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Non-economic incentives to improve animal welfare: positive competition as a driver for change among owners of draught and pack animals in India

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Abstract

Since 2005, owners of draught and pack horses, mules and donkeys in nine districts of Uttar Pradesh, India, have received support from a UK-based charity, the Brooke. One thousand, three hundred and ninety-six village-level groups of owners and carers, responsible for 29,500 animals, were facilitated to develop their own welfare assessment protocols using a participatory learning and action process adapted from recognised good practice in human social development. Each group assessed the welfare of their animals collectively, using findings to generate action plans for improving equine health, husbandry and working practices. Welfare assessments were repeated at 1 to 3 month intervals. Competitiveness between participants to improve their animals' welfare acted as a driver to increase the number of indicators and sensitivity of rating scales, enabling differentiation of small, incremental improvements in order to identify a 'winner' of each welfare assessment. Binary or three-point 'traffic light' (red-amber-green) scales evolved into a range of 5-, 10-, 20-point or continuous scales, then into multi-level and weighted measures to quantify the welfare improvements seen. Efforts to aggregate multi-dimensional indicators into a single 'winning' score led to indices describing welfare at individual animal level ('welfare index') and population level ('village index'). Benefits of owner-driven monitoring include high levels of commitment and strong peer motivation or pressure to take action. Welfare monitoring and action to improve welfare are integrated within a single process carried out by the same people, in contrast to the separation of evaluation and implementation of welfare improvement seen in inspection or accreditation schemes. Challenges include aggregation of results from a variety of protocols for external analysis, reporting or certification.

Keywords: *animal welfare, competition, donkey, horse, incentive, working animal*

Introduction

An estimated 100 million horses, mules and donkeys work in low-income developing countries (FAOSTAT 2009), providing draught and load-carrying power to support the livelihoods of people in some of the world's poorest communities. The Brooke is a UK charity set up in 1934 to provide veterinary care and husbandry advice to the owners of working animals and Brooke India currently works in 25 districts across five states. In 2005, recognising the need to expand its focus from short-term animal health interventions to a more holistic, long-term view of working equine welfare issues, Brooke India began to adopt participatory and sustainable approaches from the international development sector, combined with evidence from animal welfare science and other disciplines.

Working with people in groups is a recognised alternative to individual encounters for social support and changing behaviour. It is used extensively in international development contexts (Kumar 2002; Kar 2003; Gregson *et al* 2004) and in health interventions such as smoking cessation, weight loss and self care for chronic conditions (Hoddinott *et al* 2010). Brooke India's experienced extension staff facilitated equine owners (mostly men) and carers (usually the wives, children and other relatives of owners) in Uttar Pradesh to work collectively to improve the welfare of their working animals, using a participatory learning and action process adapted from recognised good practice in human social development (described in van Dijk & Pritchard 2010; van Dijk *et al* 2011). This began as a pilot in 2006 with 40 community groups owning approximately 650 horses, mules and donkeys. It is now incorporated into the organisation's core strategic approach and by September 2010 it had been used with 1,396 groups owning 29,500 working animals. During this period, field staff observed a spirit of positive competition developing in many communities which acted as a non-economic

incentive to improve welfare. In this paper, we describe how this competitive drive to improve welfare led to a gradual evolution in the complexity of welfare assessment protocols used by groups of animal owners, and the resulting lessons and challenges for equine welfare research and project management.

