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EQUINE NEONATOLOGY: CLINICAL EVALUATION AND INTERVENTION STRATEGIES IN THE FIRST HOURS OF LIFE

NEONATOLOGIA EQUINA: AVALIAÇÃO CLÍNICA E ESTRATÉGIAS DE INTERVENÇÃO NAS PRIMEIRAS HORAS DE VIDA

NEONATOLOGÍA EQUINA: EVALUACIÓN CLÍNICA Y ESTRATEGIAS DE INTERVENCIÓN EN LAS PRIMERAS HORAS DE VIDA

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ABSTRACT

Equine neonatology is a fundamental area of veterinary medicine, focused on the early diagnosis and clinical management of foals in the first hours of life, a period marked by heightened vulnerability and high mortality rates. This chapter reviews key neonatal care practices, highlighting the Apgar score, initial clinical evaluation, laboratory monitoring methods (blood gas analysis, blood glucose, lactate, and electrocardiography), and resuscitation techniques. The chapter highlights the importance of passive immunity transfer, maintaining thermoregulation, and monitoring cardiovascular and metabolic function. The conclusion is that adopting systematic, evidence-based protocols contributes significantly to reducing neonatal mortality, ensuring better animal performance, and strengthening equine farming as a relevant economic activity.

Keywords: Apgar Score. Neonatal Resuscitation. Foal.

RESUMO

A neonatologia equina é uma área fundamental da medicina veterinária, voltada para o diagnóstico precoce e o manejo clínico dos potros nas primeiras horas de vida, período

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marcado por elevada vulnerabilidade e elevada taxa de mortalidade. Este capítulo revisa os principais cuidados neonatais, com destaque para o escore de Apgar, a avaliação clínica inicial, os métodos laboratoriais de monitoramento (hemogasometria, glicemia, lactato e eletrocardiografia) e as técnicas de reanimação. Evidencia-se a importância da transferência de imunidade passiva, da manutenção da termorregulação e do acompanhamento da função cardiovascular e metabólica. Conclui-se que a adoção de protocolos sistematizados e baseados em evidências contribui de forma significativa para a redução da mortalidade neonatal, assegurando melhor desempenho dos animais e fortalecendo a equinocultura como atividade econômica relevante.

Palavras-chave: Escore de Apgar. Reanimação Neonatal. Potro.

RESUMEN

La neonatología equina es un área fundamental de la medicina veterinaria, centrada en el diagnóstico precoz y el manejo clínico de los potros en las primeras horas de vida, un período caracterizado por una mayor vulnerabilidad y altas tasas de mortalidad. Este capítulo revisa las prácticas clave de atención neonatal, destacando el puntaje de Apgar, la evaluación clínica inicial, los métodos de monitoreo de laboratorio (análisis de gases en sangre, glucemia, lactato y electrocardiografía) y las técnicas de reanimación. El capítulo destaca la importancia de la transferencia de inmunidad pasiva, el mantenimiento de la termorregulación y la monitorización de la función cardiovascular y metabólica. La conclusión es que la adopción de protocolos sistemáticos basados en la evidencia contribuye significativamente a reducir la mortalidad neonatal, garantizar un mejor rendimiento animal y fortalecer la ganadería equina como una actividad económica relevante.

Palabras clave: Puntuación de Apgar. Reanimación Neonatal. Potro.

1 INTRODUCTION

Brazil has an equine herd estimated at approximately 5.5 million animals, making it the fourth largest population in the world. This sector moves about 7.5 billion reais and generates approximately 3.2 million direct and indirect jobs, demonstrating the relevance of equine farming in national agribusiness. However, some obstacles still limit its full development, among which the high neonatal mortality stands out, often associated with the absence or inadequacy of the first care for the neonate, in addition to metabolic, pulmonary, cardiovascular, and thermoregulation changes (Conceição, 2021).

In Rio Grande do Sul, a study conducted by Frey-Júnior (2006) showed that morbidity in foals in the first 24 hours of life reaches about 76.6%, while mortality reaches 2.5%. These data highlight the importance of adequate care for the newborn, since the speed and efficiency of clinical evaluation and intervention, including resuscitation, are determinant for survival. The literature points to the need to deepen studies on physiology and clinical evolution in the immediate postpartum period, favoring the advancement of veterinary neonatology (Cruz et al., 2015).

