Animal welfare in large dairy herds: a survey of current practices

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ABSTRACT

To gain insight into the farm practices and animal welfare issues on large dairy herds, we conducted a postal survey (n = 132). The questionnaire covered four areas: demographics, stand-off practices, management during extreme weather, and races. Respondents managed 910 ± 466 (mean ± SD) milking cows during the 2003 season. When asked to identify the most important animal welfare problem on their farm, 73% of the respondents named one of the following: lameness, disease, or nutrition/growth. Fifty-one percent of respondents used some form of stand-off area during periods of inclement weather. There are several management practices used with stand-off areas that are relevant to animal welfare including: provision of feed, shelter, space allowance, and surface type. During extreme winter and summer weather, a range of practices was used to manage cows, including changes in grazing patterns. For example, 61% of respondents used paddocks closer to the milking shed and 40% used sprinklers at the shed during hot weather. Finally, on average, cows walked 1.9 ± 0.8 km to the milking shed, and walking distance increased with the number of cows/farm. Farmers demonstrated awareness of animal welfare issues and implemented management practices that likely improve the well-being of their stock.

Keywords: animal welfare; dairy cattle; herd size; management practices.

INTRODUCTION

Worldwide, the size of the average dairy farm is increasing (e.g. Canadian Dairy Improvement Centre, 2005). In New Zealand (NZ) the average dairy farm has increased from 112 to 302 cows in the last 29 years, and 13% of farms now have more than 500 cows (Livestock Improvement, 2004). However, very little research has investigated the effects of group and farm size on the welfare of dairy cattle, particularly in intensively managed pasture-based systems. There are a number of potential welfare issues that may be unique to large dairy farms, such as group size, level of animal supervision, and longer walking distances. Our objective was to gauge farmer awareness of welfare issues and describe management practices on large NZ dairy farms. We will discuss the results of our survey in relation to existing literature and discuss areas where welfare issues on large farms may require future research.

MATERIALS AND METHODS

Three hundred members of the New Zealand Large Herds Association (NZLHA) were selected at random and an eight-page questionnaire was posted to them in July 2004. The survey covered several areas: demographics and staff, animal welfare issues on their farm, stand-off practices, management during extreme weather, and races. Questions in the survey were asked with respect to farm management in the 2003/2004 season. All questions were short-answer, multiple-choice or ranking (strongly agree, agree, neutral, disagree, strongly disagree). Descriptive statistics were calculated in Excel. Due to inconsistencies in the number of cows reported, one farm was excluded from both the average farm size and the group demographic responses. The relationships between number of cows/farm and 1) stand-off practices such as use of concrete, feeding, and space allowance, 2) percentage of paddocks near shelter, and 3) average and maximum, walking distance were examined using Proc RobestReg in SAS (SAS, 1999).

TABLE 1: Summary of herd demographics for 131 respondents. The number and percentage of respondents, mean number of cows/farm, the mean number of cows/group, and smallest and largest group on the farm are presented according to the number of groups of cows on the farm. Overall means for all farms are also reported.

	Number of groups						
	1	2	3	4	5	8	overall
Number of respondents	8	71	29	15	7	1	131
% of respondents	6.1	54.2	22.1	11.5	5.3	0.8	100.0
Mean total no. of cows/farm	496	697	1008	1387	1929	2150	910
Mean size of groups/farm	496	345	334	348	383	269	349
Smallest group/farm	360	20	20	10	25	150	10
Largest group/farm	620	700	640	900	625	350	900

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RESULTS

Useable surveys were received from 132 respondents giving a margin of error of 10% and a response rate of 47%.

Demographics and staff

The respondents were primarily farm owners/operators (86%), followed by share milkers (11%), and farm managers (2%). All respondents had worked in the dairy industry for at least 6 years and 94% had 10 or more years of dairy-related experience. In 2003, the respondents were managing 910 ± 466 cows on 344 ± 182 hectares (mean ± SD; summary of herd demographics in Table 1). They employed 5.5 full-time and 2.2 part-time employees, and larger farms employed more full-time workers. When hiring new employees, 69% of respondents said stockmanship was either important or very important, although only 11% agreed that they managed highly-qualified employees.

Animal welfare issues on their farm

In short-answer questions, respondents named a number of welfare issues including lameness, nutrition/growth, disease/health, weather, and calving and described a range of solutions to these problems (Table 2).