Materials and methods

Since 2003, Brooke India has used trained staff to assess the welfare of working horses, mules and donkeys using an assessment protocol developed with the University of Bristol, UK, specifically for the purpose (Pritchard *et al* 2005; Pritchard 2007). In 2005, field facilitators encouraged owners to participate in this process, aiming for better ownership and use of the protocol to inform appropriate action towards welfare improvement. However, most owners did not fully accept the validity or relevance of the indicators and rating scales used by 'outsiders' to assess their animals. Firstly, they felt that the assessors did not necessarily choose indicators that owners themselves considered to be important. Some of the owners' preferred signs of good and poor welfare were not included in the protocol. They did not regard some indicators as fair or meaningful, such as scars which had been present at the time they purchased the animal, representing past welfare insults for which they were not responsible. Secondly, with the exception of wounds and some behavioural responses, the rating scales used were mostly binary (normal/abnormal). These aimed to identify small or early but potentially significant signs of poor welfare, such as low-grade lameness and dirty or watering eyes, however they did not capture incremental improvements in welfare. Owners felt that the scoring system did not 'allow them to succeed', because normality defined by the standards of non-working horses and donkeys in temperate climates may be impossible to achieve within the constraints of the animals' living and working environments: pulling or carrying large loads daily for long periods in hot, dusty or impoverished conditions. As a result, field staff facilitated village-level groups of animal owners and carers to develop and implement their own welfare assessment protocols and plans for welfare improvement. Each group used adapted participatory rural appraisal (PRA) exercises, known as Participatory Action Tools for Animal Welfare (PATAW) (van Dijk *et al* 2011) to produce a list of welfare issues affecting their animals. They agreed on a scoring system that included welfare inputs (resources or provisions and equine husbandry practices) and animal-based welfare outcomes. Facilitators used novel tools such as 'Animal Feelings Analysis' and 'If I Were A Horse' (van Dijk *et al* 2011) to ensure that both mental and physical aspects of welfare were captured in the assessment protocols and that no major elements had been missed.

Each group then walked from house-to-house through the village, accompanied by the facilitator, collectively assessing the welfare of all animals belonging to group members using their agreed list of welfare indicators. During and after these walks, participants discussed and analysed welfare inputs and outcome findings with each other and the facilitator, and generated action plans to improve equine health, husbandry and working practices. Where an individual animal was affected by a welfare problem, its owner agreed to take specific action devised by the group and other group members were assigned to monitor compliance. In cases where several animals in a village were affected, for example by a high incidence of tetanus, or travelling on pot-holed village roads, the group agreed collective solutions and worked together to implement them. Participants also added, removed, refined and consolidated the welfare indicators and scales of measurement, to allow them to capture observed welfare changes more accurately the next time round. The village walks and in-depth discussions of findings were repeated at intervals of 1 to 3 months, leading to regular refinement of both the welfare assessment protocol and the resulting action plans. All assessment findings and plans were recorded by group members on chart paper or in ledgers kept in the villages.

Results

Initial welfare assessment protocols did not remain static. At first, most groups chose to use binary (good/bad; present/absent) or 'traffic light' (red-amber-green) ratings. Competitiveness to improve the welfare of their animals developed between participants as each owner or carer became increasingly aware of their own ability to make a positive change. Awareness came about through experiential learning by carrying out regular welfare assessments, and also through facilitated discussions and exercises concerning successful and unsuccessful actions, exploring root causes for welfare issues, any barriers to change and how these could be overcome through collective action. Early successes acted as a driver for increasing sensitivity of rating scales, enabling differentiation of small, incremental improvements in welfare to identify a 'winner' of each welfare assessment. Binary or 'traffic light' scales evolved to a range of 5-, 10-, 20-point or continuous scales, with systems for adding and subtracting points for ordinal measures. Table 1 summarises the change in welfare indicator rating scales used over time across all villages. The rate and type of change to the rating scales varied from village-to-village because changes to welfare assessment protocols evolved naturally from group discussions and not all villages progressed through all stages. Groups would often begin with a welfare assessment using the 'traffic-lights' rating and score all the animals in the village on three or four occasions. When most owners were scoring 'green' for all welfare observations this triggered debate about whether some 'greens' were better than others and more sensitive numerical scales were adopted for each indicator. Groups also began to define scoring criteria in more detail. With each change made they ensured that all members agreed on the rating scales and criteria used to score each indicator. Discussions at the time of each village walk, together with facilitated exercises in between welfare assessments, led participants to notice and share their opinions on new aspects of positive and negative welfare.

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Table 1 Evolution in complexity of owner-led working equine welfare assessment protocols over time. Overall, village equine welfare groups tended to progress from the more simple rating scales shown at the top of the table to the more complex scales at the bottom, although not all villages progressed through all stages.

