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The journey to animal welfare improvement

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Abstract

The process of driving improvement in animal welfare has three stages: 1) assessment of animal welfare, 2) identification of the risk factors potentially leading to a compromise in animal welfare, and 3) interventions, in response to the risk factors, to bring about improvement in animal welfare. This process is applicable to animals farmed in commercial situations and for individual animals kept or worked in isolated environments. An impressive weight of knowledge has accumulated in the science of animal welfare assessment and this needs to be counterbalanced by development of mechanisms to actively improve welfare. In the case of animal welfare, interventions have to motivate the animal owner or carer to make changes to their own behaviour on behalf of a third party; the animal. This is a different situation from that described in the human health literature where interventions encourage people to take steps to improve their own well-being, thus benefiting themselves directly. The development of strategies to improve animal welfare require a multi-disciplinary approach including social scientists, psychologists and economists, however, the skills of animal welfare scientists are essential to ensure that interventions truly achieve improvements in animal welfare.

Keywords: *animal welfare, behaviour change, implementation, intervention, risk factor, welfare assessment*

Introduction

Techniques used to assess animal welfare are developing and improving constantly. The rate at which they are being adapted and applied to the many situations and environments in which animals are kept is impressive. However, despite the tremendous effort going into developing systems that are reliable, repeatable, valid, feasible and relevant; welfare assessment represents the beginning of a much larger process rather than the endpoint. The endpoint is, of course, achieving sustained improvement in animal welfare.

Intervention is the term given to a "systematic attempt to change peoples' behaviours" (Rutter & Quine 2002) and, although our goal is to improve animal welfare, the reality is that interventions have to be targeted at the people who hold animals in their care. This process may be via intermediary stakeholders such as consumers, retailers, assurance schemes, Non-Governmental Organisations (NGO's) and legislators, or through direct contact between researchers and animal owners. The process involves not only passing on knowledge of what needs to be changed (derived from scientific studies and risk factor assessments) but motivating and empowering people to implement changes to their systems, management and daily routines. The strength of welfare and animal scientists is their direct knowledge of what animals need, however, this knowledge is of limited value unless it is applied by producers and owners.

Legislation, financial penalties or group meetings will only achieve some, but not optimal, welfare improvement unless the animal carers truly believe in the changes they are making. Rosenstock (1974) described the likelihood that an intervention would be implemented as being governed by: 1) an individual's perception of the severity of the problem, 2) what perceived benefits will be derived from implementing the intervention and 3) what barriers are perceived to inhibit implementation of the intervention. Barriers include things such as effort required, financial cost of making change, social pressures against changing, the likely success and sustainability of the intervention and the complexity of the intervention, to list but a few.

The vast majority of literature that features intervention techniques focuses on direct interventions to improve human health. This is an invaluable resource but falls short of the challenge which faces those wishing to improve animal welfare, who are unable to intervene directly on the animal, but have to persuade an owner, carer or organisation to carry out the intervention on behalf of the animal. The literature describes many approaches and methods used to effect a change in people's behaviour; these represent an array of tools from which the most appropriate set can be selected.

This paper describes and reviews elements within the process of reaching an implemented intervention. Wherever possible examples involving animals will be used but where necessary the human health literature will be called upon.

Understanding the problem

Any intervention must be targeted at an identified need and tackle the causes of the problem. Animal welfare interventions have sometimes suffered from a non-empirical

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approach to fulfilling these requirements and consequently, have on occasion, achieved only limited success or sustainability. The two key tools that welfare scientists have at their disposal for defining the problem are welfare assessments to identify and prioritise the problem, and risk assessments to determine the causes of the problem.

Animal welfare assessment

The formalised assessment of animal welfare uses two core approaches; animal-based observations and resource-based observations. Animal-based observations (Whay *et al* 2003; Pritchard *et al* 2005) are direct assessments of animals' health and behaviour and often include records that can, if they have been well kept, supply historical information about animal health. Animal-based observations give the most direct insight into how animals are coping within their own environment. They have the advantage of being practical and focused, however, there is a high level of subjectivity within this type of assessment and interpretation of the significance of the results to the animals themselves presents an ongoing challenge. Resource-based observations (Hörning 2001) focus on what has been provided for the animal such as shelter, comfort, space allowance, nutrition and companionship. This is a more indirect measure of animal welfare, based around the concept that if we provide the correct environment and care for the animal then its welfare must be good. The attraction of these measurements is that they are less subjective, however, they are hampered by what could be termed 'prospective interpretation', ie knowing what an animal needs to ensure good welfare is as difficult as knowing which animal-based outcome measures represent important welfare problems to the animal. In reality, practical welfare assessments tend to combine elements of both animal-based and resource-based assessments, usually with a stronger bias towards one technique or the other. Decisions about what is important for the animal are made using the best information we currently have and are made with the provision that they may be revised as new information becomes available. As part of the process of stimulating behaviour change it is essential that animal owners and carers also understand the significance of these welfare measures.

