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Working towards a reduction in cattle lameness: 2. Understanding dairy farmers' motivations

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ABSTRACT

Reducing lameness in dairy herds requires farmers to adapt or change existing practices or resources. Those who seek to improve animal welfare by influencing the actions of farmers need to understand farmers' motivations. To investigate why farmers see lameness as a problem and what motivates their efforts to reduce lameness, a questionnaire was carried out with 222 UK dairy farmers. Farmers considered pain and suffering for the cows to be an important outcome of lameness, but reduced performance by lame cows was also seen as a considerable problem. The motivator most commonly given high importance was pride in a healthy herd. Factors incorporating accreditation issues, public image and costs of treatment were generally seen to be of some, but lesser importance. Advisors need to take all these areas into consideration when working to encourage farmers to act to reduce lameness and thereby improve animal welfare.

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1. Introduction

Lameness is a response to pain. Foot lesions causing lameness in cattle are multifactorial, contributing factors being trauma, metabolic disorders and infection. These are all affected by aspects of herd management, such as housing conditions, hygiene and nutrition. Lameness is related to infertility in dairy cows (Dobson et al., 2008) and can result in economic loss for farmers (Esslemont, 2005). In addition, lameness in dairy herds is a large and increasing problem of animal welfare. In European countries recently reported prevalence estimates range from 19% on organic farms in Germany (March et al., 2008) to 31% in Simmental dairy herds in Austria (Dippel et al., 2009), and 36% in UK herds (Barker et al., in press). Achieving a reduction in lameness requires farmers and farm staff, who work daily with the cows, to take action, by modifying existing management practices or altering farm facilities. A number of barriers to achieving this have been identified (Leach et al., 2010). In summary, these are related to: farmers' perception of the existence and scale of the problem, financial constraints to the business, the pressures of other tasks and issues on the farm, and understanding of the implications of lameness for the physical and financial performance of the herd.

To develop ways of encouraging farmers to take action to reduce lameness, it is important to understand the motivating factors that are likely to drive their efforts in lameness control. Understanding farmer motivation has received increasing attention recently, as scientists, policy makers and advisors consider how to encourage farmers to make changes of various kinds (Greiner et al., 2009). To date, research on farmer behaviour and motivation in relation to herd health remains scarce, with the majority of examples relating to mastitis control (Valeeva et al., 2007; Jansen et al., 2009). Bigras-Poulin et al. (1984) observed 25 years ago that "attitudes should be measured and considered before proposing management practices to improve farm performance", but often this advice is not followed by advisors and veterinarians (Kristensen and Enevoldsen, 2008).

A simple economic argument is seldom enough to make people change (Greiner et al., 2009). People do not necessarily follow the expected rational behaviour to gain maximum profit, and farmers' decisions are known to be influenced by a range of factors including sociodemographics, psychology of the farmer, household characteristics, farm business structure and the character of the innovation (Edwards-Jones, 2006). For example, the likelihood that landowners would take up an incentive to allow public access to their woodlands was found to be driven more by their support of the goals of the scheme than by financial gain (Church and Ravenscroft, 2008). The overall relative advantage of a new technology or method is generally seen as being broader than just "profit" and can incorporate, for example, the effects on risk, human capital and personal preferences (Garforth et al., 2006). Seeing a benefit of a new strategy, which outweighs the effort needed to introduce it, is generally a requirement for making a change, but there is a wide range of potential types of benefits which may influence people's willingness to change (McKenzie-Mohr and Smith, 1999). Once these and the barriers to change

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are understood, approaches using techniques such as social marketing can be developed to stimulate and sustain change (Sørensen et al., 2008).

This paper uses findings from a questionnaire, interpreted in the context of current understanding of behaviour change, to present some suggestions on possible ways of motivating dairy farmers to take greater action to reduce lameness. The sections of the questionnaire analysed in this paper refer to the reasons why farmers see lameness as a problem, and the factors that motivate them to take action to control lameness, or that they suggest might motivate other farmers to do so.