Description	Type	Example village
Categorical		
Red, amber, green	Ordinal	Most, in early stages
Red, blue, green	Binary, 2 levels[1]	Baghpat, in early stages
Red, green, black (for 'incurable')	Nominal	Mundakhera
Blank (= no problem/green); colour-coded dots for different welfare	Nominal	Dhikana
Yes-no or red-green or present-absent	Binary	Goili, Gadha
Numerical scores		
0–3, 0–5, 0–10, 0–15, 0–20[2]	Ordinal	Kanpur Rural
5-point (or similar) bands are defined, then scored within each band[3]	Ordinal, 2 levels	Mundakhera, Lucknow
Points added for defined positive criteria within a single indicator, up to an agreed maximum score (eg 2+2+2)	Summative	Baghpat
Points subtracted from an agreed maximum score, for defined negative criteria within a single indicator (eg 10-2-2-2)	Subtractive	Baghpat
Wound measurements and penalties	Continuous	Nisurkar
Weighted scores		
Weighting of welfare measures	One level	Rathura
As above plus differential weighting of animal-based indicators, resources and management practices	Two levels	Goshaganj
As above plus weighting within body parts	Three or four levels	Panchi
Indexing		
Individual and village indices	Sum of (weighted) scores	Meerut, Dhanura

[1] Participants first score the animal as normal (green) or abnormal for each welfare issue, then score abnormal animals according to the degree of abnormality (red = severely abnormal, blue = moderately abnormal).
[2] The group agrees on the scale to be used for each indicator and the criteria for assigning scores. For each scale, the end points are marked with a descriptor (for example, working animals rarely have unrestricted access to drinking water, so 15 = offering fresh, clean water at least 6 times a day; 0 = offering dirty pond water or offering less than twice a day). Sometimes intermediate points are also marked to assist with scoring (eg 10 = offering fresh, clean water two or three times a day).
[3] The criteria for scoring are divided into bands or ranges and then a score allocated within each band. For example, in Goshaganj village the welfare indicator 'wounds' can be scored in one of three bands (where 10 is the best possible score and 1 is the worst); small wounds caused by the saddle/ harness score in the range 5–10 points, bites from other horses score in the range 3–5 points and beating wounds score in the range 1–2 points. The group identifies which band the animal's worst wounds fall into, then give it a score within that band. This particular scoring system takes into account both wound severity and good management practices.

They added these to the assessment protocols, which developed from using 15 or 20 indicators to an average of 30, and in some places to over 60. Table 2 gives examples of welfare indicators used as part of these village-level welfare assessments.

The Brooke did not reward winners of each welfare assessment round. For most groups, the reward was status within the village or pride in their winning animals, although some decided to award prizes of their own choice purchased with group savings. Over time, many equine welfare groups developed new ways to enhance their competitions and address questions of fairness. Dhanura villagers found that the same people were winning the competition each time, so started to reward both the best animals and the most improved. In Faridpur, group members felt that owners who were relatively wealthier had an inherent advantage over poorer people with lower quality animals. They began to judge the competition using a combined score representing the welfare of each member's own animal plus the actions they had taken since the previous round to help others who had scored badly. In Ranpur, an equine welfare group persuaded neighbouring villages to join the competition and set up a rotating group of representatives as a judging panel.

Issues of inter-observer repeatability did not arise due to the collective nature of the process, with all observers agreeing the scores allocated to each animal at the time of each assess-

Table 2 Examples of welfare indicators, definitions and scores/scales devised by groups of horse-, mule- and donkey-owners in Uttar Pradesh, India.