Stand-off practices

Fifty-one percent of respondents used a stand-off area during inclement weather. Of these, 60% described their stand-off area as special purpose, 45% used a milking-shed yard, 18% used races, and 19% used a 'sacrifice paddock' (30% of the respondents used more than one type of stand-off area). Surfaces of special purpose pads included: concrete (45%), post peelings (21%), sawdust or wood shavings (15%), and other materials (30%). Forty percent did not provide feed during stand-off. Sixteen percent had purpose-built shelter and 46% provided natural shelter next to the stand-off area. Twenty-four percent provided a space allowance of at least 8 m^2/cow. Farmers who considered that the space allowance on their stand-off area was too low provided an average of 2 m^2/cow. The number of cows per farm did not explain the variation in stand-off practices such as the use of concrete, feeding during stand-off, or space allowance ($P \geq 0.206$; $R^2 \leq 0.03$).

TABLE 2: The 5 most commonly cited categories of animal welfare issues on respondents' farms and the number of respondents naming the issue. For each category, a few specific examples of the issues and solutions employed are reported.

Category of animal welfare issues	number of respondents	Selection of examples	Selection of solutions
Lameness	45	• foot rot • condition of races • handling of animals	• foot baths/mats • resurface races • rebuild wet areas with rotten rock • minimise number of consecutive long walks to shed • professional hoof trimming • staff education
Nutrition/growth	40	• amount and quality of feed • starvation • weight loss after calving	• lower stocking rate • buy in feed • monitor animals
Disease/health	23	• mastitis • bloat • milk fever • staggers • rotavirus • downers • eczema	• cull high SCC • drench • magnesium • feed silage and minimise walking • vaccinate for rotavirus
Weather	20	• flood • drought • wet soil • heat stress	• plant shelter in paddocks • walk up hills in a.m., flats in p.m. • supply supplementary feed • stand-off
Calving	16	• difficult calving • reduce induction	• take bull out early • monitor calving animals • use easy-calf bulls • improve feeding around time of calving

Management during extreme weather

A variety of practices were used to manage cows during extreme winter and summer weather. For example, 75% of respondents changed grazing patterns in response to extreme weather and both land contours (60%) and good drainage (76%) were cited as important paddock features. Seventy percent had paddocks near shelter belts, and 17% of these had shelter belts near more than half of their paddocks. However, the number of cows per farm did not explain the variation in the percentage of paddocks near shelter belts ($P = 0.455$; $R^2 = 0.004$). Nearly 84% of respondents provided additional feed during cold and wet weather and 73% provided supplementary feed when the cows were not lactating. During hot weather, 33% of respondents occasionally changed milking time and 61% used paddocks closer to the milking shed (sum of 'occasionally', 'often', and 'always' responses). Only 6% of respondents provided overhead shade for cows waiting to be milked, but 40% used sprinklers at the milking shed.

Races

Cows walked 1.9 ± 0.8 (mean ± SD) km to the milking shed. Both average and maximum walking distances increased in relation to the total number of cows per farm ($P \leq 0.001$; $R^2 = 0.03$ and $R^2 = 0.04$, respectively; Figure 1). Forty-five percent of respondents used quarry metal as their race surface, 25% used pumice, and 18% used sand. Forty-six percent reported that animals waited less than 1 hour to be milked.

DISCUSSION

The owners and managers of large herds in this survey were responsible for 608 more animals on 233 more hectares than the national average. There was little difference in the average cows/hectare on survey farms compared to the national average (2.64 cows/hectare in our sample vs 2.75 cows/hectare nationally, Livestock Improvement, 2004). Average group size per farm was similar across the range of farm sizes (349 cows per group) and was highest on farms with less than 500 cows, possibly because it may be less practical to divide this number into a second group.