2. Materials and methods

2.1. Pilot study

A pilot study was carried out in Spring 2006 with 50 farmers, 10 in each of five EU countries, who had contact with scientific institutions involved in the EU "Welfare Quality®" project. These countries were the UK, Germany, Italy, Austria and the Czech Republic. During a visit from a staff member of the scientific institution, these farmers were asked the following open questions:

"Why do you see lameness in your dairy cows as a problem?"
"What would motivate you to take more action to control lameness?"

The reasons for seeing lameness as a problem included reduced milk yield, cost, poor cow welfare, extra work, and effects on feed intake, cow condition and fertility. The most common answer to the second question was that an increase in the scale of the problem would motivate farmers to take more action to control lameness.

All the answers given were taken into consideration when designing a questionnaire for the main survey.

2.2. Data collection

The main survey was carried out between October 2006 and May 2007. A face to face questionnaire was conducted with 222 UK dairy farmers, who were taking part in a large study of lameness in dairy cattle (Barker et al., in press). These farmers were recruited by contact through milk buyers, or using the telephone directory, as described in Barker et al. (in press). The questionnaire

was carried out by one of four trained researchers during the initial farm visit for the project. The questions that are given consideration in this paper are the following:

1. *"Why is lameness a problem?"*
2. *"What motivates you to take action to control lameness?"*
3. *"Do you have any suggestions on how other farmers could be encouraged to take more action to reduce lameness in their dairy herds?"*

For the first two questions, a list of possible reasons was given (Figs. 1 and 2), drawn from answers to the open questions in the pilot study, and the farmers were asked to rate each one on scale from 1 (not important) to 5 (extremely important). Farmers were also invited to supply any other reasons why lameness was a problem to them, or factors which motivated them. The third was an open question, which deliberately asked about ways of influencing "other farmers". It was expected that farmers might be more open in answering a question which implied criticism that "other farmers" were not doing enough to reduce lameness, rather than one which might appear to level this criticism at them directly. One farmer might give more than one answer.

Data on herd size, labour structure, and the farmer's assessment of current lameness prevalence (FP) were also collected through the questionnaire. In addition, the prevalence of lameness was assessed on the day of the visit by the researcher, as described by Leach et al. (2010). Farms were classified into three groups according to their labour structure as follows: F: mainly family labour (assisted by casual or relief staff for less than half a labour unit), C: combined (family plus more than half a unit of external labour), or E: (all employees, none of the owner's family members involved in managing or working with the cows).

2.3. Statistical analysis

Mean, standard error of the mean, SD, median and range were calculated for herd size, number of labour units per cow in herd, and prevalence of lameness (FP and RP). For the questions on outcomes of lameness and motivating factors using Likert type scales, the percentage of respondents giving each answer on the scale was calculated. Principal components analysis (PCA) was carried out using SPSS Version 16 to explore the Likert type scale responses to individual questions, identify any underlying structure, and

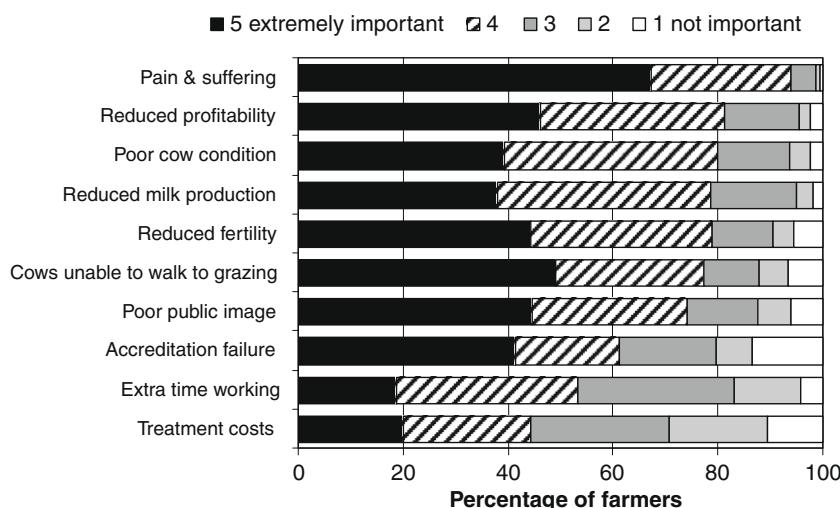


Fig. 1. The ratings given to specific negative outcomes of lameness by 222 dairy farmers.