Indicator	Category	Criteria/definitions	Score/scale	Village group
'Stable cleaning'	Management practice	Floor is level Floor is dry Faeces > 1 m from animal No bad smell from manger	Summative, 2 points for each, maximum score 8	Baghpat
'Feeding pot'	Resource provision and management practice	Feed present Cleanliness Height	Overall categorical score using 'traffic lights'	Not recorded
'Legs'	Animal-based outcome (physical and behavioural components)	Twisted hoof Swelling hind Foot canker Injury/wound Lameness Stiff legs	Overall categorical score using 'traffic lights'	Unnao
'Eyes'	Animal-based outcome (physical and behavioural components)	Mud on eyes Dust particles on eyes Redness Animal does not allow owner to touch eyes	2 points for each, subtracted from maximum score 10	Baghpat
'Weakness'	Animal-based outcome (physical)	No ribs showing = 10 points 2–3 pairs of ribs showing = 6 points 4+ pairs of ribs showing = 3 points	Categorical, maximum score 10	Baghpat
'Beating'	Work practice (assessed using animal-based outcomes and owner behaviour)	Presence of signs (physical) Fearful animal (assessed by response to owner approach) Kicks the cart Owner seen carrying a stick at any time	Penalty points for each	DBF Kanpur brick kiln
'Daily grooming'	Management practice (assessed using animal-based outcomes and physical test at time of assessment*)	Not done: long, loose or excess hair Dandruff on hair Hair not shining Spots of urine and faeces * Hair on your hand when you rub hair	2 points for each, subtracted from maximum score 10	Dhikana
'Wounds'	Animal-based outcome (physical)	Length of each wound measured in one-eighths of an inch using a ruler, then summed for whole animal: 10 points for no wounds, 8 points for 1" total wound length, 6 points for 2" etc, to 0 points for 5" or more	Continuous measure, converted into 1" bands for score allocation	Nisurkar

ment. Validity of welfare indicators was addressed through facilitated discussions, including introduction of external expertise where needed. In one village, group members initially included auspicious hair whorls in their assessment protocol, because such animals were marked as 'lucky' and must have better welfare than 'unlucky' ones without whorls. We considered it important not to stifle ownership and creativity by dissuading groups from using measures which were important to them. As indicators were refined through more detailed discussion of their relationship to welfare issues, whorls were dropped from the protocol. Where welfare issues were not included in protocols because owners did not recognise normality (for example, when the condition is ubiquitous in a population, as with lameness in adult working horses), facilitators introduced specific discussion around the full range of scores. If welfare issues were deliberately excluded because they were 'incurable' and therefore scores could not change over time, facilitators suggested that some chronic conditions initially thought by owners to be irreversible, such as harness-related wounds, might in fact be cured. This led to small-scale participatory action research projects to find solutions to previously challenging welfare problems. For truly irreversible issues, such as blindness or chronic lameness, owners explored appropriate management and palliative care strategies and included these in individual action plans.

Over time, multi-level and weighted welfare assessments emerged. Weightings were allocated to individual indicators in several ways: for example, weighting parts of the body or welfare issues according to their 'importance'. Some groups ranked management practices and resources according to their contribution to welfare and assigned weighting coeffi-

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cients accordingly. Many decided to assign additional weightings between three categories: (i) resource provision; (ii) owner husbandry or work practices; and (iii) animal outcomes. Husbandry and work practices, such as stable cleanliness, driving speed and beating, were often assigned a higher weighting than resource provision or animal-based outcome measures, giving participants a particular incentive to address these. Owners said that this was because equine management practices were under their personal control, so there was 'no excuse' for low scores. They acknowledged that animal-based outcomes could be influenced by both husbandry/work practices and by providing better resources (such as feed, grazing areas or harness); however, resources were often limited by local availability or affordability rather than a lack of motivation to improve them.

Efforts to aggregate multi-dimensional measures into a single 'winning' score led to development of indices describing welfare at individual animal level ('welfare index') and population level ('village index'). Many villages calculated a welfare index or overall score for each animal by summing its scores for each indicator. Overall scores were used to identify owner rankings and the winner of each competition. They also enabled owners to update their individual action plans according to areas of weakness. Scores, rankings and winners and action plans were recorded on chart paper or in the group's ledger for future reference. A village index was calculated by summing all group members' scores for each welfare indicator and comparing this to the maximum possible score for that indicator, showing which elements of welfare had improved in all animals since the last competition. Common or persistent problems in the village equine population were addressed through facilitated discussion, leading to action plans involving the whole group. Examples included mending the village access road to improve working conditions for cart horses, and reducing the incidence of tetanus by negotiating vaccination at a discounted price (van Dijk *et al* 2011). Approximately 400 equine welfare groups included savings-and-credit as part of their collective action; this acted as an additional economic driver for welfare improvement (Kandpal *et al* 2010; Ali *et al* 2012). Group savings were used to finance collective actions such as buying farriery services or feed in bulk.