The roles of animal assessment in welfare improvement

In whatever form it takes, welfare assessment is a powerful tool that has the potential to fulfil multiple functions in the journey to welfare improvement. Listed below are some examples of the many roles of welfare assessment:

- Identifying current welfare problems.
- Checking farm assurance and legislative requirements have been met.
- Benchmarking – (welfare comparisons among groups or individuals).
- Indicating risk factors leading to a welfare problem – (interactions between animal-based measures, problems identified during assessment of resources or interactions between resources and animal-based assessments).
- Identifying and prioritising targets for intervention programmes.
- Informing producers, owners and other stakeholders of the need for interventions – ('real' field data can strengthen the case for interventions to be carried out).
- Testing the efficacy of interventions.
- Epidemiological survey/population surveillance.
- Gathering information to inform ethical judgements or consultations about welfare.
- Research tool for evaluating and comparing production systems, environments, management systems, animal genotype etc.

It is clear that welfare assessment has many roles in the intervention process. The importance and diversity of its functions more than justifies the effort that is put into developing assessment techniques. Not only does welfare assessment help determine the priorities for intervention but it clearly has a role in overcoming barriers to implementation by providing producers/owners/stakeholders with information about the severity of problems. A further barrier to implementation, previously highlighted, is the likely effectiveness of the intervention; this can be mitigated for by conducting a thorough assessment of potential risk factors contributing to the welfare problem so that interventions can be demonstrably targeted at properly identified and understood risk factors.

Risk factor assessments

Animal welfare problems are likely to result from a complex interaction of causal factors, often referred to as 'risk' factors. Primary risk factors are those that impinge directly upon animal welfare and are most likely to be under the direct control of the animal owner or carer. In addition, there are a further set of factors which act on the primary risk factors and they may arise from the social context, education, circumstances and attitudes of the animal carers themselves. Figure 1 illustrates a theoretical hierarchy between primary and secondary risk factors. For example, in an epidemiological study of the causes of flock outbreaks of footrot among UK sheep, caused by *Dichelobacter nodosus*, Wassink *et al* (2003) identified a series of primary risk factors. These included the presence of individual sheep with active footrot lesions, high levels of interdigital dermatitis within the flock, carrying out routine flock level foot trimming and failure to effectively treat and isolate infected individuals. In addition to this a survey of farmers' attitude and flock management strategies identified a series of secondary risk factors also potentially contributing to the levels of footrot within the flocks (Wassink *et al* 2005). These factors included the farmers perception of lameness levels within their flocks, their attitudes and beliefs about footrot, the economic value of their sheep and the cost of implementing or changing their preventive strategies. It is these secondary risk factors which determine the manage-

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Figure 1

The relationship between the primary and secondary risk factors in welfare problems. Secondary risk factors are likely to have indirect but still important influences on the welfare problems. (adapted from Weitkunat & Wildner 2002).