simplify the original variables into a smaller set of components for further analysis. The responses to questions on both outcomes of lameness and motivators to reduce lameness were included in this analysis. This type of analysis groups together associated variables in "components" and indicates, by a "loading", the correlation between each original variable and each component (a weighted linear combination of the variables). Further analysis can then be carried out on the components themselves, (which are each given a descriptive summary name) to discover whether combinations of attributes are associated with other variables, for example, in this case, labour structure or herd size. Using a correlation matrix and Varimax rotation, components were kept for further analysis if the eigenvalue was greater than one, according to their position on a scree slope. Correlation analysis was carried out to investigate relationships between the retained components and the following variables: herd size, cow:staff ratio, and measures of lameness prevalence given by the farmer (FP) and the researcher (RP). Pearson's correlation coefficient was calculated for all pairs of variables except those including herd size. Since this variable was not normally distributed, Spearman's rank correlation was used in this case. The mean value of each component was calculated for each of the labour structure groups and analysis of variance was carried out, comparing groups F, C and E, to test whether farmers working in different labour structures demonstrated different combinations of attributes, as reflected by the components.

3. Results

3.1. Farm characteristics

Herd size ranged from 30 to 630 cows (mean 163 ± 7.1 , SD 106.6, median 135) and the number of cows per labour unit from 15 to 182 (mean 61 ± 1.95 , SD 28.5, median 62.5). The prevalence of lameness as assessed by the researcher, using a four point scale from 0 to 3, where scores 2 and 3 were classed as lame, ranged from 0% to 79% with a normal distribution (mean $36\% \pm 1.25$, SD 18.6, median 36%). Eighty farms (36%) were run entirely with family labour (F), 46 (21%) entirely with employed labour (E) and 92 (41%) by a combination of family members and employees (C).

3.2. "Why is lameness a problem?"

Fig. 1 shows the percentage of 222 farmers who rated each of the given outcomes of lameness on each of the points on a five point scale. The majority of farmers agreed that most of these out-

comes had some importance, as would be expected since the consequences were proposed on the basis of the pilot study results. When asked specifically to consider "pain and suffering for the cow" as a consequence of lameness, 94% of farmers said this was very or extremely important. Reduced profitability and the negative effects on cow body condition, milk production and fertility received relatively high ratings, all of which were quite similar, with 78–80% of responses being "extremely" or "very" important. Poor public image was of slightly lower importance overall, with 74% considering this "extremely" or "very" important. Potential failure of an accreditation scheme was less important again, followed by extra time spent working with lame cows. The least important of the outcomes suggested was the cost of treating lameness. Additional consequences (each mentioned by 3% of farmers) were the negative effect on staff morale and increased culling.

3.3. "What motivates you to take action to control lameness?"

When asked directly about the importance of specific factors which motivated them to control lameness in their dairy herd, 83% of the 222 farmers considered pride in a healthy herd to be "very important" or "extremely important" (Fig. 2). This was followed by 81% rating feeling sorry for lame cows in one of the top two categories. Feeling guilty about lame cows, the view that lame cows lose money, and the desire for a good public image scored quite similarly, with 70%, 71% and 72% of farmers, respectively, considering these factors as "very" or "extremely" important. The risk of lame cows affecting farm accreditation was considered to be relatively low, so that only 44% of farmers put this in one of the top two categories, while 35% felt this was of slight or no importance. The lowest motivator was that of having less lameness than other herds. Farmers generally seemed uninterested in what was happening on other farms, with only 38% having an important or extremely important motivation from a desire to be better than other farms.