The neonatal period is critical, marked by adaptation to a hostile environment, in contrast to the intrauterine environment, which is stable and protected. Physiological and behavioral changes should be promptly identified through a thorough clinical examination, allowing early detection of trauma, immaturity and systemic dysfunctions. This approach directly contributes to a favorable prognosis, reduces economic losses and ensures better future performance of the animal (Martins, 2012).

Thus, this chapter aims to carry out a literature review on the evaluation and neonatal care in horses, with emphasis on the application of the Apgar score, the analysis of vitality patterns and the main monitoring methods, reinforcing the relevance of neonatal care as a strategy to reduce mortality and improve equine productivity (Landim-Alvarenga, 2006).

2 LITERATURE REVIEW

Foal Evaluation

The initial clinical evaluation is essential to verify the viability of the neonate, identify possible physiological changes, and guide therapeutic interventions. For this, the physical examination must be detailed and conducted by trained professionals, ensuring early diagnosis of relevant clinical alterations (Cruz et al., 2015).

In the first hours of life, the foal should assume sternal decubitus in a few minutes, show a sucking reflex and ingest colostrum, preferably in the first two hours. The

ingestion of colostrum is vital for the transfer of passive immunity, ensuring the acquisition of maternal immunoglobulins, in addition to stimulating intestinal motility and the elimination of meconium (Sardinha, 2017). Within 60 minutes, the healthy foal must remain in season independently (Neutzling; Salla, 2021).

To evaluate immune transfer, different tests can be employed, such as protein electrophoresis, zinc sulfate turbidity, latex agglutination, radial immunodiffusion, and enzyme-linked immunosorbent assays. IgG values greater than 400 mg/dL, measured between 18 and 24 hours after colostrum ingestion, indicate adequate transfer. In cases of failure, the administration of plasma is recommended to supply passive immunity (Dias; Pimentel, 2014).

With regard to thermoregulation, neonates do not have full capacity to maintain body temperature, making them vulnerable to environmental fluctuations. The range considered ideal is between 37.2 ºC and 38.8 ºC, and regular monitoring is essential (Cruz et al., 2015).

The circulatory evaluation includes the inspection of the mucous membranes, which must be pink in color, and the capillary filling time (TPC), which must be less than two seconds. Normal physiological parameters include a respiratory rate of 20–40 movements per minute and a heart rate between 60–120 beats per minute (Neutzling; Salla, 2021).

Urination should occur within 12 hours of birth, and it is important to observe it directly. The absence of this event may indicate congenital alterations or gestational and perinatal traumas, which require immediate intervention (Cruz et al., 2015).

Care for the newborn

Neonatal care begins in intrauterine life, since maternal health and proper management during pregnancy are determinant for the foal's vitality. In the final third of gestation, special attention is recommended to the mare's nutrition and management in appropriate paddocks, in order to reduce the risk of neonatal diseases, such as diarrhea or perinatal asphyxia syndrome (Dipp, 2010).

After giving birth, the foal faces the extrauterine transition, which may require immediate interventions. In situations where the newborn remains covered by fetal membranes or when there is no spontaneous rupture of the umbilical cord, the intervention of the professional is essential. The healing of the navel should be performed with immersion in a solution of 0.5% chlorhexidine or 2% iodine, an essential measure to prevent neonatal infections (Martins, 2012).

Apgar score

Developed in 1953 by Virginia Apgar in human medicine, the Apgar score was adapted for veterinary medicine and has established itself as a simple, accessible, and reliable tool for assessing neonatal viability. It reduces the subjectivity of clinical evaluation, helping in decision-making regarding the need for immediate intervention (Castagnetti, 2010).

The score evaluates five parameters: heart rate, respiratory effort, muscle tone, reflex irritability, and mucous membrane coloration. Each variable receives a score from 0 to 2, totaling up to 10 points. The classification considers: 0–3 points (severe condition), 4–6 (moderate condition) and 7–10 (satisfactory condition). Signs such as weakness, inactivity, respiratory and cardiac instability, as well as delayed sucking reflex, require intensive monitoring (Landim-Alvarenga, 2006).

