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Specific features of using life quality assessment tools for geriatric horses: Literature review

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Abstract. With the change in the social role of horses and the development of veterinary medicine, their average life expectancy has increased, so the problem of the quality of life of geriatric horses has become relevant nowadays. The purpose of the study is to determine the main approaches to the assessment of the quality of life of horses in old age. The study employed the following methods: analysis, synthesis, comparison, graphical presentation of data. Five main ways to improve life expectancy and QoL indicators and reduce mortality of old horses were determined: full and sufficient feeding; ensuring optimal ADL performance; creation of comfortable housing conditions; conducting cryotherapy maintenance vibrotherapy, manual therapy, horseshoe therapy, therapeutic and preventive exercises, magnetotherapy, phototherapy, shock wave and ultrasound therapy; use of modern methods of early detection and treatment of oncological diseases. It was found that the most common causes of death were diseases of the gastrointestinal tract, followed by diseases of the musculoskeletal system and reproductive system, and oncological diseases. Among the latter, tumours of the pituitary and thyroid glands, melanoma, sarcoidosis, lymphoma, squamous cell carcinoma (SCC) prevailed – up to 60% of oncological sick horses. It was summarised that quality of life assessments, including evaluation of factors related to health, activities of daily living and mental well-being, are useful in informing decisions



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regarding management, health care and euthanasia. The results of this study can be used by equestrian professionals, farmers or veterinarians to help them choose the safest and most beneficial care for horses

Keywords: veterinary medicine; treatment; oncology; disease; euthanasia

INTRODUCTION

Over the last century, the role of horses in modern society has changed. Working-user horse breeding has lost its importance, while at the same time the demand for sports and prize horses has increased. There is a growing trend towards more applied roles, including intellectual horsemanship. In developed countries, the use of horses for recreational rather than commercial purposes is common. For example, according to C.M. McGowan, more than one-third of horses are used for recreational purposes, about one-third are used mainly for equestrian sports and shows, and the remaining 20% are used for hippotherapy and other purposes (McGowan, 2011). J.L. Ireland *et al.* (2011) characterise the relationship between people and animals as unique and strong, due to the long-term interaction between owners and athletes. Thus, the role of horses as recreational animals has been negligible for the past few decades. C.M. McGowan and J.L. Ireland (2016) in a research survey of 50,000 US households found that 38.4% of owners keep their horses for family and children, and more than half 56.5% – as pets, 5.1% – use only economic criteria.

R. Bushell and J. Murray (2016) claim that during a Dutch survey of horse owners, 47% of respondents named horses as their partners. In Great Britain, a 15-year survey of horse owners found that about 60% of the animals were used for recreation and sport, and 30-40% were kept as companions. About 25% of horse herds aged 15 and over kept their horses until old age or natural death, according to a survey of owners. M.K. Mueller *et al.* (2018) argue that most owners of elderly horses are concerned not only about their health and well-being, but also about the ability to maintain a high quality of life. Owners' interest in the health and well-being of their ageing animals is reflected in veterinary care, with the number of hospitalised horses steadily increasing. Thus, during the ten-year observation period, there was an almost six-fold increase in the total number of hospitalised horses from 2.2% to 12.5%.

S. Popescu *et al.* (2014) established that getting older, horses are more likely to suffer from chronic diseases. Given the above, when horses getting older, it is necessary to assess and maintain the quality of life of such animals. The state of health is often equated with the quality of life, therefore, the creation of a system of standards for its assessment is established in risk groups starting from 12-15 years of age.

Considering the increase in the average age of sports horses, for recreation, companions, the question arises of ensuring the quality of their life. Given the relevance of this issue, the goal of the research was to

determine the main approaches to studying the quality of life of horses in old age in the process of analysing the results of fundamental research on this issue. According to the set goal, the following tasks have been established for the horses of the geriatric group: to analyse the role of owners and veterinarians in determining the quality of life (QoL); to investigate the factors of QoL assessment to determine the importance of daily activities; to determine the relationship between mortality and key factors of euthanasia in horses of the geriatric group according to QoL parameters.