3.4. Principal components analysis of farmer perceptions of outcomes of lameness, and motivators to reduce it

The loadings of the Likert type scale variables (for both outcomes of lameness and motivators for lameness control) onto components are shown in Table 1. The first component extracted by the PCA, which explained 32.9% of the variation, included the following variables with loadings greater than 0.5: perception of negative outcomes of lameness such as reduced fertility, poor cow condition, reduced profitability, reduced milk production, and the motivator

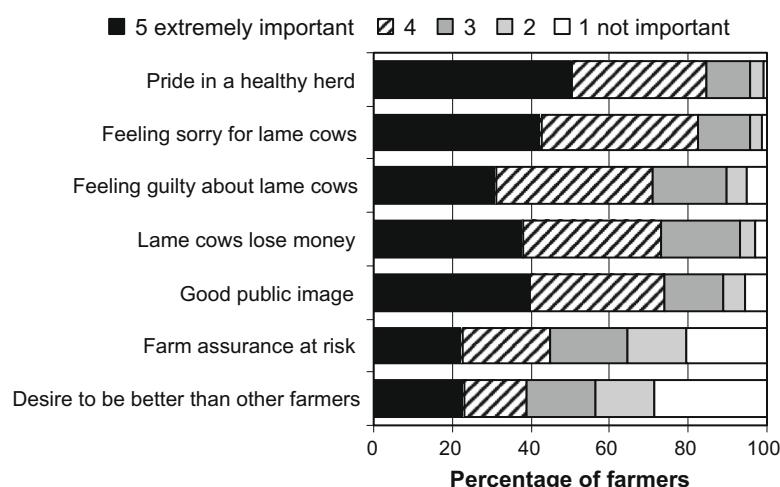


Fig. 2. The importance of factors motivating farmers to control lameness.

Table 1

Rotated component matrix showing the correlation (loading) between individual variables representing outcomes of lameness (O) or motivators to take more action to control lameness (M), and the components extracted by principal component analysis.

Variable	Component				
	1	2	3	4	5
Reduced fertility (O)	0.790	-0.002	0.164	0.196	0.109
Poor condition (O)	0.772	0.016	0.276	0.140	-0.113
Reduced profitability (O)	0.748	0.129	0.209	0.169	0.188
Reduced milk production (O)	0.664	0.312	0.025	-0.021	0.277
Lame cows lose money (M)	0.518	0.251	0.057	0.503	0.144
Feeling sorry for cows (M)	0.143	0.810	-0.066	0.129	-0.115
Feeling guilty about cows (M)	0.053	0.748	0.106	0.188	0.027
Poor public image (O)	0.102	0.643	0.305	0.187	0.121
Potential accreditation failure (M)	0.256	0.080	0.818	0.132	0.128
Farm accreditation at risk (O)	0.077	0.136	0.761	0.470	0.016
Cows unable to walk to grazing (O)	0.422	0.132	0.567	-0.117	0.213
Desire to be better than other farms (M)	0.081	0.100	0.260	0.714	0.038
Good public image (M)	0.106	0.500	0.147	0.620	0.035
Pride in a healthy herd (M)	0.396	0.330	-0.138	0.607	-0.026
Treatment costs (O)	0.316	0.046	0.134	0.016	0.733
Extra time working with lame cows (O)	0.203	0.102	0.325	-0.036	0.580
Pain and suffering (O)	0.263	0.306	0.194	-0.202	-0.539
Extraction method: principal component analysis					
Rotation method: varimax with Kaiser normalisation					
Component scores >0.5 in bold					
Variables ordered according to their loading onto components			% variance		Cumulative variance
Component 1: "cow productivity"		32.9		32.9	
Component 2: "farmer sensitivity"		11.7		44.6	
Component 3: "accreditation issues"		7.8		52.4	
Component 4: "pride"		6.7		59.1	
Component 5: "costs of treatment"		5.9		65.0	