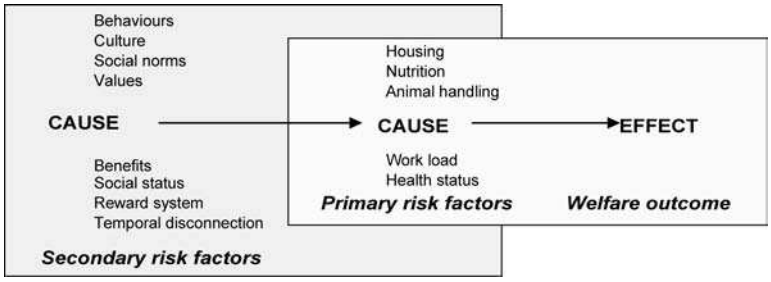
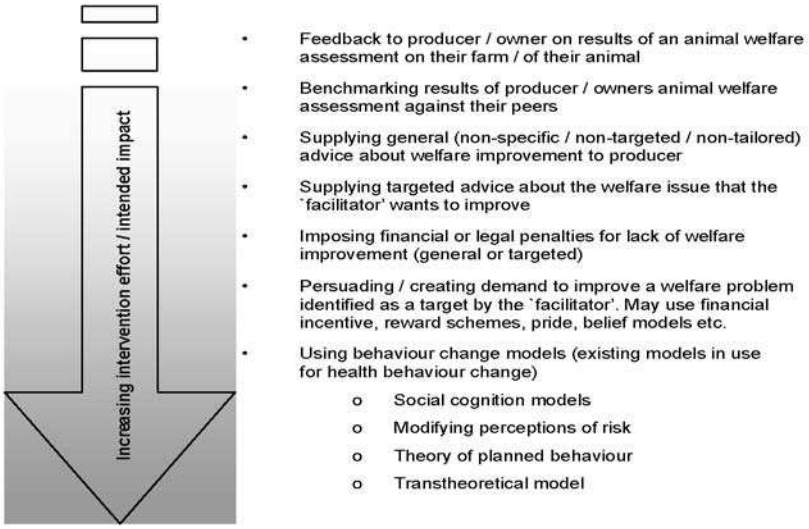


Figure 2

Examples of intervention programme techniques listed in order of increasing 'intervention effort.'



ment practices of the farmers, so to be effective, interventions must address both primary and secondary risk factors.

As is apparent from the example of footrot in sheep there are many variables potentially contributing to an animal welfare problem and the interactions between these risk factors are likely to be through a series of complex relationships. This presents a challenge in both studying risk factors and analysing the data, requiring sophisticated forms of epidemiological modelling as suggested by Weitkunat and Moretti (2005). This is made yet more complex by the time lag between the risk factor(s) commencing and the appearance of the welfare problem. Possible solutions include conducting longitudinal risk factor studies and, where possible, using case controlled methodologies. However, regardless of the difficulties and challenges of risk factor assessment it is an essential step in the intervention process so must be subject to the highest possible degree of scientific rigour.

The identification and management of risk factors essentially targets avoidable problems, this is distinct from identifying the need to change an entire system such as changing from keeping battery caged hens for egg production to a free range system. Risk factor assessment is the basis of making changes to improve the welfare of animals within an existing system, be it extensive, intensive or the interaction between a single animal and its owner.

Intervention strategies to improve animal welfare

The intervention stage is where a planned attempt is made to change peoples' behaviours. The plan is formulated using the results of the risk factor assessment, which was conducted on the basis of the findings of the welfare assessment. The intervention itself is then dependant on identifying what intervention technique is best suited to achieving welfare improvement in a particular situation. There are many stakeholders who can affect an intervention programme; some are indirect intermediaries such as consumers who may be encouraged to purchase only meat of high welfare provenance and some have an enforcing role, such as legislators who may be lobbied to introduce legal requirements targeting specific welfare issues. However, in the most part this paper will focus on the roles and interactions between the agency or scientist identifying, designing and promoting the intervention (the facilitators)

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and those, such as the stockperson or animal owner, who have responsibility for implementing change at the animal level (the implementers).

A successful intervention requires the implementer to be motivated to change his or her practices. In the case of animal welfare interventions the challenge is to motivate the implementer to make changes to their behaviours on behalf of a third party, the animal, without necessarily seeing any direct benefit to themselves. For this reason there is a difference between animal welfare interventions and the majority of human health interventions where the implementers are asked to change practices such as smoking (COMMIT 1995) to directly benefit themselves.

There are many factors to consider when devising an intervention. As well as the specific model being used (examples listed in Figure 2) it is useful to consider who the stakeholders are and which of them are to be the implementers. Consideration should also be given to whether the behaviour change to be provoked is a one-off such as vaccination or long-term such as a change to the daily milking routine used on dairy farms. In addition, the intervention strategy has to match the type of behaviour change required; strategies may include awareness raising campaigns, training programmes to develop specific skills, internet information resources, promotion of discussion or community groups and so on. The 'dosage' or intensity with which the intervention programme is to be delivered must also be planned, this will be dependant on the level of change the intervention aims to achieve, the resources, such as time and money available to the facilitator and what the implementing group are judged likely to accept rather than resent (for a full discussion see Kerr *et al* 2005).