PREPARATORY RESEARCH ANALYSIS

In world practice, a protocol Animal Welfare Indicators (AWIN) is used to assess the well-being of horses on farms, being aimed at improving animal welfare by developing practical protocols for assessing the well-being of horses (*Equus caballus*): selection of potential welfare indicators; elimination of gaps in knowledge; consultation of interested parties; testing the protocol prototype on the farm (Dalla Costa *et al.*, 2015). M. Long *et al.* (2022) in their research, focuses on comprehensive studies of the shortcomings of the welfare of horses, requiring the application of basic welfare criteria for evaluating animals in modern horse breeding.

The study by E. Dalla Costa *et al.* (2017) describes the created digital application AWIN Horse, it allows farmers, veterinarians, zoo technicians to determine indicators included in the AWIN protocol, which provides visual feedback on the well-being of horses, emphasises positive conditions and establishes comparisons with a reference population. According to M.M. Ratz *et al.* (2021), the well-being of horses of the geriatric group is assessed by the condition of the individual, the degree of satisfaction of needs, the absence of discomfort, physiological and biochemical indicators, animal behaviour, and the level of productivity.

Z. Raw *et al.* (2020) developed nine protocols consisting of 19 indicators of equine welfare based on Equid Assessment, Research, and Scoping (EARS). F.D. McMullan (2005) determined the indicator of the duration of hunger by weight, weight formula, visual assessment, and body condition score (BCS), this criterion is based on the monitoring of weight and hunger, since obesity is as much a welfare problem as underweight, and some animals can become obese when hungry. M.O. Zakharenko *et al.* (2021) consider the criterion of the absence of long-term thirst, which allows one to assess the level of dehydration based on the skin test, the dryness of the mucous membrane, and the "bucket of water" drinking test.

M.M. Brosnahan and M.R. Paradis (2003) describe the criteria for comfortable rest and thermal comfort, based on the duration and quality of sleep, the ability to lie on the side than in the supine position of the sternum, and the optimal temperature conditions of keeping, which affects their well-being and productivity in animals' geriatric group. M. Wisniewska *et al.* (2019) in their study, note an important criterion easy movement of horses in sufficient space, because locomotion plays a key role in the positive physical and mental health effects. A.B. Miller *et al.* (2021) emphasise the widespread one-box keeping of horses, finding that confinement endangers their well-being, especially in geriatric individuals.

N. Jarvis (2021) reports that more than 70% of horses over 20 years old have age-related diseases that require special care, reduction of respiratory and cardiovascular functions before intense exercise, problems with thermoregulation, including assessment of body weight, hydration status, and pain indicators. T. Doherty and A. Valverde (2008) provides an estimate of the quality of life of horses of the geriatric group under different conditions of keeping, especially when it is a question in making veterinary decisions regarding the euthanasia of chronically ill and old animals. The criterion for identifying injuries is characterised by the appearance of age-related changes in hair colour, hairless spots, skin lesions, swollen joints and tendons, a sensitive back, and lameness.

According to E. Boldt (2022), in horses of the geriatric group, it is mandatory to take care of the legs with the use of anti-inflammatory drugs for the joints, a thick layer of litter, installation of light horseshoes for comfortable movement. The criterion for the absence of diseases in horses is the absence of behavioural pain syndrome, the presence of ectoparasites, unhealthy hair, faecal contamination, cough, abnormal breathing, discharge from the eyes and nose, changes in the colour of the mucous membrane, and limb abnormalities. P.M. Dixon and I. Dacre (2005) point out the importance of dental health, horses' teeth continue to grow throughout their lives, but the rate of wear exceeds growth, wearing them down to the point of being unable to chew dry hay and straw, so geriatric animals are more often fed grass from pastures, grass pellets wheat flour, beet pulp, crushed grain, which are soaked in water and given in the form of thick or liquid porridge.

According to B.M. Hopka *et al.* (2011), the main problem for older horses is loss of condition, which is facilitated by dental conditions, parasite control, chronic diseases, reduced absorption of nutrients, and loss of appetite to the point of anorexia. F. Napolitano *et al.* (2008) reveal in his work the essence of the expression of social behaviour of horses, as highly social herd animals, considering the important role of being in a group. Moreover, with age, suppression of the emotional state of fear, suffering and apathy is possible in horses.