that lame cows result in loss of money. This component could be defined as "cow productivity". Component 2 explained 11.7% of the variation and included the motivator variables of feeling sorry for lame cows, feeling guilty about lame cows, and the negative outcome of poor public image. This has been defined as "farmer sensitivity". The third component, "accreditation issues", explaining 7.8% of the variance, included the negative outcomes of failing a farm accreditation or certification audit, and cows being unable to walk to grazing, and the motivator of product accreditation being at risk. The cows' need to walk to reach grazing tended to be more important to organic farmers, which explains its high loading on this component. The fourth component explained 6.7% of the variation and included desire to be better than other farmers, good public image, and pride in a healthy herd, summarised as "pride". The fifth component explained 5.9% of the variance and incorporated the negative outcomes of the cost of treating lame cows and the extra time spent working with lame cows, summarised as "costs of treatment".

Small but significant positive correlations were found between Component 1 ("cow productivity") and herd size (Spearman's ρ 0.168, $p < 0.05$), Component 3 ("accreditation") and lameness prevalence as assessed by the researcher (Pearson's r 0.155, $p < 0.05$), and Component 4 ("pride") and lameness prevalence as assessed by the researcher (Pearson's r 0.162, $p < 0.05$). A small significant negative correlation was found between Component 5 ("costs of treatment") and the number of cows per labour unit (Pearson's r -0.176, $p < 0.05$). No other significant correlations were found with herd size or lameness prevalence as reported by the farmer or assessed by the researcher.

Component 1 (cow productivity) was the only component that showed a relationship with labour structure. There was a significant difference ($p < 0.01$) between the mean values for this component between group F (-2.43 ± 0.16) and group C (2.3 ± 0.08). These did not differ significantly from the mean for group E (-0.88 ± 0.13). This indicated that cow productivity was perceived as less important on the farms run by the family alone, compared

with those with a combination of family labour and employed labour.

3.5. "Do you have any suggestions on how other farmers could be encouraged to take more action to reduce lameness in their dairy herds?"

The question on what might motivate other farmers to reduce lameness did not always receive the expected type of answer. Respondents generally tended to talk about technical management

Table 2

Farmers' suggestions for encouraging others to take more action to reduce lameness (individuals could give more than one suggestion).

	Number of farmers making the suggestion
<i>Economic drivers</i>	
Information on costs of lameness	15
Increase in milk price	14
More time/labour	4
Economic incentive for sound cows	2
Economic penalty for lame cows	1
Total	36
<i>Other suggestions</i>	
Discussion groups	10
More effective audits	5
Advice	4
Interactive projects	3
Training	3
Increased awareness of lameness	3
Awareness of public opinion	3
Changes to casualty cow rules	2
Better veterinary input	1
Information in newsletters	1
Total	35

measures which they felt would help other farmers, rather than more theoretical concepts of motivation (these answers are not reported here). However, 68 answers referred to general concepts which might increase motivation and these have been separated into suggestions for "economic drivers" and "other suggestions" as summarised in Table 2.

Overall, suggestions were evenly split between economic and other drivers. The majority of economic solutions fell into one of two categories, related either to informing farmers about the costs of lameness, or to an increase in milk price. The most common non-economic solution was discussion groups or farm visits, through which farmers could learn from each other, share their ideas and ways of tackling lameness problems, increase their enthusiasm and receive encouragement. Suggestions for providing advice, training and interactive projects included similar concepts. Only a small number of farmers thought that external pressures, such as more stringent auditing of farms and greater awareness of public opinion, might be effective. Three farmers suggested that others might need to increase their awareness of lameness.