Figure 2 contains a set of possible intervention strategies listed in order from those requiring minimal 'intervention effort' by the agency or scientist attempting to promote the intervention (the facilitators), although not necessarily minimal effort on the part of those implementing change at the animal level (the implementers), through to very high input, high effort models. As a general principle, the level of success achieved by an intervention is closely related to the effort put in by both the facilitators and the implementers.

Types of intervention programme

There appears to be a very strong link between the amount of effort expended on the design and facilitation of an intervention; the recognition of the underlying complexity of human behaviours which relate to poor animal welfare and the level of impact that an intervention may achieve.

A cattle welfare benchmarking project on 15 organic dairy farms in the south west of England used feeding back of the results of animal-based measures to encourage farmers to identify areas of their herd's welfare that they intended to improve (Huxley 2005). The results of the welfare survey were fed back to the farms so that they could anonymously compare their results with those of the other farms participating in the study. Twelve of the 15 study farms identified areas that they would like to improve. Of the 12 farms, nine then went on to implement a management change. Each farm focused on a single change either relating to foot care, cleanliness of the cows or lying area improvements. On re-evaluation the following year only two out of the nine farms had achieved an even partially statistically significant improvement in the welfare outcomes directly relating to their interventions and all nine farms showed either no significant effect or a significant deterioration in at least one related welfare outcome. This example demonstrates the motivational power of benchmarking in stimulating 60% of farmers to implement an intervention. However, the subsequent weakness of this low input approach and its failure to generate significant welfare improvement is illustrated through the farmers' decisions to change only single practices in relation to what were undoubtedly multifactorial problems.

A different intervention approach has been described by Algers and Berg (2001) to improve the welfare of commercially produced broilers in Sweden. An animal welfare programme for broilers set up by the Swedish Poultry Meat Association monitored the standards of the buildings and equipment used in the rearing of broilers and a score was formulated on the basis of the assessment. This score then determined the future maximum stocking density at which a producer was allowed to keep broilers. The stocking densities at which the birds could be kept ranged between 20 kg m^{-2} and 36 kg m^{-2}, this had obvious economic implications for the producers and as such was promoted as a reward system for those producers who chose to improve their broiler rearing facilities. Contained within the animal welfare programme was the foot health programme which monitored and scored the prevalence of footpad dermatitis in the birds at the time of slaughter. As well as being part of the stocking density reward programme the foot health monitoring programme was linked to an advisory service which was available to the farmers. Within the first two years of running the foot health programme the prevalence of severe footpad lesions had decreased from 11 to 6%. This example employs feeding back of assessment results to the farmer, availability of problem specific advice to the farmer and the indirect financial reward of allowing the birds to be reared at higher stocking densities. The 'reward' system described in this study could also potentially be operated as a penalty system should the stocking density allowance for a farm be reduced. This system clearly illustrates the level of input, by an external agency, required to bring about a change in the animals' welfare.

The final animal welfare example in this section is the use of a behaviour change model to intervene on the attitudes and behaviour of stockpeople on small, independent farms. Hemsworth *et al* (1994) used a three stage cognitive-behavioural modification technique in the retraining of stockpeople working with pigs. The three stages involved initially providing factual information about the ease with which pigs can and should be handled and the adverse effects of negative handling behaviours. The second stage focused on modifying inappropriate beliefs by showing the

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stockpeople video footage illustrating the effects of negative interactions on the behavioural responses of the pigs. Then, thirdly, the stockpeople were encouraged to practice their new animal handling techniques upon return to their farms in order to actively modify their existing behaviours. Stockpeople from thirty-five commercial pig farms were involved in the study and their attitudes and behaviour to their pigs was observed prior to and up to fifteen months post intervention. Following cognitive-behaviour modification the stockpeople demonstrated an increase in positive attitudes and behaviours towards their pigs and the pigs themselves were less fearful of an experimenter visiting the farm. This example illustrates both the strength of a well planned, strategic approach to intervening and how effective demonstration and reinforcement of messages can be at changing behaviours.

As Figure 2 illustrates, there are a plethora of behaviour change models employed in the field of behaviour change. These models are intended as guidance only and can be adapted to suit the circumstances of the intervention and the needs of the facilitator.

