

Impacts of New Zealand dairy housing systems on dairy cow welfare

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Contents	Page
1. Introduction	3
2. Methods	4
3. Results	5
3.1. Veterinarian Survey	5
3.2. Producer survey	6
3.3. Producer Workshops	7
4. Summary and Conclusions	10
5. Appendices	21

Executive Summary

There is little information available on the welfare implications of housing for cattle under New Zealand (NZ) conditions. This investigation of housing systems in NZ was aimed at providing preliminary information about the scope and impacts of housing for dairy cattle and consisted of three parts; a veterinary survey, a producer survey and two workshops. These elements provided information about the following three areas: a) prevalence, types of housing and regional differences; b) management practices; c) perceptions of advantages, disadvantages and impacts on animal welfare.

Overall, this project confirmed that the number of dairy farmers using housing in New Zealand is still very small (no more than 3 percent). There is some indication that for many producers, use of housing facilities is a relatively new practice (average of 2.7 seasons reported). Management decisions were generally focussed around weather or season/time of year, with multiple goals relating to pasture protection, cow comfort, environment/effluent management, and stocking rate/production. All producers surveyed used their housing system in winter, with half also using it in the summer. Provision of access to pasture varied, with some cows on pasture at night, some for a fixed time during the day, and some not at all.

Veterinarians expressed concern about specific health and welfare issues, in particular mastitis, dirtiness (possibly an indicator of overstocking), injury (other than hoof) and lying/resting times. Problems in these areas were also reported in the producer survey. Key management practices relevant to animal health and welfare that were discussed in the producer workshops and highlighted by both surveys centred on:

- cow adaptation;
- exercising and provision of access to pasture;
- removing cows at risk (e.g. lame, not adapting);
- monitoring/inspections;
- calving.

Three potential, broad-level, welfare risks associated with indoor housing were highlighted by dairy producers; 1) a lack of dairy stockpeople with knowledge of housing systems, potentially reducing level of husbandry care, 2) risk of cost-cutting by some producers if housing becomes an environmental management requirement, rather than a voluntary decision. This risk may lead to inadequate care and maintenance of the housing system, potentially impacting cow welfare, 3) any increase in numbers housing systems may lead to an increased demand for straw for bedding beyond supply, potentially increasing welfare risks associated with inadequate flooring (e.g. hoof injury, reduced lying times).

RECOMMENDATIONS:

1. The information in this document can be used to inform producers about common issues to expect when housing cows and to support formation of initial best practice guidelines.
2. The findings in this report highlight the potential importance of management around the introduction and subsequent adaptation of cows to housing systems. A better understanding of key animal-based indicators for identifying at-risk cows during adaptation may better equip producers to successfully manage cows during this critical period.
3. Mastitis management to reduce risk in housed cows was highlighted in this investigation. Preventative management through dry cow treatments (e.g. teat sealing) and improved bedding management techniques need to be promoted.
4. Inadequate lying facilities for housed cows is an important issue and one that may lead to injury problems.

5. More detailed information about stocking rates, bedding/substrates, and the value of access to pasture for cow welfare would assist with the refinement of future best practice guidelines.

1. Introduction

In New Zealand, housing of dairy cows is not a common management practice, however it is becoming increasingly utilised for a variety of purposes. Some of the major potential benefits of dairy housing, identified in a 2007 Dexcel/Dairy Insight report, were pasture protection, effluent management, cow health and welfare, supplementary feed management and production benefits¹. However, there is a dearth of scientific literature on the welfare implications of housing for cattle under New Zealand conditions, and the full animal welfare implications of housing management practices and facilities on New Zealand dairy farms are yet to be identified. This research served to provide an initial overview of the types of housing systems currently used in New Zealand, the management practices associated with their uses, and highlights potential animal welfare advantages and disadvantages, including areas where further research is required.

2. Methods

This investigation consisted of 3 parts; a veterinary survey, a producer survey and two workshops. The veterinary survey was designed to capture information about the prevalence of different housing systems and to gather information on vets' perceptions of potential animal welfare risks associated with dairy housing. The producer survey was aimed at gathering information about how the housing systems were being used, factors that influence use, animal-associated issues, and producer perceptions about impacts on costs, pasture, animal health and production. The workshops were designed to gather information from producers who were recommended by veterinary and industry professionals as running "best practice" systems in relation to dairy housing. These workshops had a specific focus on perceptions of management factors relevant to cow comfort, and potential cow welfare issues associated with housing.

