaluating condition, and "Movement" checking for lameness on the AAEP (American Association of Equine Practitioners) scale.

The Horse Grimace Scale. The Horse Grimace Scale was described as a pain coding system that evaluates six different facial expression characteristics: "ears turned back", "tension above the eyes", "orbital tightening (facial wrinkles)", "protruding and tense chewing muscles", "a tense mouth with a pronounced chin", and "tense nostrils with a flattened profile".

Assessing pain is critically important for horse welfare and the simplest method of assessment is the animal's facial expressions. Each pain marker is rated on a scale from 0 to 2, where zero points indicate the absence of the sign and two points indicate clear presence [10].

This ethogram allows assessment of the horse's condition as soon as a person approaches its stall, significantly simplifying the rider's understanding the animal's well-being based on its facial expressions. However, a complete analysis requires a comprehensive assessment of the horse's condition, which is why several methods are used during the experiment.

The purpose of this research was to evaluate the use of ethograms to provide an objective, data-driven method of recording ethological and physiological data for horses used in various types of work under saddle. Behaviors indicative of compromised welfare were identified in horses used in different types of work and under different living conditions, with particular emphasis on behavioral changes during movement under saddle and the animals' responses to palpation of specific body areas.

Результаты и их обсуждение
Results and discussion

The findings from the horse population at Suhail Sports Center in Qatar revealed that a total of 33 horses were assessed using three methods. Based on the Ridden Horse Pain Ethogram, 30 out of 33 horses were recorded in the group scoring seven and above. The most prominent marker, occurring in 24 horses, was "horse's head divergence from vertical (>30°)" indicating that the horse avoids rein contact and experiences discomfort as a result (Fig. 1). The result of a constantly elevated head is a lack of muscle engagement in the back, which has a significant impact on the horse's health due to the risk of developing osteoarthritis [7]. Other prominent markers included "ears turned back" and "tense gaze" noted in 21 and 15 horses respectively, indicating animal fatigue and experienced discomfort or pain. The behavior of "multiple mouth openings" observed in 22 horses reveals how gently or harshly the rider uses their hands; opening the mouth under rein pressure indicates pain, encouraging the horse to avoid rein contact by altering its head position [8]. "Tail swishing in various directions" recorded in 27 horses, also signifies rough handling where the rider uses the heel or whip as punishment for disobedience instead of applying pressure with the leg. "Multiple stumbling" noted in 27 horses during riding indicates a lack of impulse, but may also signal incorrect shoeing, improper hoof trimming and inappropriate saddles [8].

When assessing horses using the Horse Chronic Pain Scale method, it was found that the animals most often showed pain responses in the following areas: "General Appearance" noted in 10 horses; "Head Position" indicating discomfort, observed in 15 horses; and "Reaction to Observer" which should reflect the animal's loyalty and interest in humans, but the scores indicating a negative reaction were recorded in 13 horses, four of which exhibited aggression. This behavior suggests that painful sensations during training lead to negative associations for the horses, as the lack of response to a person in the stall or the opposite, aggression, are instincts of self-preservation and attempts to protect themselves from pain caused during exercise [7]. "Pain Reaction to Back Palpation" was expressed in 23 horses (Fig. 1). Pain indicators such as "Body Condition Score" assessing conditioning, and "Movement" checking for lameness on the AAEP (American Association of Equine Practitioners) scale, were recorded in nine horses.

The number of animals demonstrating pain as assessed by the Horse Grimace Scale, which assesses pain in horses through changes in facial expression, was 24 out of 30 horses (Fig. 1). Many horses exhibited "orbital tightening (facial wrinkles)" and "tension above the eyes", as well as "protruding and tense chewing muscles". Therefore, the data obtained are consistent with the ratings from the Ridden Horse Pain Ethogram and the Horse Chronic Pain Scale,

indicating the presence of chronic musculoskeletal pain in these animals.