4. Discussion

In response to the first question, "Why is lameness a problem?", the main study suggested a far greater concern for welfare than did the open question in the pilot study. When presented as a potential outcome of lameness "pain and suffering" was almost unanimously described as "extremely important" or "very important"; outcomes reflecting reduced production were also generally highly rated. This contrasts with the responses to the open question in the pilot study, in which welfare issues were very rarely mentioned spontaneously. There is evidence that many farmers underestimate the level and severity of lameness in their cows (Wells et al., 1993; Whay et al., 2002). Therefore, there is a need to overcome this and increase their awareness of poor welfare among their cows, so that their professed concern for animal welfare results in action to reduce lameness.

Effects on public image or possible failure of accreditation schemes (leading to inability to sell milk, or maintain a premium "label") received lower ratings than animal welfare and production related issues. It appears that farmers generally did not see the implications of lameness for accreditation as particularly strong. However, the positive correlation between the component for "accreditation" and prevalence of lameness suggests that farmer concerns about compliance do increase with levels of lameness. Public image was rated rather higher overall than farm accreditation, and those farmers who ranked public image highly often mentioned close contact with members of the public, for example holiday cottages or footpaths on the farm. This contact had apparently increased awareness in two directions – public awareness of the existence of lame cows, and farmer awareness of public disapproval of lame cows. Although in a UK survey carried out in 2007, 50% of respondents from the general public gave dairy cow welfare a positive rating of good or excellent (Ellis et al., 2009), there has subsequently been considerable discussion of the subject in the popular media and public concern is likely to increase (Davies, 2009).

Although cost and negative effects on production were the problems arising from lameness most often mentioned spontaneously by farmers in the pilot study, and were given relatively high ratings in the main study, these did not emerge clearly as the highest motivators for taking positive action to reduce lameness. This is an important distinction to make and needs to be clearly understood by anyone trying to influence farmers' actions for the benefit of their cows. "Pride in a healthy herd" and "feeling sorry for lame cows" received higher ratings as motivators than

the fact that "lame cows lose money". Seeing a problem does not necessarily result in taking action to solve it. This is perhaps part of the reason why the patterns of answers to the questions on the outcomes of lameness and motivators to control it differ. When studying motivation to control mastitis, Valeeva et al. (2007) showed that non-monetary factors relating to internal esteem and taking pleasure in healthy animals on the farm were equally as motivating as monetary factors affecting farm economic performance. If this is the case for mastitis, where the financial losses are obvious and measurable, the balance for lameness is likely to be even further in the direction of non-monetary motivators, since the financial costs of lameness are less clearly seen and understood by farmers (Leach et al., 2010). After modelling the costs of mastitis, Stott and Gunn (2008) observed that profit maximisation and disease minimisation may even be incompatible, due to diminishing returns.

Kristensen and Enevoldsen (2008) identified two subsets of farmers: those who valued welfare more because of the belief that it would improve productivity, and those who gained a sense of wellbeing and satisfaction from owning healthy cows. Our analysis showed that the importance of the combined "productivity" component depends upon the farm size and labour structure. This component is more influential on larger farms, but does not have a strong positive influence on family farms, where issues such as lifestyle and job satisfaction are likely to be much more important. Greiner et al. (2009) found that graziers in Australia did not include financial items in their top five goals. Rather, these were related to satisfaction in their work and sustainability of the land and environment. Therefore attempts to motivate farmers merely by increasing their understanding of the costs of lameness, whether in terms of monetary value or production characteristics, will certainly not be effective on all farms. This may mean that advisors need to refine their approaches. Kristensen and Enevoldsen (2008) discovered a difference between the factors related to health planning, which emerged as important to Danish farmers, and the factors which veterinary advisors expected the farmers to view as important. This illustrates the importance for advisors of understanding the values of their clients.

Perhaps surprisingly, few farmers expressed a desire to have less lameness than other farms. In other measures, farmers can be quite competitive and take an interest in "benchmarking" the performance of their herds against others, particularly in terms of yield. However, where lameness is concerned they seem more concerned with the absolute standard of the health of their own herd, as perceived by themselves and defined by "pride in a healthy herd", than with comparison with other herds.

