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Beyond words…
Cognitive and behavioural approaches to assess emotions in horses

Summary

Concern for animal welfare is based on the assumption that animals are sentient beings that have feelings and are capable of suffering from negative experiences. Since feelings are subjective, we do not have direct access to them and thus depend on indirect proxy measures to assess animal emotion and thus animal welfare. The aim of the present dissertation was to contribute to the identification of indicators of emotional states in horses using cognitive and behavioural methodologies.

As cognitive methodology, I applied the judgement bias paradigm which is based on the assumption that decision-making under ambiguity is affected by the underlying emotional state. Therefore, an individual experiencing positive emotion is more likely to interpret an ambiguous situation as predicting something positive, whereas an individual experiencing negative emotion is more likely to judge the same situation as predicting something negative. I systematically compared the two most commonly used choice-based judgement bias task designs, the Go/No-go and the Active Choice task, in terms of acquisition learning and differentiation of ambiguous cues (Chapter II). All five Go/No-go horses but only one Active Choice horse successfully learned their task, indicating that it is easier to train horses on a Go/No-go than on an Active Choice task. When being tested, horses did not discriminate between the three ambiguous cues, thereby questioning the validity of the results as measures of judgement bias.

To investigate behavioural measures of emotion, I exposed horses to conditions assumed to induce positive (grooming, food anticipation) and negative emotional states (food competition, waving of a plastic bag). As a first behavioural measure, I investigated how a specific feature of facial expressions in horses, wrinkles in the skin above the eyeball, was affected by the different conditions (Chapter III). To this end, I developed a scale to assess different aspects of the wrinkles in detail. This scale was proven to be a highly reliable tool both in terms of intra- and inter-observer reliability. From the six measures of this scale, only the angle between the highest wrinkle and a line drawn through the eyeball was consistently affected by the different conditions: the angle decreased during grooming and increased during food competition, thereby reflecting relaxation and contraction of the underlying muscle, respectively.

As a second behavioural approach, I applied the methodology of Qualitative Behaviour Assessment (QBA) to video clips obtained when the horses were exposed to the above described conditions (Chapter IV). QBA is based on the premise that human observers are able to integrate details not only of *what* animals are doing but also of *how* they are doing it, describing the animals' behavioural expressions or body language in terms (e.g. content, nervous, curious) that reflect their putative emotional experience. Fifteen observers watched the video clips and were asked to note all terms that they thought would best describe the horses' behavioural expressions. Following this, they quantified the expressions of the horses in the different conditions on a Visual Analogue Scale for each of their chosen terms (Free Choice Profiling). The results show that observers who were blind to the

treatments were able to judge the behavioural expressions in line with expectations, thereby supporting the predictive validity of QBA in conditions of both negative and positive valence.

In this PhD project cognitive and behavioural methodologies were either newly developed (eye wrinkle scale) or adapted (judgement bias task, QBA) for the assessment of emotional states in horses. The results are encouraging and form a solid basis for future research. I could show that Active Choice tasks are more difficult to learn than Go/No-go tasks and developed suggestions of how to refine the task design based on my research. The eye wrinkle scale is a reliable tool to further study not only the effect of short-term emotional states but also of long-term mood on eye wrinkle expression, which might potentially be an easily detectable and non-invasive indicator of emotion in horses. Moreover, QBA has been shown to be a reliable methodology for the assessment of both positive and negative emotional valence but more work is needed to render the Free Choice Profiling practical for on-farm use. In future, a closer look at the potential relationship between the two behavioural measures (eye wrinkles, QBA) as well as in combination with the cognitive measure (judgement bias) would be valuable. If, for example, facial expression and body language consistently changed with optimistic or pessimistic biases, these changes would allow us to identify behavioural indicators of emotion for the on-farm assessment of horses' emotional states and thus horse welfare.