In the second group, scoring less than seven points on the Ridden Horse Pain Ethogram, three out of 33 horses were identified as showing no signs of pain during the time of assessment. Pain assessment using the Horse Chronic Pain Scale revealed minimal scores (zero points) on all indicators except for one horse that showed a pain response to back palpation and received one point. The number of animals demonstrating facial pain on the Horse Grimace Scale accounted for two out of the three animals (Fig. 1). Despite being classified as healthy, these horses displayed minor signs of pain; however, at the time of assessment, they had been removed from rental duties and were worked exclusively by trainers, favorably influencing the results, indicating that a change in training had a positive effect on the score.

For example, the vast majority of horses at Suhail Sports Center, 30 out of 33 in fact, are prone to lameness when kept exclusively in the stable with no opportunity for exercise, experiencing varying degrees of pain (Fig. 1). Intensive work under saddle without free exercise negatively impacts their health and does not support the natural recovery of the body through relaxation during free movement outside of work [7].

The results from Itkaya Horse Base evaluated 33 horses using the three methods. In the first group, scoring seven points or more points on the Ridden Horse Pain Ethogram, six out of 33 horses were identified. The most pronounced pain signaling indicators were "head throwing", and "mouth opening", occurring in four horses, indicating poor rein influence and discomfort in the horses, which, if not corrected, may lead to a swayback and osteoarthritis. "Ears turned back" was also noted in four horses, signaling fatigue and overexertion, while "tail borne to the side" in three horses indicated discomfort in the back and lumbar region, and "slow gait" and "unwillingness to move forward" expressed by four horses could signify hoof and leg problems or the emergence of new problems in the form of lameness due to lack of necessary cushioning during extended rides without active movement. The behavior of "multiple stumbling", noted in four horses while riding, indicates a lack of stimulation, as well as possible incorrect shoeing, improper hoof trimming and inappropriate saddles; in the mountainous terrain of the Altai this could lead to hoof punctures and the use of a horse without shoes (Fig. 1).

The most prominent pain indicators based on the Horse Chronic Pain Scale included "Head Position", reflecting how fatigued the horse feels (five horses), and "Pain Reaction to Back Palpation", indicating conditions of the spine and back muscles (five horses) (Fig. 1). Only one animal indicated pain based on facial expressions according to the Horse Grimace Scale, which communicates the duration of pain.

The second group of animals, based on the Ridden Horse Pain Ethogram, comprises 27 out of 33 horses that

scored less than seven points. Upon assessment of these individuals using the Horse Chronic Pain Scale, it was found that 24 of the 27 horses had positive responses to "Pain response to back palpation". Additionally, seven horses had their heads positioned below the withers ("Head Position") at rest. None of the animals in this group showed lameness. The number of animals showing pain on the Horse Grimace Scale was two horses out of 27 (Fig. 1).

Consequently, the results, based on the results of the Ridden Horse Pain Ethogram, indicated that 27 out of 33 horses were not predisposed to lameness. Although the use of horses in tourism has a negative effect on their back conditions, this does not affect the incidence of lameness in this stable because during the working season, the horses graze for approximately 12 hours a day, which has a positive effect on their musculoskeletal system. While grazing, the horses relax and can satisfy their need for natural movements. Furthermore, outside the tourism season, the animals rest from work for 7 months, which allows them to recover (Fig. 1).

The assessment results from the CSKA Equestrian Complex showed that 27 horses assessed by the Ridden Horse Pain Ethogram led to the discovery of pain syndrome in 16 horses, as they scored 7 or more points (Group 1). The most prominent pain indicators were "mouth opening" and "horse's head divergence from vertical," exhibited by 16 horses, indicating incorrect rein influence that prevents the horse from achieving the necessary head position; without behavioral corrections, this results in back pain detectable through the Horse Chronic Pain Scale. "Ears turned back", noted in 15 horses, indicated fatigue and overexertion, while "tail swishing in various directions" in 15 horses indicated back and lumbar discomfort. "Mouth opening" during riding in 16 horses indicated excessive work on the reins causing pain (Fig. 1).