Discussion

Benefits of owner-driven welfare assessment

The benefits of positive competition to improve animal welfare among owners working as a group include: (i) a high level of interest in and commitment to the process; (ii) strong peer motivation or pressure for change; and (iii) the use of collective wisdom and action to overcome economic or other constraints. Using participatory methods to achieve positive behaviour change relating to animal welfare reflects wider changes in the human health and social development sectors over the last two decades. Fabiano (1994) stated that:

> Health education as a field is turning from its individualist roots in which behaviour change is viewed as an isolated phenomenon that occurs within an individual, to a new conceptual framework in which behaviour change occurs within a complex ecology of individuals interacting with and influenced by other people, cultural norms, access to healthcare, affiliation with community, the entire environment of a person's life.

The Brooke recognised this by expanding its approach, from giving basic husbandry or preventive advice to individual animal owners at the time of veterinary treatment and isolated from other contextual considerations, to a more holistic method in which the wider community of owners and carers were encouraged to address a broad range of welfare issues together. Through facilitated discussions and exercises, this process took into account the position of working horses and donkeys as part of people's overall livelihood strategies and recognised their owners' social, financial, environmental and other constraints to making welfare improvements.

In a study of zookeepers' ratings of animal welfare, Whitham and Weilebnowski (2009) suggested that the best way to evaluate well-being may be for the person most familiar with an animal's temperament, preferences, behaviour and routine to be 'the voice' for that individual. They cited evidence from a study of human dementia patients which showed that caretakers may be better than clinicians when assessing less observable dimensions of welfare, such as anxiety and depression (Bryan *et al* 2005) and concluded that the reports of people who spend time with animals year-round are important for assessing long-term welfare. This concurred with our findings that in many cases, equine welfare groups chose some welfare indicators which reflected ongoing care or husbandry practices, such as whether the stable was cleaned every day or whether the owner was ever seen carrying a stick to beat his donkey, rather than taking only a snapshot view of welfare outcomes or resource provision at a single point in time.

The groups' tendency to give the greatest weighting to equine husbandry and work practices encouraged people to make the highest level of improvement possible within their financial and other constraints. Collective monitoring and action enabled animal owners to reduce their vulnerability to external shocks, such as lameness, wounds or tetanus leading to reduced work output, or even death of their animal and thus loss of family income. It increased their resilience in the face of resource shortages, for example by enabling them to bulk-buy feed and fodder. Although in most situations welfare assessors try to balance simplicity with comprehensiveness, we found that these owners usually chose to increase the number and sensitivity of measures over time. They increased complexity and comprehensiveness in order to make judgements about whose animal was in the best state of welfare, based on small, incremental improvements made over short (1 to 3 month) time-scales. This can be compared to observations from the water and sanitation sector, where communities are often seen to progress up a 'sanitation ladder' from basic to more complex systems, as people's demand for improvements in sanitation increases over time (Rosemarin 2010).

Reliability of welfare assessment scores

Webster (2003) stated, due its multi-dimensional nature, any welfare assessment that is based only on behaviour, or motivational state, or physical appearance, or production performance, is never a true reflection of welfare. In a study of the similarities and differences between UK farmers' and scientists' assessment of animal welfare, Hubbard and Scott (2011) found that farmers who developed their own prototype monitoring system appeared to concur with this, since they used a combination of animal-, resource- and management-based measures to assess welfare. Following facilitated exercises to encourage the use of animal-based measures to monitor welfare change, the groups of horse and donkey owners in India also chose to use the same three categories in their welfare assessment competitions. The inclusion of all three categories conferred benefits over using only one or two: monitoring management practices encouraged positive change in their day-to-day animal care; monitoring resource provision encouraged collective action to improve the availability, accessibility, acceptability, affordability and quality of equine-related resources and service providers (farriers, saddlers and others); while monitoring animal-based outcomes enabled groups to check whether their resource- and management-based action plans were working or not and to make adjustments or try alternative courses of action.