Constraints on intervention programmes

As well as limited resources such as funding, time available, personnel etc dictating the scope of an intervention programme, experience from the human health sector has highlighted some further potential constraints. The implementer, to whom the intervention is targeted, may not be solely in control of the behaviour which is to be changed; they may be subject to management dictates or conflicting pressures from within their communities or society. Certainly in humans, unhealthy behaviours may also have a pleasurable element as is the case for smoking and alcohol consumption. It is, of course, extremely unlikely that poor animal welfare practices occur for reasons of pleasure but 'life priorities' may still intervene, examples include a preference for spending time with the family rather than giving additional time to animal care or a perception that change is an admission of a previous failure. Further, the changed behaviour may conflict with other practices, for example an intervention to reduce lameness in dairy cattle which requires regular examination of cattle claws may cause time to be taken from some other essential work such as observing the herd for signs of oestrus.

There are two key stages to the intervention process as illustrated previously by Hemsworth *et al* (1994). A change in the attitude of the implementer is needed before behaviour change can be effected; this is complicated by the reciprocal nature of the relationship between a person's attitude which dictates their behaviour which then reinforces their original attitude. As Hemsworth illustrated, attitude must be changed before behaviour can be modified which is the basis of most intervention models currently in use. However, there is still a considerable leap between changing attitude and actually stimulating behaviour change. It has been found that a trigger factor is usually required in order to stimulate a person to change behaviour. This may be achieved through fear, such as in the case of public health scares or more often it is through negotiation and agreement with the facilitator. The absence of a clear trigger factor in part explains why population wide health programmes such as the 'five-a-day' campaigns have achieved a substantial increase in the publics' awareness of the health benefits to eating five portions of fruit and vegetables a day but only a small increase in people actually eating the five portions each day (Food Standards Agency 2004).

Discussion

Intervention programmes to improve animal welfare must be dynamic and adaptive so that they respond to changes in the industry, economics, legislation, public attitude etc. This allows the welfare improvement process to offer assurance that it is on-going and responsive. In addition, any improvements achieved need to be sustainable. Just what defines a sustainable intervention is a matter of debate. Nantel and Tontisirin (2002) suggested sustainability could be viewed as "where the activities initiated by the project continue to survive beyond the life cycle of the project and its funding". However, the aspiration is more likely to be to achieve an indefinitely sustained change. Linked to this is the question of how much change an intervention should achieve, a change which is statistically significant may not be as equally significant from an animal welfare point of view. The answer to what represents a significant animal welfare improvement is both a scientific and ethical conundrum, probably most pragmatically handled by defining a target level of improvement before embarking on the intervention.

The intervention process described in this paper is about identifying and managing the risk factors relating to specific animal welfare problems. The process has been described in three distinct, sequentially dependant, sections. In reality it is not always easy or necessary to keep these parts separate from each other. An example of a technique which integrates the whole process is Participatory Rural Appraisal (PRA) (Chambers 1994) which is a powerful, community based development tool.

It has been widely accepted that use of multiple strategies and doses is more effective in stimulating behaviour change than a single strategy delivered once (McKenzie 2005). How these strategies are selected and delivered depends on the circumstances and type of behaviour change required but the key message is that simplistic, low input approaches are the most likely to fail. The dearth of published information about animal welfare interventions may be, in part, explained by a reluctance to publish unsuccessful outcomes or even intervention programmes which are not objectively evaluated in terms of their outcomes in much the same way that McKenna and Davis (2005) suggest happens within the human health sector. The evaluation of interventions is vital because intervention to improve animal welfare is a developing area and the opportunity to learn from both successes and mistakes will be invaluable to making progress in the field. Most importantly, interventions must be evaluated to

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recognise and avoid negative or unintended consequences occurring.

This paper is directed at animal welfare scientists who, as a consequence of their research have skills in the evaluation of welfare. While welfare scientists continue to refine and develop assessment techniques it is clear that many disciplines such as behavioural science, physiology and ethics all interplay as part of this process (Sandøe *et al* 2003). In pursuit of the further objective of delivering improvements in animal welfare yet more disciplines are being introduced into the process as the skills of social scientists, psychologists and economists are needed to interact with welfare and animal scientists. It is not clear who should be taking the lead in animal welfare improvement but it seems unlikely that those with more indirect links and interests in animal welfare will be stepping forward first. Ultimately it is the decision of the individual scientist how far down the path towards intervention they choose to go but what is indisputable is that the process will not take place in the absence of those with skills in animal welfare science.

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