

Institution: University of Edinburgh / Scotland's Rural College		
Unit of Assessment: 6		
Title of case study: H: Qualitative Behaviour Assessment: An animal welfare assessment tool used worldwide		
Period when the underpinning research was undertaken: 2001 – 2016		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Françoise Wemelsfelder	Chair of Animal Welfare and Qualitative Science	1995 – present
Alistair Lawrence	Chair of Animal Behaviour	1984 – present
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Kenny Rutherford	Reader in Animal Welfare Science	2003 – present
Simon Turner	Reader in Applied Ethology	1999 – present
Period when the claimed impact occurred: August 2013 – December 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact		
<p>Underpinning Research: We developed and validated Qualitative Behaviour Assessment (QBA), a tool for the interpretation and analysis of emotional expressivity and welfare in animals.</p> <p>Significance and Reach of Impact: QBA has been incorporated into a mandatory protocol by the Australian Standards for the Export of Livestock (2019) and into recommended EU animal welfare assessment protocols (2015) for farmed animals, which are routinely used by 390 certified assessors across Europe. QBA was adopted by Waitrose & Partners in 2020 as the designated indicator for animal emotional well-being, and is being rolled out across Waitrose's own brand cattle, pig, broiler, hen, and duck supply chains, encompassing 500 farms. The Donkey Sanctuary adopted QBA into its routine well-being assessments in 2015, and has since assessed over 27,400 donkeys worldwide, using the results to optimise management practices. Use of QBA since 2017 as part of a mandatory welfare assessment in all 15 UK zoos holding captive elephants has resulted in management improvements and improved behavioural scores.</p>		
2. Underpinning research		
<p>The Challenge: How to measure an animal's emotional state from its behaviour</p> <p>Animal welfare is an increasingly important concern in all industries involving captive animals. The conventional assumption among scientists has been that an animal's sentient capacity for emotional experience can be measured only indirectly through physical proxy indicators. Challenging this, we integrated philosophy of mind with behavioural theory to posit that at 'whole animal' level, behaviour displays an observable dynamic expressive quality, an emotional 'body language', which provides closer access to how animals experience their surroundings. Animals can behave (for example, walk) in ways that are relaxed and lively, or in ways that are tense and anxious; such descriptors summarise perceived details of dynamic expressivity and enable the quantification of different aspects of an animal's emotional state.</p>		
<p>Developing Qualitative Behavioural Assessment (QBA)</p> <p>To scientifically formalise this approach, from 2001 onwards, we developed and validated a method called Qualitative Behaviour Assessment (QBA), as part of an ongoing animal welfare research programme funded by the UK Government's Department for Environment, Food and Rural Affairs (Defra) and the Scottish Government. A key part of this research was the novel adaptation of Free Choice Profiling (FCP), a method developed in food science, for application to animal welfare research [3.1]. FCP asks assessors, while they are observing a given set of animals, to generate and quantify their own QBA descriptors to assess these animals' expressions, and then uses multivariate statistics to identify patterns of animal emotion that emerge from the pool of participants' scores. The 'free-choice' element of creating one's own descriptors optimises participants' precision of scoring, and the statistics then reduce this</p>		

terminological variety by finding underlying consensus dimensions [3.2]. These dimensions can then be used to understand the animal's emotional response to various external conditions. This is illustrated in **Figure 1**, which, based on statistical integration of pigs' QBA scores, maps pig farming systems with different characteristics (outdoor, deep straw, thin straw and slatted floor systems) onto consensus dimensions depicting levels of pig 'mood' and 'activity'.

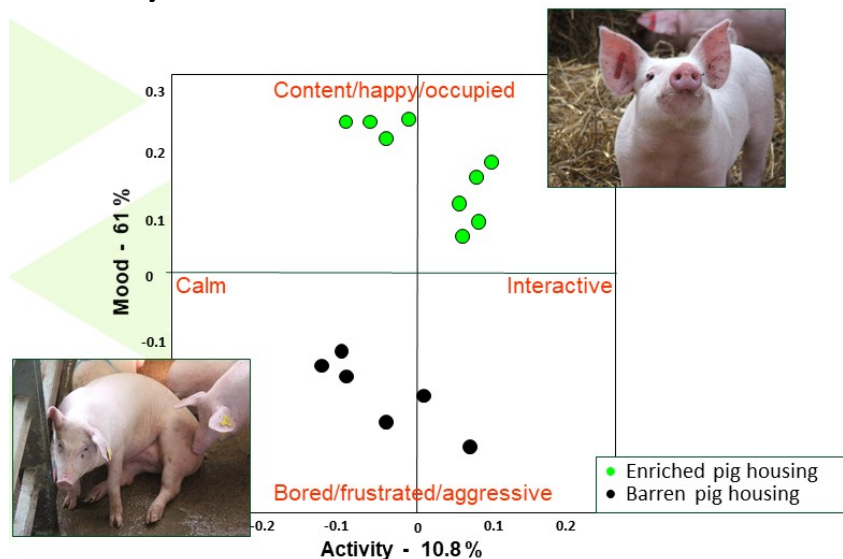


Figure 1. An example of a QBA graph enabling interpretation of animals' emotional response to external conditions. The photos illustrate animals that exemplify the mood and activity scores in the relevant quadrants.