The veterinary survey (Appendix 1) was posted or emailed to a total of fifteen veterinarians identified through DairyNZ contacts as likely to service clients with a variety of housing systems, of which twelve responded. This survey categorised artificial housing systems as: Herd Home™, cubicle housing, deep litter (roofed), or constructed shelters with no roof (with cubicles, slats and/or deep litter substrates employed).

The producer survey (Appendix 2) was carried out via phone interviews that were conducted by one interviewer with expert knowledge of the dairy industry. As there is no ready means available to gather a complete list of all producers using housing systems throughout NZ, potential respondents were identified through veterinary and DairyNZ contacts. A total of 30 producers were identified and asked if they would volunteer to participate. A time was then arranged for a follow-up call to conduct the interview. All producers that were contacted took part in the survey except for six, who were excluded as their systems did not fit the criteria for a housing system which was set at a minimum of constructed shelter with at least 3 windbreaks and flooring or substrate provided. A combination of rating scales, multiple answer options and open-ended questions were used to target four areas of information; description of the housing and how it is being used, factors that influence how it is used (open ended questions were used to gather this information, in order to maximise breadth of responses), animal associated problems encountered with use (rating scales were used to gather information about perceptions of degree), perceived influence of the housing on costs, pasture, animal health, and production (rating scales were used to access range of perceptions).

Two producer workshops were conducted; one in Southland with 7 producer participants (one of whom was a respondent in the producer survey) and one in Waikato with 5 producer participants (one of whom was a respondent in the producer survey). The workshops were run by an experienced facilitator and involved discussion around the following topics: perceptions of animal housing issues, management practices that promote/optimize cow comfort in housing systems, what cows need to be comfortable in housing environments, and how decisions are made about when to house cows.

¹ Longhurst, B., Binnie, B., McDermott, A., Oliver, L. (2007). Benefits of housing or partially housing NZ dairy cows. Dexel and Dairy Insight report.

3. Results

3.1. VETERINARIAN SURVEY

Twelve respondents in the veterinary survey provided information from a pool of 956 dairy farms. Of these, 3 percent (29 farms) were reported to be utilising some form of artificial housing (Fig 1). The types of housing used were Herd Homes, cubicle housing with and without a roof, deep litter, and constructed shelter with bedding and no roof (Fig 2).

Dairy farm locations were categorised into the geographical regions displayed in Figure 3. Data were obtained for the following regions: Auckland, Waikato, Bay of Plenty, Manawatu, Wairarapa, West Coast, and Southland. The highest number of responses, both in terms of absolute number of cows and the number of clients serviced per veterinarian, was from the Waikato, followed by the West Coast and Southland respectively.

Although the dataset was relatively small, a number of regional differences could be identified. Use of pasture all year round as a management option was highest in Auckland and lowest in Southland with races and sacrifice paddocks most common in the Manawatu and West Coast (Table 1). Routine use of feed and stand-off pads appeared to be limited to the combined Auckland, Waikato and BoP region, while cropping and winter housing were most common in Southland (Table 1). Deep litter and bedding systems were the most common in Southland, whereas Herd Homes and cubicle systems were the most common housing types recorded in the West Coast sample (Table 2). Some use of un-roofed bedding areas and cubicles were also seen in the Waikato.

Further to providing information about types of housing and management systems used by clients, veterinarians were also asked to rate indoor systems in comparison to pasture-based management on the following specific issues: aggressive behaviour, calving issues, body condition, dirtiness, hoof health, other injury, mastitis, thermal challenge, state of newborn calf and sufficient lying time. Figure 5 summarises the veterinarian rankings in relation to 5 artificial housing systems. According to these data, the main potential issues for cow welfare are mastitis, dirtiness, hoof health (at least in some systems), and other injury. Figure 6 shows veterinary rankings of the degree to which specific issues relating to indoor housing are a problem. There is some concern that lack of exercise can be a problem, and that underfoot conditions and ventilation are somewhat of a problem in deep litter systems. The main advantages of indoor housing are perceived to be better body condition, better lying times, reduced thermal challenge, and, in some cases, improved calving outcomes. It should be noted that veterinarians still considered lying times as a potential issue in relation to indoor housing because a combination of skilled management and appropriate bedding materials are almost certainly important for ensuring appropriate resting time for cows indoors.

