

TRISH FLEMING, TAYA CLARKE, SARAH WICKHAM, CATHERINE STOCKMAN, TERESA COLLINS, DAVID MILLER & ANNE BARNES

Animal behaviour as a measure of animal welfare

Animal welfare is increasingly important for the Australian livestock industries, to maintain the social licence to practice, as well as ensuring market share overseas.

Improvement of animal welfare in the livestock industries requires a number of key steps, most importantly, objective measures are needed for welfare assessment to enable comparison and contrast of welfare implications of husbandry procedures or housing options.

Qualitative Behavioural Assessment (QBA) is an integrated measure that characterises behaviour as a dynamic, expressive body language. It is not necessarily *what* the animal is doing, but *how* it is doing it. Here we describe how to carry out a QBA and summarise outcomes of recent QBA studies.

How is Qualitative Behavioural Assessment carried out?

QBA relies on observer assessments of the body language of animals (viewed live or as video footage) using a set of descriptive terms (e.g. 'anxious', 'calm', etc). The descriptive terms can either be a set of fixed list of terms determined through consultation with experts, or alternatively, observers can be shown a preview of a small number of clips and asked to generate their own descriptive terms (a process called free choice profiling; FCP).

Observers are presented with scoring sheets where each descriptive term written next to a visual analogue scale and they are asked to score each animal (or group of animals) by placing a mark on the scale at a point between 'minimum' and 'maximum' (Figure 1) that they believe reflects the intensity of the animal's expression for each descriptive term.

These marks are converted into numerical scores (between 0 = min and 100 = max) that are then compared using Generalised Procrustes Analysis (GPA) to determine common patterns ('consensus dimensions' e.g. the axes of the graph in Figure 1) in how observers scored individual animals. These consensus dimensions can then be correlated with the scores individual observers ascribed for each of their terms, to determine descriptive terms most strongly correlated with each dimension. The analysis also provides scores for each animal on these dimensions, which can be used to compare experimental treatments, or compare with physiology or presentation of particular behaviour.

Is Qualitative Behavioural Assessment an indicator of welfare-relevant behaviour?

There are significant correlations between QBA scores and physiological indicators relevant to welfare. For example during transport, cattle that were described by observers as more *agitated/restless/stressed* also had elevated heart rates and body

Example of scoring sheet given to observers and outcome of analysis (GPA):

Animal A			
Anxious	Min	X	Max
Nervous	Min	X	Max
Alert	Min	X	Max
Curious	Min	X	Max
etc...			
Animal B			
Anxious	Min	X	Max
Nervous	Min	X	Max
Alert	Min	X	Max
Curious	Min	X	Max
etc...			
Animal C			
Anxious	Min	X	Max
Nervous	Min	X	Max
Alert	Min	X	Max
Curious	Min	X	Max
etc...			

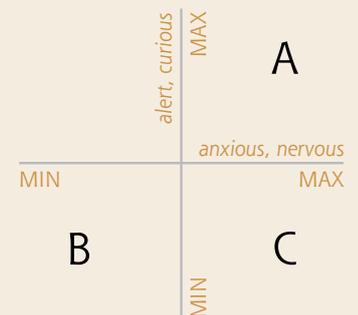


FIGURE 1 Qualitative behavioural assessment method for scoring three animals (A, B and C). Observers score each animal (or group of animals) on a visual analogue scale (labelled 'minimum' to 'maximum') for a set of descriptive terms. Observers are told to think of the distance between the zero-point (minimum) and their mark on the scale as reflecting the intensity of the animal's expression on each descriptive term. GPA is a multivariate data reduction technique that then determines the underlying patterns in scores and develops a set of consensus dimensions (the axes in the graph) that capture this consensus.

temperatures, while other physiological indicators of stress, such as changes in red and white blood cell indices were also correlated with QBA scores for these animals (Figure 2)¹. Notably, the neutrophil:lymphocyte ratio was elevated (typically associated with a stress response) in cattle described as more *agitated/restless/anxious*. In another study², cattle that came through to slaughter at the back of the group and those with higher plasma lactate concentration at slaughter (a measure of exertion and expenditure of body energy reserves) were described by observers as more *nervous/anxious*.

QBA scores have also been correlated with various quantitative measures of behaviour. For example, for sheep filmed during a behavioural demand trial (where the animals were required to walk varying distances to receive a food reward), the animals that spent more time 'sniffing and looking for more feed' and those that walked a greater distance to obtain food during the trial were

described as more *hungry/searching/excited*, while those that 'did not walk directly to food reward (stopped along way)', were scored as more *curious/intimidated/uneasy*, and those that had a higher number of feeding events during the trial were more *hungry/searching/excited*.

Conclusions and recommendations

QBA is a versatile tool, requiring little specialist equipment and enabling *in situ* assessments, that enables comparative, hypothesis-driven evaluation of various industry-relevant practices. QBA reveals aspects of the animal's affective or physiological state that is relevant to their welfare, is reliable (can be repeated with confidence in the results), and relatively economic to apply. While most other welfare assessment methods record 'problems' (e.g. lameness, injury scores, etc), QBA can capture positive aspects of animal welfare (e.g. positively engaged with their environment, playfulness, etc).