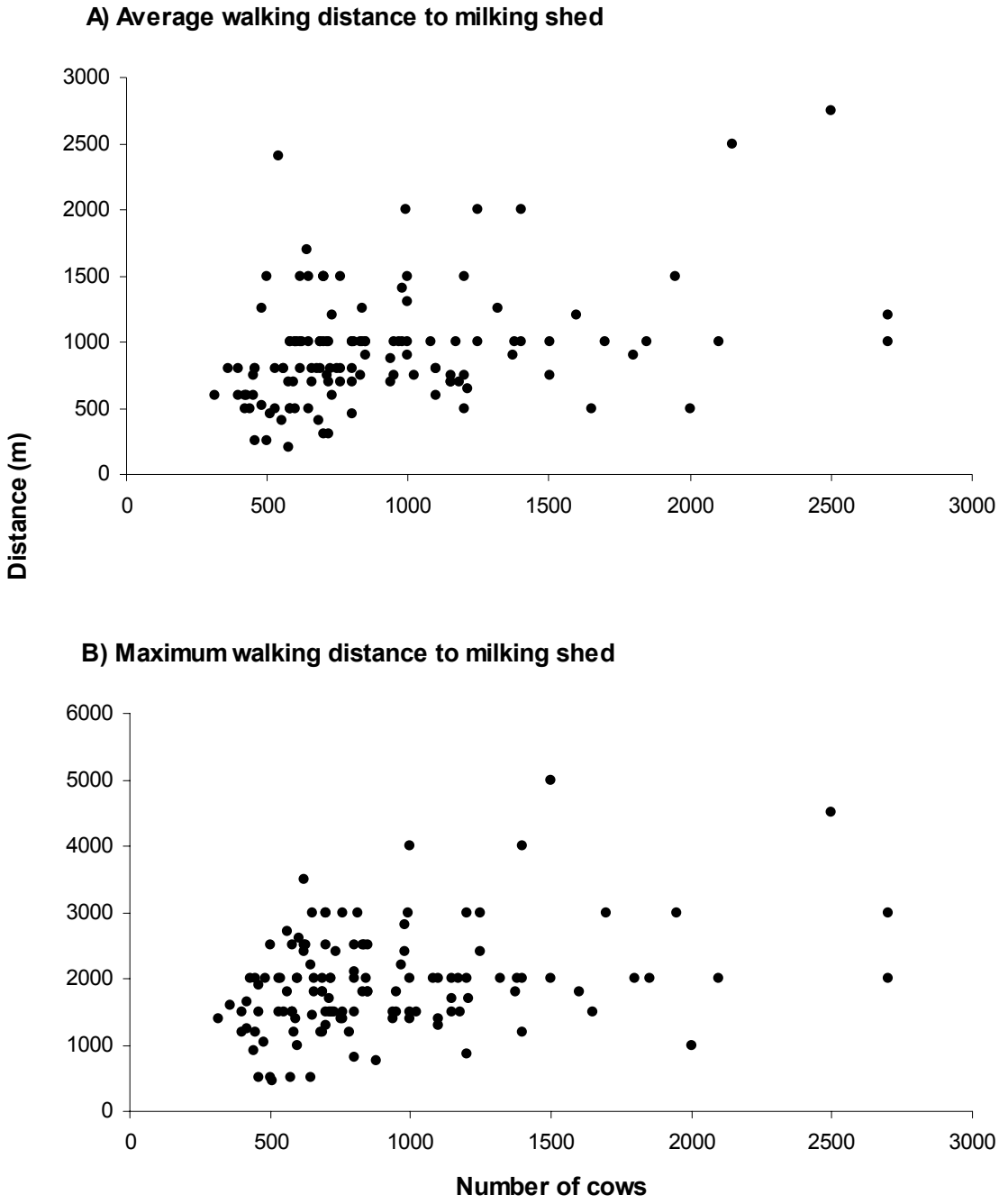
A number of welfare issues were identified including lameness, nutrition/growth, disease/health, weather, and calving, along with a range of solutions. Previous information on NZ farms is primarily concerned with animal health. For example, veterinary records rank mastitis (19%), milk fever (3.9%), lameness (3.6%), and calving (1.7%) as the main health problems on NZ dairy farms (Anderson, 1985). More recent work identified lameness (20%), mastitis (10.5%), retained placenta (8%) and metabolic diseases (1.5%) as the most common health problems in sire-proving herds (Xu & Burton, 2000). Many farmers citied lameness as a problem and this indicates that it is an important issue for large farms, although further work is required to understand how lameness, nutrition, weather, and calving problems differ with farm size.

Larger farms employed more workers, especially full-time employees. The respondents recognized that stockmanship was an important skill when hiring employees. Cows produced more milk and moved less during milking when handled gently (Rushen *et al.*, 1997) indicating that good stockmanship would benefit farmers. The ability to handle cattle quietly and confidently is an important component of animal welfare. Hitting and rough handling of cattle results in increased flight distances and higher levels of vigilance, which are indicators of fear in cattle (Munksgaard *et al.*, 1997; Welp *et al.*, 2004). Although respondents recognized the importance of stockmanship, only 11% felt that they managed highly-qualified employees. This indicates that recruitment, training, and retention of staff are important issues for the dairy industry.