D. Bedenice and A.L. Johnson (2022) determined that the level of trust in people affects productivity and behaviour, strengthening the fear response, positive emotions of security and satisfaction. D. Butler *et al.* (2019) established that in the practice of veterinary care for ageing horses, the concept of integral indicators of QoL is used, borrowed from the medical practice of human geriatrics, where QoL includes special tools approved for monitoring the impact of pain, chronic diseases and age-related changes on the quality of life. QoL is also used to determine the success of treatment and other interventions. Despite the frequent use of this concept both in medicine and in veterinary medicine, a single consistent definition has not been developed in veterinary medicine.

S. Dyson (2002) characterises modern attitudes to the quality of life of horses QoL. There are objective and easily measurable indicators of physical health, as well as subjective indicators of psychological state (PS) and total enjoyment of life (TEL). They are defined as objective complex indicators of QoL, PS and TEL. The owner (caretaker) and a veterinarian who regularly treats horses over the age of 20 must participate in the assessment.

M.M. Pudgorotsky *et al.* (2019) reported that health-oriented quality of life assessment tools related to specific conditions and diseases were developed primarily for use in small animal medicine in dogs and productive farm animals. The requirements of horses are markedly different from those of small animals and livestock, so previously published tools for these species cannot be directly extrapolated to assess the quality of life of horses. Investigation of the problems of well-being, maintenance, and use of older horses for the preservation of high sports results in athletes of various levels is gaining relevance.

BASIC ASPECTS OF HORSE WELFARE

The analysis of literary sources indicates an increase in the life span and term of use of horses of all directions in most countries. Unsurpassed results are currently being observed in the US Equestrian Association. Ballynoe Castle RM horse, which is a mixture of Belgian Warmblood and Irish Thoroughbred, after reaching the age of 15, was included in the 4th place in the composition of the USA team at the World Equestrian Games (WEG) in 2010 and 2014. In 2015, "Reggie" continued to win many top-level competitions, but in 2016 he stopped competing. Thoroughbred Arabian endurance horse "Haji Karev Omar" covered 8,575 miles in 170 races at the American Endurance Ride Conference (AERC). "Smart Snap" won the National Show Horse Association and Equestrian Congress titles from members of the Galbraith family, and the 17-year-old bay gelding now competes in France, Italy, Germany and Canada, winning nearly 150 races (Dalla Costa *et al.*, 2014).

As a general rule, if having proper training and management, competition horses can continue to compete

at the highest level well into their older years, often in the range of 15-20 years. The same trend was observed in studies of horses of amateur equestrian organisations for 2014-2019. From the studied herd, 31.3% of horses belonged to the older group at the age of 15 years and older. The share of horses in the older group increased from 60% to 77.8% when the height of the obstacle was higher than 80-110 cm. Older horses had an advantage over younger horses on all routes. In the course of the study of the correlation between the age of the horse and the indicators of sports use, the value of older horses was also confirmed. This indicator increased from +0.192 to +0.694 correlating with an increase in the height of obstacles (Koskinen, 2014; Fenner *et al.*, 2019).

The loss of the importance of working-utility horse breeding, given an increase in the role of applied and intellectual, the predominance of the use of horses for non-commercial purposes and proper veterinary care – increases the average life expectancy of horses. There is some disagreement about which horses can be considered old. Not so long ago, a horse at the age of 8 was considered old, in some publications the maximum age of a horse was equal to 25 years, but today the perception of the age of horses has changed radically. At the 2012 London Olympics, of the 74 horses that competed in the triathlon, 23% were over 15 years old, with the oldest being 20; in dressage competitions, 24% of the 50 horses were over 15 years of age, including two of the three prize winners. In the USA, from 7 to 15% of sports horses are over 20 years old, while 63% of them still perform at various sports events, 10% participate in international competitions (Egenvall *et al.*, 2006).

A number of physiological changes are associated with ageing in horses: metabolism, insulin-like growth factor 1 (IGF-I), endocrine and immune and respiratory functions, aerobic capacity for exercise, cardiovascular tone decrease. Changes in the structure of muscle fibres are observed, animals become less hardy and tolerate intensive training worse. Control of cardiac activity is an important element of health control, especially for sports horses, in which the percentage of cardiovascular diseases is 61.5%, and when getting older, the efficiency of the heart muscle decreases and diseases of the cardiovascular system develop, therefore the heart rate increases and the animals sweat more actively. Young horses have a high physiological reserve, the ability to quickly recover, which is confirmed by their ability to adapt to loads. Horses of the geriatric group have problems with thermoregulation, so after training, the animal's normal body temperature is restored slowly (Briceno *et al.*, 2018).

