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Can pain affect reproduction?
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Abstract
Subtle pain can be challenging to recognize clinically. Very little work has been done to critically evaluate the effect of pain on reproductive performance in horses. A small body of evidence suggests that lameness has a negative impact on reproductive performance in dairy cattle. This talk will discuss recognition of subtle pain in horses and how both musculoskeletal and visceral pain may have an impact on fertility.

Keywords: Mare, pain scoring

Overview of pain in horses
Most horse owners and veterinarians are comfortable recognizing signs of moderate to severe pain in horses, with colic and lameness being the most commonly recognized forms of visceral and somatic pain, respectively. But, more subtle signs of pain can be challenging to recognize. Whether pain is recognized or not, chronic pain may have substantial systemic effects and, in some cases, may result in either infertility or subfertility.

In human beings capable of verbal communication, pain is typically evaluated by self-assessment. In animals and non-verbal humans, pain assessment is always based upon the perception of an observer, be that an owner, trainer, or veterinarian. Thus, when addressing an animal’s status, inherent differences in based upon species, age, sex, genetics, environment, source (visceral, somatic, neuropathic), and duration (acute versus chronic) can affect one’s perception of pain. When evaluating pain in horses, careful evaluation of the animal in its environment can provide useful information.

One way to summarize subtle signs of pain in horses is to evaluate the factors included in some of the more commonly used clinical pain scoring systems. These include the animal’s time spent in various locations within the stall (head in a corner, looking out a window, at the front of the stall, etc.), in various positions or activities (ear position, head position, eating, lying down, etc.) or performing various events (vocalizing, stomping feet, shifting weight, etc.). Time budget and event analyses have been able to detect differences in post-operative pain assessment following colic and arthroscopic surgery.1,2 Using a numerical rating system, a Washington State group has shown that horses receiving a butorphanol constant rate infusion in addition to flunixin following colic surgery had improved behavior/pain scores in the 24 hours following surgery, decreased cortisol concentration, less weight loss, and faster discharge from the hospital relative to horses receiving flunixin and a placebo infusion.3 Similar results have been found in humans, where treatment by an organized pain service results in lower postoperative pain scores, improved satisfaction, and accelerated hospital discharge.4

Pain and reproductive performance in other species
A rise in nociceptive or pain threshold has been documented in pigs and humans during late gestation and labor, which is reversed post-partum.5,6 Some evidence suggests that this is an opioid-mediated event as it can be reversed with naloxone in sows.5 Hormonal factors likely play a role in this period of hypoalgesia in addition to neuronal factors, as 17-beta estradiol and progesterone modulate an opioid analgesic system during pregnancy.7

Much of the work demonstrating an inversely proportional relationship between pain and fertility has been performed in dairy cattle. Lameness has a substantial impact on not only the welfare of dairy cows, but also the bottom line for producers. In a Florida cohort study of 837 dairy cows, claw lesions were the most common cause of lameness; these lesions were associated with a longer (40 days) time to conception and a higher number of breedings per conception relative to healthy cows.8 Similar effects of lameness have been shown on other measures of reproductive performance.9,10
Because stress stimulates the hypothalamic-pituitary-adrenal (HPA) axis, one assumes that lameness, and by association, other forms of acute and/or chronic pain can therefore disrupt the hypothalamic-pituitary-ovarian axis and its associated hormonal release, thereby disrupting reproductive function. In an attempt to further refine this hypothesis, 59 dairy cattle were observed following estrus synchronization with gonadotropin releasing hormone followed by prostaglandin F2α seven days later. In that study, lame cows had lower estrus intensity scores and lower milk progesterone concentrations in the six days prior to estrus but no difference in duration of estrus or milk estradiol or cortisol concentrations relative to healthy cows. The authors concluded that lame cows may be related to decreased sexual or “stress-related” pheromones or processing thereof. This confirmed the authors’ prior work in which prior progesterone, but not estradiol, concentrations were associated with lameness and estrus behavior.

One can certainly infer that, if acute and/or chronic pain substantially affects reproductive performance in one species, similar effects are likely to occur in other species as well. The literature profiling pain in horses is remarkably small, though the vast majority describes lameness and causes thereof. Thus, it is not particularly surprising that an association between pain and fertility – or infertility – has not yet been established in the horse. The lack of data, however, certainly does not infer lack of relationship.

References