The validity of measures is a concern in any system purporting to assess welfare. Witham and Weilebnowski (2009) found that, across a variety of zoo species, caretakers' assessments of traits related to the well-being of individual animals can be both reliable and valid. In animal welfare or behaviour studies that are not purely focused on physical health, it is more common to investigate construct validity (ability to measure a postulated attribute; usually assessed by expert opinion) rather than criterion validity (accuracy compared to a 'gold standard' measure), because there is often no gold standard against which to compare the rating scale (Meagher 2009). Welfare is often defined from the perspective of the animal, so any measure is an indirect estimate of the animal's experience; however, the indicators produced by the owners of working equids were comparable to those of welfare assessment protocols produced in academic institutions. We did not find the working equine welfare assessment tool developed with the University of Bristol (Pritchard *et al* 2005) suitable as a 'gold standard' criterion against which to evaluate welfare assessment protocols developed by animal owners, since its rating scales for animal-based outcomes are not sensitive enough to detect the small, incremental changes that could be measured by the village protocols. Also, it does not contain a wide variety of welfare indicators for comparison: in particular, it has few measures of mental welfare and the human-animal bond and does not include resource provision and management practices.

Meagher (2009) also pointed out that in applied settings, the benefits of using a particular scale or method may outweigh the costs of having relatively low levels of a particular type of validity. For example, lack of specificity may be traded off against low cost or practicality of the assessment. In our case, the importance of group members owning the process, thereby committing to improving their animals' welfare, outweighed the occasional and usually temporary appearance of invalid indicators.

Observers will score animal welfare indicators relative to norms for a species or population, so scores depend on the observer's range of experience (Meagher 2009). Initially, owners of working animals did not assess some welfare issues because they were irreversible or were not recognised as a problem. The latter tended to occur when they were not familiar with normality or the full range of possible scores, because all of their animals suffered from a welfare issue to some extent. In our experience, skilled facilitation was needed to raise these new issues without trying to impose them, reach a collective understanding of their importance to the animal and explore ways to address them.

Animal welfare scientists working on the EU Welfare Quality® project reviewed methods for compounding or aggregating measures to make an overall assessment of welfare, identifying four ways in which this could be achieved: non-formal aggregation, defining minimal requirements for measures, sum (or mean) of ranks and sum (or mean) of scores (Botreau *et al* 2007). We found that equine welfare groups tended to use the sum or mean of scores, including any weightings applied, to calculate individual welfare indices and village indices. In addition, some villages chose a minimum total score below which no animal would qualify as a winner of the competition; in other words a minimum standard for welfare.

Lessons and challenges for project management and working equine welfare research

The Brooke's field and management staff learned several project lessons during this five-year period of 'real world' experience. Skilled facilitation was needed to move owners from considering only welfare inputs to welfare outcome assessment. Facilitators and animal owners developed novel PRA/PATAW tools together, specifically for this purpose. Technical staff (particularly veterinarians and researchers) became better at recognising distributed capacities and intelligence, in particular, animal owners' indigenous knowledge of equine welfare. Owners were recognised as experts in the implementation of welfare interventions, in the form of their individual and village action plans. Their situational analysis and extensive experience of overcoming financial and other constraints became an essential part of expert opinion on working equine welfare, valued equally to that of 'outsiders' such as community facilitators, veterinarians and animal welfare scientists. In a discussion of interdisciplinarity in animal welfare science, Lund *et al* (2006) noted that natural scientists will continue to be central for achieving animal welfare improvements, but social scientists are also needed for better understanding of the role of human behaviour and animals' roles in society, as well as for implementing solutions, in order to achieve animal welfare in practice. Our experience suggests that it is also necessary to include skilled social motivators with grass-

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roots experience in facilitating behaviour change interventions. Hubbard and Scott (2011) suggested that any technique developed by scientists could benefit from the co-operation of farmers, with both working together to contribute to the development and promotion of higher animal welfare standards. We would go further than this, emphasising that any technique developed by scientists alone is unlikely to be fully implementable in practice, because it will not take full account of the social, financial, environmental, cultural and other constraints to implementation. The genuine involvement of farmers in developing welfare assessment techniques and protocols is a prerequisite for success because it motivates them to analyse and attempt to overcome these constraints themselves and to measure their own progress, creating an internal, self-sustaining incentive for ongoing welfare monitoring and improvement.