The highest number of pain indicators by the Horse Chronic Pain Scale was noted in the "Reaction to Observer," indicating the horse's attitude towards humans (12 horses) and the "Pain Response to Back Palpation," which reflects spine and back muscle conditions (12 horses).

The number of animals scoring higher than five points on the Horse Grimace Scale, indicating the duration of pain, was 13 horses.
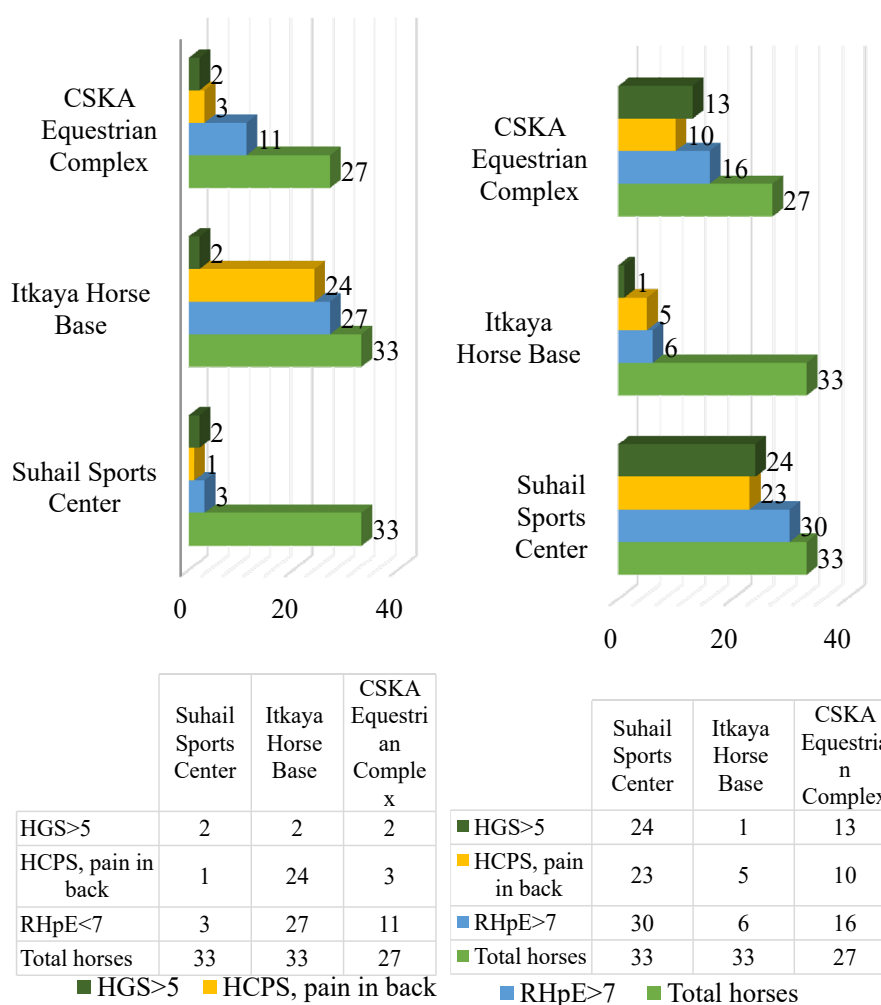

	Suhail Sports Center	Itkaya Horse Base	CSKA Equestrian Complex
HGS>5	2	2	2
HCPS, pain in back	1	24	3
RHpE<7	3	27	11
Total horses	33	33	27

	Suhail Sports Center	Itkaya Horse Base	CSKA Equestrian Complex
HGS>5	24	1	13
HCPS, pain in back	23	5	10
RHpE>7	30	6	16
Total horses	33	33	27

■ HGS>5   ■ HCPS, pain in back   ■ RHpE>7   ■ Total horses

Fig. 1. Comparison of the populations of three horse breeding enterprises for comprehensive musculoskeletal pain using three methods according to RHpE

