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ZOOL 567

Topic Summary

Stress behaviour in horses focusing on behaviour induced by handling stress.

Stress behaviours resulting from novelty have aided the horse's ability to thrive as a prey species for millions of years (Grandin, 1999; Christensen et al., 2005). Many of the stress behaviours that evolved towards threatening stimuli remain, even though most threats for domestic horses have been eliminated in a modern-day setting (Leiner & Fendt, 2011). Therefore, horses may become nervous around new objects in their environments and attempt to avoid novelty by fleeing or eliminating the stressor (Grandin, 1999). As prey animals, horses have evolved a combination of senses for identifying and responding to stressful stimuli (Christensen et al., 2005). Horses' wide field of vision (>300°) and excellent hearing ability (peak sensitivity between 1000-16000 Hz) contribute to their innate fear of visual and auditory stressors (Grandin, 1999).

Stress behaviour during handling can include a variety of behavioural and physiological stress responses. These behaviours may be influenced by several factors, such as the horse's coping strategy (Budzynska, 2014), the handler (Ijichi et al., 2018), and prior handling experience (Hartmann et al., 2021). Stress behaviours towards novel stimuli can occur in a specific order, including changes in facial expression, vocalizations, avoidance behaviours, and flight behaviours (Leiner & Fendt, 2011). Observation of stress behaviours also depends on the coping strategy, and whether it is proactive or reactive (Squibb et al., 2018). Proactive horses display dynamic stress behaviours like dangerous attempts to fight or flee, whereas reactive horses may become unresponsive towards the handler and display few obvious signs of stress (Squibb et al., 2018). Stress behaviours can be observed by visually watching horses as they perform novel handling tests. Videotaping horses during test performance is also common, allowing researchers to analyze and classify the behaviours (Leiner & Fendt, 2011; Marsboll & Christensen, 2015; Hartmann et al., 2021; Jezierski et al., 1999; Wulf et al., 2013).

Multiple studies have identified increased heart rate as an influence on stress behaviour during novel handling tests (Christensen et al., 2005; Leiner & Fendt, 2011; Jezierski et al., 1999; Marsboll & Christensen, 2015; Wulf et al., 2013). Increases in heart rate are an evolutionary adaptation, preparing the body for fight or flight through activation of the sympathetic nervous system (Christensen et al., 2005). Heart rate monitors can be attached to a horse to study heart rate changes during handling. Christensen et al., (2005) identified a relationship between increased heart rate and alert behaviours when horses were exposed to sensory stressors impacting their vision and hearing, but not their sense of smell. Similarly, Leiner & Fendt (2011) found that as heart rate increased, so did the number of fearful behaviours during handling. A study by Squibb et al., (2018) found no difference in heart rate between proactive and reactive horses, despite reactive horses displaying fewer stress behaviours than their proactive counterparts. Similarly, handling by a known handler overshadowed and decreased the expression of fear behaviours during handling, despite simultaneous increases in heart rate (Marsboll & Christensen, 2015). Together these findings

indicate that heart rate is a reliable indicator of physiological stress and fear during handling, even when stress behaviours are masked by other factors, like the influence of the handler. It is unknown why horses did not experience increased heart rate towards olfactory stressors. Future studies should be conducted to examine the impact of other odours, such as predator scents, on stress behaviour (Christensen et al., 2005).

Hormonal mechanisms also influence behaviour during handling (Budzynska, 2014; Wulf et al., 2013). Male yearling horses were more cautious of human handlers than females, displaying increased resistance to physical manipulation, and initially requiring more time to be approached and haltered (Wulf et al., 2013). Hormones also impacted coping strategy. Proactive horses were associated with high behavioural activity, increased sympathetic nervous system activity, and low cortisol response (Budzynska, 2014). Reactive horses were associated with low behavioural activity, and high parasympathetic activity and cortisol response (Budzynska, 2014). The specific role of reproductive hormones and age on behaviour in horses during novel handling remains unknown, as future research needs to be conducted (Wulf et al., 2013). Genetic influences on stress behaviour during handling also remain unclear, requiring future research involving more horses to investigate the genetic parameters of behaviour (Jezierski et al., 1999).

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