Including aspects of a positive mental state, rather than merely avoiding negative experiences is becoming an increasingly important component of any welfare index as it is likely to promote animal wellbeing and greater biological function. ■

More information

Contact Trish Fleming

E: t.fleming@murdoch.edu.au

Acknowledgements

Thanks to Meat & Livestock Australia, Beef & Lamb New Zealand, Australian Pork Limited, and the Pork CRC for financial support that enabled development of this project for the Australian livestock industries.

References

- 1 Stockman, C.A., Collins, T., Barnes, A.L., Miller, D.W., Wickham, S.L., Beatty, D.T., Blache, D., Wemelsfelder, F., and Fleming, P.A. 2011 Qualitative behavioural assessment of cattle naïve and habituated to road transport. *Animal Production Science* **51**:240–249.
- 2 Stockman, C.A., McGilchrist, P., Collins, T., Barnes, A.L., Miller, D.W., Wickham, S.L., Greenwood, P.L., Cafe, L.M., Blache, D., Wemelsfelder, F., and Fleming, P.A. 2012 Qualitative behavioural assessment of cattle pre-slaughter and relationship with cattle temperament and physiological responses to the slaughter process. *Applied Animal Behaviour Science* **142**:125–133.

This article is an excerpt from: Fleming, P.A., Clarke, T., Wickham, S.L., Stockman, C.A., Barnes, A.L., Collins, T., and Miller, D.W. 2015 Qualitative behavioural assessment as a welfare assessment method for Australian livestock industries.

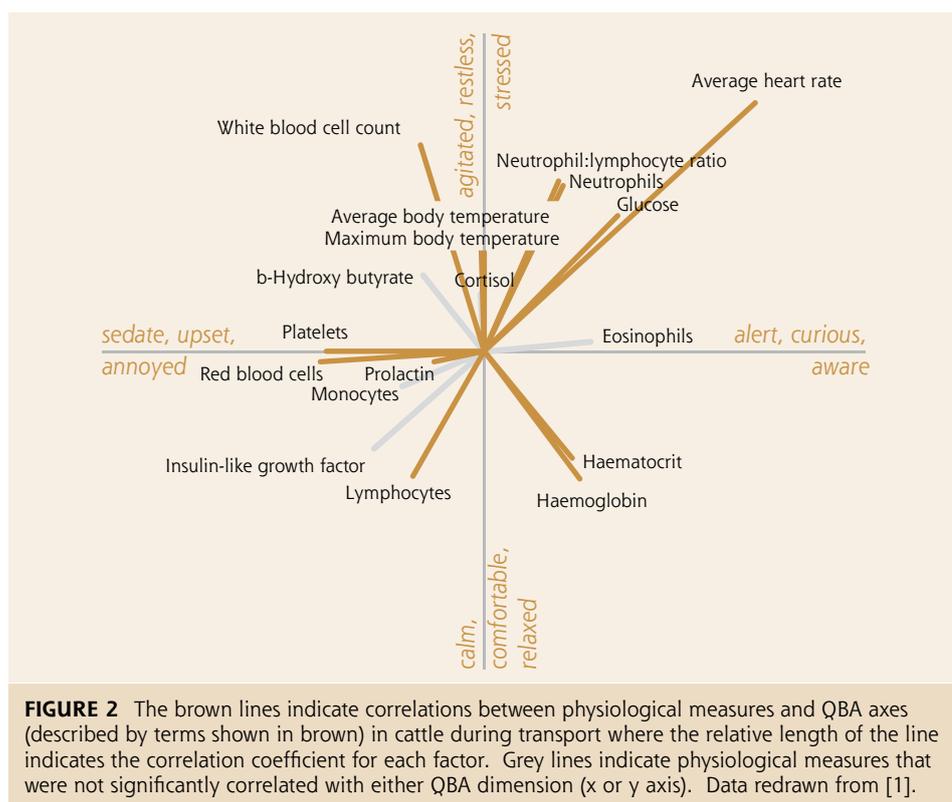


FIGURE 2 The brown lines indicate correlations between physiological measures and QBA axes (described by terms shown in brown) in cattle during transport where the relative length of the line indicates the correlation coefficient for each factor. Grey lines indicate physiological measures that were not significantly correlated with either QBA dimension (x or y axis). Data redrawn from [1].



If you are interested in our research and would like to know more, then please contact us on vlsresearch@murdoch.edu.au

Our research bulletins can be downloaded from www.murdoch.edu.au/School-of-Veterinary-and-Life-Sciences/Our-research/Our-Bulletins/ Undergraduate or postgraduate degrees, please see www.murdoch.edu.au/School-of-Veterinary-and-Life-Sciences/Our-courses/