Validation of QBA

Together with a large number of UK and international academic and industrial collaborators, we established the validity of this QBA process in a wide range of species, showing that the dimensions of animal experience it captures correlate well with other measures, such as heart rate or levels of activity, and can therefore help integrate these measures into coherent judgments of animal welfare [3.3-3.5]. In a field where the focus was previously largely on *negative* aspects of animal welfare ('stress'), a particular strength of QBA is its capacity to include the *positive* aspects of welfare ('happiness') and to thus have much larger diagnostic reach. Elevated heart rate, for example, is an important stress indicator, but could equally likely be a positive sign, for example of joyful anticipation or exuberant play. QBA weighs up the various negative and positive aspects of an animal's expressivity into more subtle, balanced assessments of its mood.

The diagnostic strength of such judgment was demonstrated particularly convincingly in blind randomised trials where observers successfully distinguished the mood of pigs with a pre-administered affective neurochemical treatment from that of control animals [3.3].

Development and validation of pre-fixed descriptors

Allowing observers to generate their own descriptors, while experimentally useful, is not practical in applied conditions. When the opportunity arose through involvement in EU programmes to incorporate QBA in standardised EU welfare assessment protocols, it became necessary to develop and validate pre-fixed QBA descriptor lists for a range of species [3.6]. Through networks with international partners, we have developed, field-trialled, and published QBA descriptor lists for pigs, cattle, buffalo, poultry, sheep, goats, donkeys, horses, dogs, and captive elephants, many of which are now in routine use in a variety of settings.

3. References to the research

[3.1] Wemelsfelder, E., Hunter, E.A., Mendl, M.T. and Lawrence, A.B. 2001. Assessing the 'whole animal': a Free-Choice-Profiling approach. *Animal Behaviour* 62, 209-220. (299 citations) [doi: 10.1006/anbe.2001.1741](https://doi.org/10.1006/anbe.2001.1741)

[3.2] Wemelsfelder, F., A.S. Hunter, E.S. Paul, A.B. Lawrence. 2012. Assessing pig body language: agreement and consistency between pig farmers, veterinarians, and animal activists. *Journal of Animal Science* 90, 3652-3665. [doi: 10.2527/jas.2011-4691](https://doi.org/10.2527/jas.2011-4691)

[3.3] Rutherford, K.M.D., Donald, R.D., Lawrence, A.B., Wemelsfelder, F. 2012. Qualitative Behavioural Assessment of emotionality in pigs. *Applied Animal Behaviour Science* 139, 218-224. [doi: 10.1016/j.applanim.2012.04.004](https://doi.org/10.1016/j.applanim.2012.04.004)

[3.4] Camerlink, I., Peijnenburg, M., Wemelsfelder, F., Turner, S.P. 2016. Emotions after victory or defeat assessed through qualitative behavioural assessment, skin lesions and blood parameters in pigs. *Applied Animal Behaviour Science* 183, 28–34. [doi: 10.1016/j.applanim.2016.07.007](https://doi.org/10.1016/j.applanim.2016.07.007)

[3.5] Masłowska, K., Mizzoni, F., Dwyer, C.M., Wemelsfelder, F. 2020. Qualitative behavioural assessment of pain in castrated lambs. *Applied Animal Behaviour Science* 233 105143. [doi: 10.1016/j.applanim.2020.105143](https://doi.org/10.1016/j.applanim.2020.105143)

[3.6] Minero, M., Dalla Costa, E., Dai, F., Murray, L.A.M., Canali, E., Wemelsfelder, F. (2016). Use of Qualitative Behaviour Assessment as an indicator of welfare in donkeys. *Applied Animal Behaviour Science* 174, 147-153. [doi: 10.1016/j.applanim.2015.10.010](https://doi.org/10.1016/j.applanim.2015.10.010)

4. Details of the impact

Impact on policy: EU and Australian animal welfare assessment protocols

Australia

In 2019, the Australian Standards for the Export of Livestock incorporated QBA into its animal health and welfare assessment protocol [5.1]. This protocol is now mandatory to apply during sea voyages of sheep and cattle taking longer than 10 days. Furthermore, Meat and Livestock Australia (MLA) and the Australian Lot Feeders Association commissioned an adjusted version of this protocol, again including QBA, for welfare monitoring in feedlot cattle [5.2a]. A MLA report in 2018 specifically highlighted that performing QBA “provides a useful measurement of an animal’s wellbeing, capturing how it reacts to its environment at a specific time point” [5.2b].