Low scores indicate the need for resuscitation measures. Studies indicate that all neonates with a score lower than six required medical intervention, and most of those with a score of 0 to 3 died, even after resuscitation (Veronesi, 2009).

The application occurs in the first, fifth and tenth minutes of life, corresponding to the period of greatest neonatal clinical instability. In addition to not generating costs, the method can be used in environments with limited infrastructure, which reinforces its practical importance (Loth et al., 2001; Gasparelli et al., 2009).

Neonatal resuscitation

Knowledge of neonatal physiology and rapid intervention in the face of the need for resuscitation are crucial to reduce mortality. The use of vitality scores guides clinical management and contributes to increasing survival rates (Cruz et al., 2015).

In foals, cardiorespiratory arrest usually has a respiratory onset, evolving to cardiac arrest due to asphyxia. Thus, the priorities in care include airway clearance and immediate ventilatory support. The earlier the intervention, the more likely it is to succeed. Cases of intrauterine asphyxia or during dystocia have a poor prognosis, due to prolonged anoxia (McKenzie, 2021).

Clinical signs indicating risk include apnea, irregular breathing, heart rate less than 40 bpm, hypotonia, absence of reflexes, hypoglycemia, hypothermia, as well as conditions such as sepsis and metabolic acidosis. Although resuscitation is possible, survival depends on the control of underlying diseases, since secondary complications, such as myocardial lesions due to hypoxia, can occur (Leal; Feitosa, 2023).

Basic life support should be initiated promptly, including tactile stimulation, nasal rubbing, orotracheal intubation, or tracheotomy in severe cases. Manual ventilation

should occur at about 10 breaths per minute, with evaluation of thoracic expansion as a measure of effectiveness. If bradycardia or absence of heartbeat persists, chest compressions are indicated (McKenzie, 2021).

After stabilization, it is recommended to monitor blood glucose, blood volume, and physiological parameters. In more severe cases, referral to specialized intensive care centers is essential to increase survival (Leal; Feitosa, 2023).

Methods of assessing vitality

Blood gas analysis

Blood gas analysis evaluates pH, partial pressures of oxygen (PaO2) and carbon dioxide (PaCO2), in addition to bicarbonate, providing information on acid-base balance and tissue oxygenation. Reference values include pH 7.35–7.45, PaO2 between 70–100 mmHg, and PaCO2 between 35–45 mmHg (Days; Pimentel, 2014). These parameters allow early identification of hypoxia, metabolic acidosis, and respiratory failure (Costa et al., 2019; Vassalo, 2014).

Glucose and lactate

Blood glucose is an essential parameter to assess neonatal metabolic status. Reference values range from 60–140 mg/dL, with levels below 60 mg/dL indicating hypoglycemia, a condition that can lead to seizures and organ failure. Hyperglycemia, on the other hand, may be associated with severe metabolic disorders (Smith et al., 2018; Amaral et al., 2020).

Serum lactate reflects the balance between oxygen supply and energy intake. Normal values in foals are between 0.5–2.5 mmol/L, and elevations are related to hypoxia, shock, or sepsis (Jones et al., 2019; Neutzling; Salla, 2021). Continuous monitoring is essential, especially in cases of risk of neonatal asphyxia (Conceição, 2021).

Cardiogram

Electrocardiographic evaluation (ECG) makes it possible to monitor cardiac rhythm and conduction, being useful in the detection of arrhythmias and cardiovascular adaptation disorders. In equine neonates, the initial heart rate ranges from 60 to 80 bpm, increasing progressively with physiological stabilization. Despite being an accessible and low-cost test, there are still few in-depth studies on its routine application in equine neonatology (Ullian et al., 2018; Gama, 2018).

3 FINAL CONSIDERATIONS

Proper neonatal management is crucial for the survival and future performance of the foal. Early diagnosis of abnormalities, combined with knowledge of neonatal physiology, enables rapid and effective interventions, reducing mortality and associated economic costs. Care should begin during pregnancy, extending to childbirth and the first hours of life, when adaptation is most critical.

The use of tools such as the Apgar score, associated with laboratory methods and complementary tests, contributes to greater diagnostic accuracy and improved prognosis. In this way, equine neonatology plays an essential role not only in animal health, but also in strengthening equine farming as a strategic agribusiness sector.

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