Over half of the respondents used a stand-off area during periods of inclement weather and 64% of these used their stand-off area either daily or weekly. Several management practices used with stand-off areas are relevant to welfare. For example, 40% of respondents did not provide feed on stand-off areas. The lack of feed could be problematic if prolonged. Indeed, other surveys indicate that farmers use stand-off areas for 17-23 h/day (Stewart *et al.*, 2002). Further research is required to understand how short-term feed deprivation affects dairy cattle. Many farmers provided shelter near or over their stand-off pad (16% had purpose-built shelter and 46% had natural shelter) and this should help animals cope with cold temperatures (e.g. Redbo *et al.*, 2001). Forty-five percent of the respondents reported that concrete was their only stand-off surface, and this percentage is higher than the estimate of 16% concrete use on farms with an average of 316 cows (Stewart *et al.*, 2002). A higher use of concrete may be a concern as concrete surfaces reduce the time dairy cattle spend lying down (Fisher *et al.*, 2003). Cattle prevented from lying down have short-term increases in cortisol (e.g. Fisher *et al.*, 2003) and will perform an operant task in order to lie down (Jensen *et al.*, 2004). These findings indicate that lying down is important to cows and that the use of concrete surfaces for prolonged periods reduces the welfare of dairy cattle. The amount of space provided per cow on stand-off areas is also likely to influence welfare. Twenty-four percent of respondents reported space allowances greater than or equal to 8 m^2/cow, and further research is required under NZ conditions (e.g. few hours of stand-off) to assess if this is adequate. Farmers who considered that the space allowance on their stand-off area was too low provided an average of 2 m^2/cow. Research with permanently housed cattle found that providing only 2 m^2/cow resulted in reduced feed intake and daily weight gain, indicating reduced animal welfare (reviewed by Hickey *et al.*, 2003). In addition to stand-off, a variety of practices were used to manage cows during extreme winter weather. Nearly 84% of respondents provided additional feed during cold and wet weather. However, a reduction in time

spent feeding (and likely feed intake) has been shown to indicate cold stress (e.g. Malechek & Smith, 1976). Further research is required to understand how farmers can best provide additional feed to minimise the effects of reduced feed intake in winter weather. In addition, most farmers used paddocks with good drainage during wet weather which is likely to be beneficial for cattle, as they prefer dry lying surfaces (Keys *et al.*, 1975). In addition, 70% of respondents have at least some paddocks near shelter belts, and cattle have been shown to seek out shelter in and near trees in response to winter weather (Redbo *et al.*, 2001).

FIGURE 1: Average (A) and maximum distances (B) walked to the milking shed in relation to total number of cows per farm.



Shelter and shade also provide benefits for cattle in hot weather. Cows with access to shade in summer have significantly lower respiration rates and core body temperatures (Blackshaw & Blackshaw, 1994). During NZ summer conditions, dairy cattle readily used shade if provided and produced 0.5 kg per day more milk than those without shade (Kendall *et al.,* personal communication). Regardless of whether shade was provided, cows reached similar core body temperatures after walking to the shed for afternoon milking (Kendall *et al.,* personal communication). Cooling cows with both fans and sprinklers after the walk to the milking shed reduced rectal temperatures and respiration rates in the short term, and vaginal temperatures for 2-4 hours after milking (Araki *et al.*, 1984; Valtorta & Gallardo, 2004). These findings indicate that the 40% of respondents using sprinklers in the yard before milking are effectively cooling down their cows.

Finally, the walk to and from the milking shed can influence the animals in several ways, including lameness and heat stress. Cows on larger farms walked further, however, farm size accounted for only 3-4% of the variation in walking distance. Other factors including farm shape, topography, placement of the milking shed, and position of road underpasses affect walking distances and may explain the variation in distances reported. Handling during the walk to the shed can influence prevalence of lameness: farms with patient handlers have fewer hoof injuries (Chesterton *et al.*, 1989). After the walk to the shed, 46% of respondents' animals waited less than 1 hour to be milked. Research into the effects of walking distance, waiting time at the shed, and the range of races surfaces is required to understand the animal welfare implications of these practices.

In conclusion, the respondents identified a range of animal welfare problems and solutions on large dairy farms. Many farmers demonstrated awareness of animal welfare issues and implemented management practices that likely improve the well-being of their stock. Further research is required to understand the extent and severity of the issues identified by farmers and the animal welfare implications of specific management practices.

ACKNOWLEDGEMENTS

We thank the NZLHA, the farmers that completed our survey, the Waikato focus group for their suggestions, John Wilson for conducting the statistical analysis, and Lyn Hanes for coordinating data entry. This research was funded by Dairy InSight and FRST.

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