Challenges to equine welfare assessment in India include aggregating results for analysis and reporting purposes from the variety of assessment protocols generated by animal-owning communities. The Brooke is currently addressing this using experience from the international development and social medicine sectors in aggregating and analysing 'participatory numbers': numerical data derived from 'real world' participatory processes which contain a relatively large amount of variability compared to data from controlled experiments (Chambers 2003; Postma *et al* 2003; White & Pettit 2005). These analyses will be used to identify common principles, themes and indicators adopted across equine welfare groups, as well as other aspects of community well-being arising from participation in a group-based process. Representatives of equine welfare groups are now being helped to form 'cluster groups', so animal owners have an opportunity to be key players in identifying commonalities and aggregating their own welfare assessment findings on a higher level.

Most equine welfare groups facilitated by Brooke India are composed mainly or exclusively of men, who are usually the owners of working animals, although there are a growing number of women's groups. In a study of different communication strategies used for encouraging healthy dietary behaviour, Larkey *et al* (1999) found that male participants were more likely than women to use 'mock competition' to encourage behaviour change. A gender-disaggregated study of working equine welfare monitoring and improvement processes may also uncover differences in competitiveness between men and women, and highlight other peer-encouragement behaviour change strategies used by women's groups. Larkey *et al* (1999) also encouraged documentation of the creative approaches utilised by lay educators among their peers, in order to maximise social network effects and to inform training of outreach workers within various cultural, gender and social contexts.

Using external assessors to evaluate the outcomes of all equine welfare projects over large working animal populations across many countries would be prohibitively expensive for a supporting organisation such as the Brooke. Relatively inexpensive, owner-led welfare assessment protocols drive welfare improvement at individual animal and village levels and their findings can be triangulated with smaller independent assessments. As with the zoo biologists described by Whitham and Weilebnowski (2009), this is particularly important for working equine research because it is necessary to generate data from large numbers of animals across multiple, geographically dispersed locations, in order to disentangle the many variables affecting animals kept individually or in small groups in widely differing environments. The same authors commented that frequent welfare monitoring carried out by animal carers may allow institutions to become more effective when prioritising their activities according to welfare needs and quantitatively assessing the impact of management decisions.

Animal welfare implications

The spirit of positive competition which developed between owners led to welfare benefits for their working animals, as measured by their wide variety of assessment protocols and observed by technical experts in working equine welfare who have visited the project areas over the five-year period reported here. There is no single, external and objective tool for evaluating these positive welfare changes, although we are currently comparing animal-based welfare outcomes identified using different assessment methods and will report these in a future publication. A competitive approach to welfare improvement also strengthened the groups' social cohesion, which in turn improved knowledge sharing and peer-encouragement and increased members' negotiating power with suppliers of equine-related services and resources. Welfare monitoring and action to improve welfare were two integral parts of a single competitive process carried out by the same people. This is in contrast to the separation of evaluation and implementation of welfare improvement seen in inspection or accreditation schemes, where persuading animal owners to accept and act on the results of external assessments can be an ongoing challenge.

Animal welfare is a dynamic state. Regular monitoring and reflection, along with a competitive drive to maintain and improve standards, enabled the owners and carers of working horses, mules and donkeys to recognise welfare problems early, act on them promptly, track individual and collective actions by monitoring changes in management practices and resource provision, and assess the effect of these actions using animal-based indicators. Spontaneous development of positive competition between farmers has also been reported in the early stages of a Canadian farm animal welfare labelling scheme (Duncan 2012) and we see further potential for adaptation of group-based behaviour change methods to other animal welfare contexts, such as farmer peer networks or groups of companion animal owners addressing specific health and behaviour issues together.

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