	Спортив-ный центр «Сухайль»	Конная база «Иткая»	Конно-спортив-ный комплекс ЦСКА		Спортив-ный центр «Сухайль»	Конная база «Иткая»	Конно-спортив-ный комплекс ЦСКА
■ HGS>5	2	2	2	■ HGS>5	24	1	13
■ HCPS, боль в спине	1	24	3	■ HCPS, боль в спине	23	5	10
■ RHpE<7	3	27	11	■ RHpE>7	30	6	16
■ Всего лошадей	33	33	27	■ Всего лошадей	33	33	27

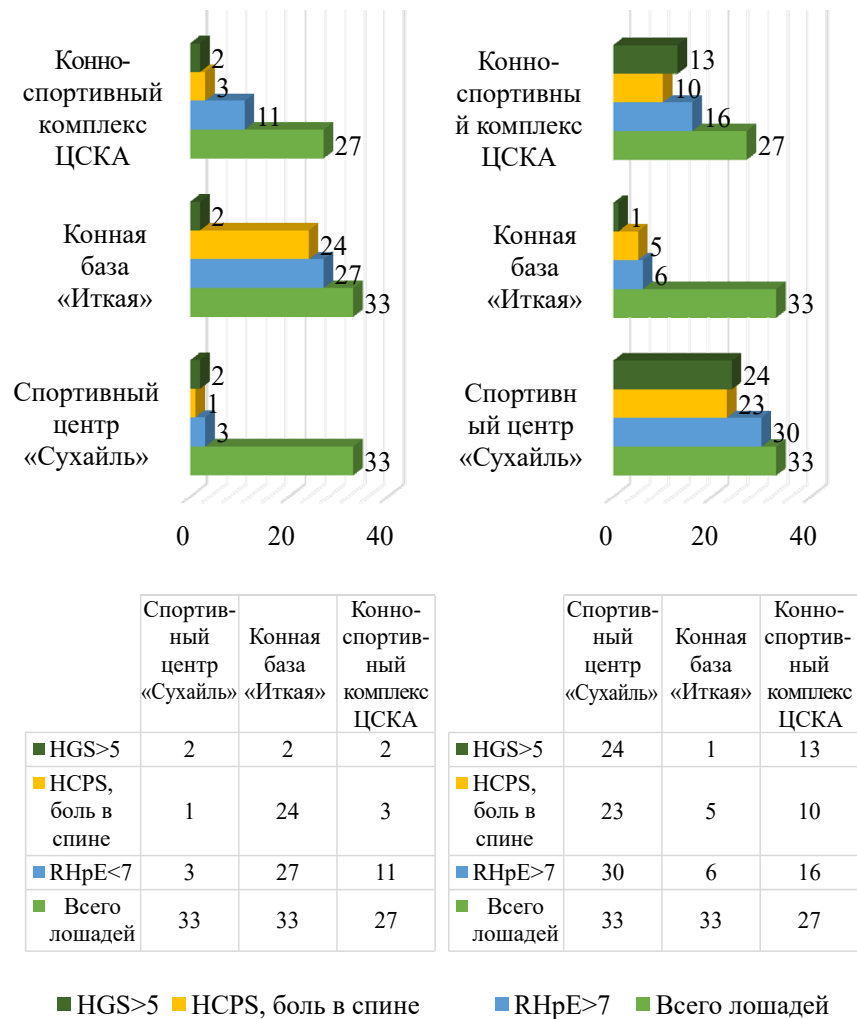■ HGS>5 ■ HCPS, боль в спине ■ RHpE>7 ■ Всего лошадей

Рис. 1. Сравнение поголовья трех коневодческих предприятий по комплексной боли в опорно-двигательном аппарате по трем методам в соответствии с RHpE

In the second group, based on the Ridden Horse Pain Ethogram, 11 out of 27 horses scored less than seven points. The most notable markers from the Horse Chronic Pain Scale included indicators for "Reaction to Observer" (four horses) and "Pain Response to Back Palpation" (three horses). Two horses scored more than five points on the Horse Grimace Scale (Fig. 1).