The morbidity of cardiovascular system organs in horses older than 10 years for 2018-2020 is 55%, 6-7 years – 48%, 3-4 years – 20%, and in two-year-old animals only 5%. In sports horses, pathology of the organs of the cardiovascular system was noted much

more often in 61.5%, less often in training horses – 15.4%, inseminators – 15.4%, and mares – 7.7% (Sobol *et al.*, 2020). Maintaining health and establishing high QoL indicators of horses is impossible without monitoring the state of the cardiovascular system in the geriatric group of animals, this parameter can provide some measure of health-related quality of life in horses. Assessment of individual or combined health indicators will not be sufficient for the geriatric group, so although weight loss or obesity may affect the risk of morbidity and mortality, the BCS assesses this problem partially. The problem of assessing the subjective parameters PS and TEL can also imperfectly give an adequate assessment of the horse's quality of life. Veterinarians are effective evaluators of equine health, although owners have more experience with individual animals and can significantly influence psycho-emotional well-being. Long-term ownership of geriatric horses tends to increase, and most owners are responsible for the day-to-day care of such an animal a long time. Thus, compared to veterinarians, owners have much more knowledge about their animal. As research has shown, they are familiar with the character, behaviour, and daily routine of their animal, have a heightened awareness of the importance of external factors from the standpoint of an individual animal.

QoL depends on the individual's perception and interpretation, leading to several forms of personal bias. The owner's perception of the quality of life and factors affecting the dependence of anthropomorphism or anthropocentrism, therefore, the owner, and the veterinarian must participate for a comprehensive QoL in geriatric horses. The vast majority of owners believe that their geriatric horses have a good or excellent quality of life; however, increasing age of the horse is associated with a decrease in QoL rating, from the owner's perspective. Welfare issues were named the fourth most important health issue affecting geriatric horses in a large survey of Australian owners. Among the largest horse owners in the Netherlands, 99.6% said that good health is an indicator of good well-being. Existing problems with health and increasing age of horses were negatively associated with quality of life because they were assessed by owners, not corresponding to QoL factors.

Mortality rates increased with age and varied greatly between breeds. Survival analysis showed that the average age of registered horses was 18.8 years. Joint problems are the most common cause of death or euthanasia (Hemsworth *et al.*, 2015). Research into the causes of death in thoroughbred horses, conducted between 2008 and 2012, showed that the most important causes of death were fractures due to skeletal muscle damage, abdominal crisis, intestinal torsion or stomach rupture, and respiratory pathology. For example, arthritis common in geriatric horses is found in many sport horses, in some cases the disease in the herd exceeds 70% (Hemsworth *et al.*, 2015). The aetiology of arthritis

varies, ranging from infections to complex fractures. In the event of pathology, animals are given preventive cryotherapy sessions, which are especially effective in the acute phase of the disease, trauma, or sudden relapse. Cryotherapy sessions are carried out in the first three to four days, the actions contribute to the removal of the pain effect in the affected area, reduction of swelling, cessation of inflammatory processes. For example, pneumonia in horses represents a significant number of cases of pulmonary bleeding caused by physical activity.

ASSESSMENT OF THE QUALITY OF LIFE OF HORSES AFTER SUCCESSFUL TREATMENT

The state of health after successful treatment of diseases with significant changes of about 18% in chronic forms is considered by owners to be a priority for the QoL of geriatric horses (Hotzel *et al.*, 2019). In addition, QoL is an important factor in the owner's decision-making regarding options for long-term treatment or euthanasia of the horse. In the assessment by the owner of the QoL of a geriatric horse, the main role is played by the state of health, therefore, a larger share of owners performs significant factors influencing the QoL: full balanced feeding according to age groups and health status; comfortable maintenance (especially stables, shelter in pastures, warmth, presence of rugs, etc.); the presence of other horses, because horses in nature live in small social groups; veterinary care (preventive health care, improvement of symptoms by providing effective analgesia). The owners focused no less attention on curative and preventive measures to support QoL: regular exercises, their intensity and variety, frequency of performance, gentle driving. Activities of daily life (ADL) is a key component in the assessment of QoL in geriatric individuals, lower scores for ADL were obtained in horse riding in association with increased risk of mortality, insist on the degree of restriction according to the effect of normal ageing (Hotzel *et al.*, 2019).