Europe

QBA was included in the EU’s Welfare Quality (WQ) welfare assessment protocols for pigs, cattle and poultry in 2009 (before the REF2021 census period) and in the Animal Welfare Indicators (AWIN) protocols for sheep, goats, donkeys and horses in 2015 [5.3a], serving as the only indicator of positive emotional state in all of them. Although not legally enforced, the WQ and AWIN protocols are considered the European norm of animal welfare assessment by the EU and mentioned in the EU Animal Welfare Strategy 2012-2015 [5.3b,c].

To ensure that assessors across Europe apply the WQ and AWIN protocols correctly and consistently, the international Welfare Quality Network provides certified training in the use of the protocols [5.4]; within the REF201 census period, 130 assessors across Europe have been accredited for their use in pigs, 100 in dairy cattle, 60 in beef cattle, 15 in sheep, 45 in broilers, 30 in laying hens and 10 in turkeys [5.5a]. In addition, since 2017, the Welfare Quality Network has certified 500 dairy, pig and poultry commercial companies in Spain to maintain WQ welfare standards on their farms, allowing the companies to use the WQ label to market their products [5.5b]. In Finland, between 2016 and 2017, 2 dairy companies were accredited to use WQ protocols, allowing animal welfare at 235 farms to be assessed, and any issues identified and addressed [5.5b].

Impact on animal welfare management practice

Welfare management across the Waitrose & Partners supply chain

The retailer Waitrose & Partners has adopted QBA as the designated measure for animal emotional well-being across its ‘own brand’ supply chains [5.6a]. In the first instance, this will cover dairy cows, veal calves, pigs, broiler chickens, laying hens, and ducks, involving a total of approximately 500 farms (250 pig farms, 80 laying hen farms, 92 broiler farms, 12 duck farms, 65 dairy farms, and 1 veal farm).

Waitrose maintains exceptionally high animal welfare standards for its own brand produce, as evidenced by 2 Compassion in World Farming awards in 2019 [5.6b], but was previously not able to assess animal emotional well-being on its farms. Waitrose approached our unit because QBA is one of the very few validated tools designed to do precisely this [5.6a]. Moreover, in November 2019, we had received BBSRC funding to support the development of a mobile application to facilitate widespread and consistent use of QBA, comparing animal or herd scores to reference cohorts and tracking their welfare over time. The emergence of this app coincided with the negotiations with Waitrose, and constituted a key reason for Waitrose to adopt QBA [5.6a].

A commercial contract warranting Waitrose 2 years exclusive use of the QBA app for livestock welfare assessment was signed in February 2020. Training of staff representing the 6 supply chains in use of the app began in May 2020, followed by practical testing through video assessment in October, and, delayed by COVID-19, meetings to initiate roll-out on farms in December 2020 [5.6a]. QBA is being implemented alongside other health and welfare measures as part of the 'Good Life' animal welfare initiative created in 2018 by the Waitrose Animal Welfare Development Group; the group's website presents QBA as a key contributor to its international leadership in the promotion of positive animal welfare [5.6b]. The adoption of QBA was also promoted in the April 2020 edition of the Waitrose in-store Food magazine [5.6c] and in a 10-minute video shown at the annual Waitrose conference on December 8th 2020 [5.6a].

Donkey welfare management at The Donkey Sanctuary

Following the publication of a QBA protocol for donkeys for the EU Welfare Quality programme in 2015 [3.6], we were invited by The Donkey Sanctuary (TDS) to provide QBA training and consultancy to its staff in order to roll out QBA as part of its global welfare assessment and management strategy for domestic donkeys. By 2020, 60 UK and EU staff had been trained, and are currently overseeing regular QBA assessment, alongside other veterinary assessments, of TDS donkey groups in the UK, Ireland, continental Europe, Nepal, India, Brazil, Tanzania and China. By the end of 2020, 27,400 donkeys across these locations had been assessed using QBA [5.7a].