Thus, the stall barn housing, albeit with limited turnout, represents a middle ground between the two stables assessed above. Based on the Ridden Horse Pain Ethogram results, 16 out of 27 horses had lameness or related problems, which constituted just over half of the horse population studied (Fig. 1).

Conclusions
Выводы

In summarizing the results of the study conducted across three equestrian enterprises, patterns between housing systems and the presence of pain in horses were identified. At Itkaya Horse Base, where horses could move freely most of the time, the methodology of the Ridden Horse Pain Ethogram indicated that the animals were less prone to lameness and chronic pain, as determined by the Horse Grimace Scale, than those in a stall-only environment like Suhail Sports Center, where most horses exhibited facial "grimaces of pain" and showed characteristic behavioral pain indicators when working under saddle. Similarly, outcomes from the CSKA Equestrian Complex showed better results in the comprehensive assessment of musculoskeletal pain than those observed at Suhail Sports Center, due to the provision of extended grazing time in the paddocks allowing horses to relax. Pain scores on the Horse Grimace Scale were average compared to other facilities, with approximately half of the horses showing signs of persistent pain. The results from Suhail Sports Center showed the highest rates of pain indicators.

Therefore, quality and extensive exercise is vital to a horse's life and health. Physiologically, horses are not adapted for long periods of standing in stalls, as this can impair blood circulation and reduce tendon elasticity. The most appropriate housing for horses is a herd system that does not restrict their movements to 1–3 hours.

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Information about the authors

Angelika A. Ksenofontova, CSc (Bio), Associate Professor, Associate Professor at the Department of Animal Feeding, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy (49 Timiryazevskaya St., Moscow, 127434, Russian Federation); e-mail: tmetre@rgau-msha.ru, https://orcid.org/0000-0003-1920-2326

Polina V. Krasavina, postgraduate student, Department of Horse Breeding, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy (49 Timiryazevskaya St., Moscow, 127434, Russian Federation); e-mail: pelageya16092000@yandex.ru

Liubov V. Shorina, CSc (Philol), Senior Lecturer at the Department of Russian and Foreign Languages, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy (49 Timiryazevskaya St., Moscow, 127434, Russian Federation); e-mail: shorinaliubov15@gmail.com, https://orcid.org/0009-0008-5233-9125

Dmitry A. Ksenofontov, DSc (Bio), Associate Professor, Professor at the Department of Animal Physiology, Ethology and Biochemistry, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy (49 Timiryazevskaya St., Moscow, 127434, Russian Federation); e-mail: smu@rgau-msha.ru, https://orcid.org/0000-0002-2408-0776

Информация об авторах

Анжелика Александровна Ксенофонтова, канд. биол. наук, доцент, доцент кафедры кормления животных, Российский государственный аграрный университет – МСХА имени К.А. Тимирязева; 127434, Россия, г. Москва. ул. Тимирязевская, 49; e-mail: tmetre@rgau-msha.ru; https://orcid.org/0000-0003-1920-2326

Полина Игоревна Красавина, аспирант кафедры коневодства, Российский государственный аграрный университет – МСХА имени К.А. Тимирязева; 127434, Россия, г. Москва. ул. Тимирязевская, 49; e-mail: pelageya16092000@yandex.ru

Любовь Валентиновна Шорина, канд. филол. наук, старший преподаватель кафедры иностранных и русского языков, Российский государственный аграрный университет – МСХА имени К.А. Тимирязева; 127434, Россия, г. Москва. ул. Тимирязевская, 49; e-mail: shorinaliubov15@gmail.com; https://orcid.org/0009-0008-5233-9125

Дмитрий Анатольевич Ксенофонтов, д-р биол. наук, доцент, профессор кафедры физиологии, этологии и биохимии животных, Российский государственный аграрный университет – МСХА имени К.А. Тимирязева; 127434, Россия, г. Москва, ул. Тимирязевская, 49; e-mail: smu@rgau-msha.ru; https://orcid.org/0000-0002-2408-0776