Considering the age factor, the mortality rate in geriatric horses increases with the transition to older groups of animals: among horses 10-12 years old, it is 4-6 cases per 100 animal units. At the age of 15-20, the rate is 9-11 people per 100 animal units; from 20 years old – 35-42 per 100 animal units. In many studies, the reported causes of death or euthanasia in geriatric horses are largely similar to some variation depending on the population. During the post-mortem pathological examination of breeding horses over 15 years of age, the most common causes of death were diseases of the gastrointestinal tract, musculoskeletal system, and reproductive system. For horses over the age of 20, various oncological diseases prevailed. The percentage of oncological diseases and tumours as causes of death was more than 16% in horses 15-20 years old, up to 22% in horses over 20 years old. Thus, subclinical signs of pituitary and thyroid tumours were observed in

70% of older horses, in grey horses older than 15 years, about 80% suffered from melanoma. The most common type of neoplasm is sarcoid – an oncological disease diagnosed in 39.9% of horses, compared to other cancers. According to the American statistics of neoplasms of horses, neoplasia, which is a common type of cancer, is diagnosed in the range of 45-80% compared to other cancers. SCC is a skin cancer with a prevalence of 60% (Taylor & Halderson, 2013).

Serious injuries, incurable bone diseases are common causes of death in horses of various ages, thus fatal limb fractures have been recorded in animals older than 5 years and a small part of geriatric horses, which have non-traumatic diseases of the musculoskeletal system with fatal consequences. In horses of the geriatric group, important moments of QoL are preservation of ADL, PS, and TEL, but quite often the disease of the musculoskeletal system becomes a direct cause of death or euthanasia (De Sousa *et al.*, 2017).

Approving decisions regarding euthanasia, owners of geriatric animals take into account concomitant diseases, signs of ageing and exhaustion, noting specific diagnoses. The number of animals euthanised due to old age and concomitant disease for 2018-2022 was 26.8%, the number of horses with age-related problems was 8.4%, due to an accident or serious injury was 4.2%. In the US, old age is the most common cause of death or euthanasia, with 29% of deaths in animals older than 6 months and 2/3 in horses older than 20 years. Old age is the most common reason for horses to be unable to ambulate, stand on their own, climb unaided, or can stand but not walk. For horses over 30 years of age, the percentage unable to move is 10.4%, which is a serious welfare problem. Advanced age is not considered a specific cause of death, but a significant increase in age with massive signs of ageing affects the owner's decision regarding treatment options for geriatric horses (De Sousa *et al.*, 2017).

The economic factor is quite a strong reason, because the cost of keeping geriatric horses, with the costs of treating associated diseases, can make the owner likely to choose euthanasia, compared to expensive or long-term treatment. In cases where geriatric horses were found to have incurable concomitant oncological and musculoskeletal diseases with pronounced pain syndrome, 43% of the owners made decisions on euthanasia. For financial considerations, the decision to euthanise was influenced by insistence for only 2% of owners (Ireland, 2020).

Therefore, the state of health of the oldest horse will be an important determinant of its quality of life and health. The attention of veterinarians provides many opportunities to evaluate their patients using the Health-Related Quality of Life index (HRQoL). It is important to understand that the index includes more than a thorough clinical examination. Assessment of animal's health status will primarily involve assessing

the impact of specific clinical features or physical limitations caused by the disease, such as pain or fatigue, whereas HRQoL measures are broader, including mental and social well-being.