The third question, on suggestions for encouraging other farmers to take more action to reduce lameness, was deliberately formulated to avoid farmers feeling threatened or criticised. However, the responses should be viewed in the light of the finding of Kristensen and Enevoldsen (2008): that asking veterinary advisors what they thought was of value to farmers gave a different set of answers from those given by the farmers themselves. Although the most common suggestion from farmers in our study was that others might be motivated by being more aware of the costs of lameness, this information has been available for over 15 years, with little apparent effect. Economic arguments are seldom effective in initiating behaviour change, although they may help to sustain it (McKenzie-Mohr and Smith, 1999). Therefore those farmers who are already active in lameness control may be encouraged to continue by an economic argument, but for the many who need to take a large initial step, this is not likely to be sufficient. Even if aware of average costs, farmers may not be influenced by them if they feel their farm is different from the "average farm", for example in terms of size, management system, breed, or location (Huijps et al., 2008). Farmers' concepts

of the financial cost of lameness on their own farms in this study ranged widely (Leach et al., 2010). The fact that another very commonly suggested motivator was "an increase in milk price" indicated that farmers currently felt financially constrained in their efforts to improve matters. At the time of the survey the milk price was particularly low in relation to the costs of production (Defra, 2007) and had been for some time (Garforth et al., 2006). However, with many other demands on the farm budget and the relatively low position of lameness among herd health priorities (Leach et al., 2010), there is no guarantee that extra income would be invested in lameness control.

A more promising suggestion is the third most common one, of taking part in discussion groups. With the positive experiences arising from "stable schools" (Vaarst et al., 2007) and monitor farms (ADASUK Ltd., 2008), this seems likely to be a successful way of encouraging farmers who will join groups, although there will always be individuals who are not able or willing to do this. The attitude of respected peers and the way a farmer is seen by them, have been shown to be important to farmers (Greiner and Miller, 2008), so there would be power in bringing farmers together with those who are already taking action to reduce lameness.

Economic penalties or premiums related to lameness were occasionally mentioned, but this was not a common suggestion. Likewise, only small number of farmers in the pilot study, responding to an open question, had mentioned that financial motivation might encourage them to increase their efforts in lameness control (the possibility of a premium for milk from sound cows, better prices for sales of animals, or economic incentive to use rubber matting, were the suggestions given, but penalties were not mentioned) (Leach and Whay, unpublished data). Quality penalties were more effective than premiums in motivating control of mastitis (Valeeva et al., 2007), but objective thresholds for imposing penalties are far easier to establish for mastitis than for lameness.

5. Conclusion

In summary, a range of approaches is likely to be needed to motivate farmers to increase their efforts in lameness control. Components summarised as "cow productivity", "farmer sensitivity", "accreditation issues", "farmer pride" and "costs of treatment" all contribute to the way farmers feel about lameness. All these issues are therefore important to consider when planning strategies to encourage farmers to make changes to benefit lame cows. The likelihood of change also depends on farmers being aware of a problem in the first place. The fact that poor animal welfare was seldom spontaneously raised as an issue arising from lameness in the pilot study suggests that work still remains to be done in raising the concept of animal welfare among dairy farmers in general. Once farmers become aware of the scale of the problem, their professed pride in herd health and feelings of compassion for lame cows should result in greater action. Encouragement through contact with other farmers with similar concerns is likely to have a positive effect, reinforcing the intention to make changes, and resulting in more and sustained activity. The effects of lameness on production seem to be quite well recognised, so the subsequent economic effects might appear to be potentially powerful drivers, but farmers are not always fully aware of these, so production effects alone are unlikely to be effective initiators of change. There is little evidence from this study that benchmarking against other herds or current farm accreditation schemes will have a great influence. Desire to maintain a good public image for dairy farms is likely to be one of the stronger external drivers and become increasingly important.

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