TDS Director of Research explains the purpose of using QBA: "*The donkeys are being assessed to identify a baseline state of wellbeing at the sanctuary [...]. This will enable TDS to understand the current welfare state of our animals (including areas of best practice and those needing improvement) and the impact of any interventions implemented.*" [5.7a]. Several examples of this can be given [all listed in 5.7b]:

- The TDS's 'Freedom to Roam' project aims to provide larger more varied outside areas to groups of donkeys, and give them the opportunity to stay out overnight. Applying QBA among other measures demonstrated that the donkeys' welfare improved significantly in this new regime – they became more relaxed, active and sociable. Based on these findings, TDS subsequently created new routes for the donkeys to access such areas.
- TDS uses QBA to monitor the quality of life of donkeys in cases where high veterinary intervention is required (for example, those with dental, musculoskeletal, or age-related problems), before, during and after treatment. They regard this information as enabling them to support vets and farm teams in providing the highest welfare standards for individual donkeys.
- TDS uses QBA to understand the needs of particular groups of donkeys, such as young adults, geriatric groups or blind donkeys, so these can be addressed in strategic planning.

Summarising all such work, TDS Director of Research states that "*we are finding the widespread use of QBA across the organisation incredibly beneficial to supporting decision-making regarding individual welfare and understanding how we can introduce even more positive experiences to our donkeys' lives overall*". [5.7b].

Captive elephant welfare management

A QBA descriptor list for captive elephants was developed and validated by researchers at the University of Nottingham [5.8a]. This list is now included in the elephant welfare assessment protocol within Defra's "Secretary of State's Standards of Modern Zoo Practice 2017", and means that all 15 UK zoo parks holding elephants are legally mandated to apply this protocol quarterly [5.8b, c]. Between 2015 and 2019, a total of 475 records were submitted for 65 elephants [5.8d]. Researchers at the University of Nottingham report that the assessments have resulted in notable improvements in elephant management, such as enrichment, larger outdoor enclosures, increased access to other elephants, and consequently improved behavioural scores through more affiliative behaviour, reduction in stereotyped behaviours which indicate stress, and more lying rest, which indicates a relaxed state [5.8d].

Furthermore, the protocol including QBA was used in a pilot study in Zimbabwe, and directly resulted in elephants being taken off chains and released into small groups overnight [5.8c].

Impact on animal welfare education

QBA has been incorporated into the teaching curriculum of veterinary and animal welfare courses across the world. For example:

- At the University of Nottingham: a dedicated QBA lecture and video practice session in a module on Zoo and Exotic Skills [5.9a].
- At the University of Barcelona: QBA is included in compulsory undergraduate lectures on animal behaviour and welfare, reaching 100 veterinary students annually [5.9b].
- At the School for Veterinary and Life Sciences at Murdoch University, Australia: a lecture on QBA forms part of an equine behaviour course for 40-60 students annually, and QBA methodology is taught to, and used by, postgraduate students as part of their MSc and PhD degrees [5.9c].
- At the University of Guelph: A dedicated QBA lecture, reading list and video practice session are included in the Campbell Centre Animal Welfare Masters course [5.9d].

The international impact of QBA as a scientific innovation on animal welfare was recognised in 2017 in a Scientific Creativity Award from the International Society for Applied Ethology [5.10].

5. Sources to corroborate the impact

[5.1] Review of the Australian standards for livestock export 2019; Table A2, p.68

[5.2] a. Email confirming that MLA and Australian Lot Feeders Association commissioned SRUC collaborators at Murdoch University to adapt a QBA-including protocol for monitoring feedlot cattle b. MLA report 2018

[5.3] a. WQ assessment protocols (2009; before impact period) containing QBA b. AWIN assessment protocols for sheep, goats, donkeys and horses, including QBA b. Email from Chair of Welfare Quality Network c. EU Animal Welfare Strategy 2012-2015

[5.4] [Welfare Quality Network website; About Us page](#)

[5.5] Assessors accredited in use of WQ and AWIN protocols across Europe a. Email from Welfare Quality Network management team member b. Welfare Quality Network newsletter April 2018, describing WQ protocol implementation by companies in Spain and Finland

[5.6] a. Letter of support from Waitrose b. Waitrose Animal Welfare website c. Article in Waitrose Food In-Store Magazine, April 2020

[5.7] Impact on TDS a. Email from TDS Director of Research b. Email from TDS re: practical application of QBA to assess welfare impact of interventions

[5.8] a. Published article describing adoption of QBA for use in captive elephants b. Secretary of State's Standards for Modern Zoo Practice; appendix on elephants c. Newsletter linking Nottingham tool to SSSMZP d. Email from Nottingham re: welfare impact of QBA on elephants

[5.9] Evidence of inclusion of QBA in veterinary medicine courses at: a. University of Nottingham b. Murdoch University c. University of Barcelona d. University of Guelph, Canada

[5.10] [Scientific Creativity Award by the International Society for Applied Ethology \(2017\)](#)