The most common causes of death or euthanasia were diseases of the oncological, gastrointestinal tract, musculoskeletal system, and reproductive system. Among the latter, oncological diseases of the pituitary gland and thyroid gland prevailed – 70%, melanoma – 80% of grey horses, sarcoidosis – 40%, lymphoma – 45-80%, squamous cell carcinoma – up to 60%. Quality of Life assessment includes health-related factors in daily life activity and mental well-being, useful for informing decision-making and management, health care and euthanasia, ensuring maximum longevity while preserving QoL. Equine welfare instruments are defined by environmental condition or health scores, BCS, hydration, lameness pain, and cardiopulmonary parameters. Parameters can be a measure of health-related quality of life, but assessment of individual or combined parameters may not be sufficient for geriatric horses. For example, weight loss and obesity are common in older horses and can affect mortality risk.

CONCLUSIONS

Given the conducted analysis, the issue of ensuring the quality of life of horses of the geriatric group, related to the change in the social role of horses, the loss of the value of working animals, the reproductive value and the increase in the role of intellectual horse breeding, for non-commercial purposes, was considered. Such changes led to an increase in the level of veterinary care and a corresponding increase in life expectancy, and an increase in the average age of horses, especially amateur animals.

If relatively recently, sports horses aged 8 years and older were considered age-matched, now horses over 15-18 years old are successfully performing, even at the

international level. Older horses can have various health problems, but the factors affecting their well-being and quality of life are higher than in younger animals. Currently, there is no varied tool for assessing the quality of life of horses in animals of any age. However, in horse breeding, many medical resources borrowed from the preventive and therapeutic actions of humans or small animals are used, which should be included in detail in the assessment of QoL for horses of the geriatric group. Veterinary surgeons actively discuss quality of life with owners, conducting a comprehensive QoL assessment in older animals. The well-being of horses of the geriatric group is realised in the process of care, feeding and maintenance, as the owner and the veterinarian.

As a result of the study, five main factors of the most effective ways to improve life expectancy and QoL indicators and reduce mortality in the geriatric category were determined: full and sufficient feeding while maintaining the recommended BCS parameters; ensuring optimal ADL performance based on use, breed, and individual characteristics, including equine and human interactions, varied exercise, and economical riding; creation of comfortable housing conditions – shelters, dens, blankets, bedding; conducting cryotherapy maintenance therapy vibrotherapy, cryotherapy, manual therapy, horseshoe therapy, therapeutic and preventive exercises, magnetotherapy, phototherapy, shock wave and ultrasound therapy; use of modern methods of early detection and treatment of oncological diseases. In future studies, the analysis of the dependence of the life expectancy of horses on their nutrition and methods of treatment can be deepened

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CONFLICT OF INTEREST

The authors report no conflict of interest.

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Анотація. Зі зміною соціальної ролі коней і розвитком ветеринарної медицини середня тривалість їхнього життя зросла, тому проблема якості життя геріатричних коней набула актуальності в наш час. Метою статті було визначити основні підходи до вивчення якості життя коней у літньому віці. Основними методами роботи були аналіз і систематизація джерел. Визначено п'ять основних шляхів покращення показників тривалості та якості життя і зниження смертності старих коней: повноцінне та достатнє харчування; забезпечення оптимальної продуктивності повсякденних активностей; створення комфортних умов утримання; проведення кріотерапії підтримуючої вібротерапії, мануальної терапії, підковотерапії, лікувально-профілактичної фізкультури, магнітотерапії, фототерапії, ударно-хвильової та ультразвукової терапії; використання сучасних методів раннього виявлення та лікування онкологічних захворювань. Встановлено, що найпоширенішими причинами смерті коней були захворювання шлунково-кишкового тракту, на другому місці – захворювання опорно-рухового апарату та репродуктивної системи, а також онкологічні захворювання. Серед останніх переважали пухлини гіпофіза та щитовидної залози, меланома, саркоїдоз, лімфома, плоскоклітинний рак – до 60% онкохворих коней. Було підсумовано, що оцінка якості життя, включаючи оцінку факторів, пов'язаних зі здоров'ям, повсякденною активністю та психічним благополуччям, є корисною для прийняття рішень щодо лікування, охорони здоров'я та евтаназії коней. Результати цієї роботи можуть бути використані професіоналами кінного спорту, фермерами або ветеринарами, щоб допомогти їм обрати найбезпечніший і найефективніший догляд за кіньми

Ключові слова: ветеринарна медицина; лікування; онкологія; захворювання; евтаназія