In general, veterinarian comments suggest a need for input recommendations and guidelines relating to space requirements (as highlighted above) and provision for mastitis management/preventative measures (e.g. more intensive dry cow treatments, improved hygiene, teat sprays for lactating cows). Further, some respondents also commented that provision for access to pasture may be important, together with appropriate guidelines for best practice for concurrent pasture use.

3.2. PRODUCER SURVEY

Data were collected from a total of 24 respondents. Fifteen Herd Home systems, 4 cubicle systems and 5 deep litter/covered shelter systems were represented in the sample. Overall, respondents had used their current housing systems for an average of 2.7 seasons (range 0.5-14 seasons) and listed their reasons (more than one reason per respondent was possible) for using a housing system as environmental/effluent management (25 percent), animal health/welfare (42 percent), pasture protection (42 percent) and stocking rate/production goals (21 percent; Table 3).

a) Occupancy and use of housing

Seventy-four percent of respondents reported using their housing system for lactating cows and 26 percent for dry cows only (Table 3). Half of respondents used their system in winter months only and 50 percent used it in both summer and winter. When using the housing in summer, 54 percent shut the cows in during the hottest part of the day, and the remaining 45 percent allowing the cows to have voluntary access. In winter, all respondents shut cows in the housing facility, with 79 percent allowing cows some time on pasture (Table 3). Of these, approximately 20 percent reported letting cows out at night. While in the housing facility, cows were reportedly monitored on average 2.1 times per day (range 1-4). A total of 10 out of 29 farms use their housing facility for calving.

b) Management strategies

Farmers were asked about factors that impacted on their decision to start putting cows into their housing facility (more than one factor per respondent was possible). Weather was reported as a decision making factor by 63 percent of respondents (46 percent cold weather, 17 percent hot weather), with 42 percent using time of year/season (e.g. “moved into housing system once they are dried off”, “start using it mid May”) and 42 percent using pasture condition (e.g. “as soon as pasture becomes too wet”) as cues for commencing housing facility use (Table 3).

Factors affecting decisions to stop housing during winter were all seasonal-based, including: weather (e.g. “once the weather starts improving”), 46 percent; pasture (e.g. “when paddocks dry up”), 20 percent; and, beginning of lactation, 16 percent (Table 3). Twenty-five percent of respondents reported that they never stopped using their housing facility all year round for; supplementary feeding, bad weather events or providing shade during summer.

Farmers were also asked about perceptions in relation to how their cows coped with being housed. A quarter of respondents (25 percent) reported the importance of cows staying in the facility because there was no other better management option for their farms (e.g. “the cows just have to get used to it” “keep using it regardless, can’t be influenced by the cows”). Thirty percent reported that the cows were ‘happy’ in the housing facility and/or stayed there willingly even when access to pasture was provided. Just over 16 percent of respondents closely monitored their cows and removed those that had any health or welfare issues (e.g. lameness, not lying down, bullying). Some of these farmers also let the cows out to walk/exercise, and used this as a time to check for sick or injured animals. Some farmers (12 percent) expressed discomfort with having to house their cows during winter.

c) Animal health and welfare issues

Respondents were asked about issues they had experienced with their housing systems in relation to animal health and welfare both in the first seasons of use and in subsequent seasons. As shown in Figure 4, injury (38 percent), dirtiness (38 percent), mastitis (20 percent), and hoof health (17 percent) were the most commonly reported health related

problems, with a minority reporting problems with calving and lying/resting times (8 percent, respectively). Two farmers reported an initial problem of cows becoming too fat during their first use of the facility, presumably as result of (mis)adjustment of feed management strategy in the new system.

Some farmers reported that use of teat sealing was successful in reducing mastitis once cows were moved into the housing facility. One farmer reported injuries a problem in the first year of use, but believed a reduction in stock numbers in the housing facility solved this problem in subsequent seasons. Use of straw bedding in subsequent seasons was also highlighted as a solution to injury problems. One farmer reported cows under strain due to concrete flooring but that “they had to get used to sleeping on concrete”. Two respondents specifically commented that cows needed time to adapt to lying down in the facility. Teat damage/tearing was a specific injury type mentioned by 3 respondents which may be associated with this adaptation period. Sixteen percent of respondents reported no health or welfare problems.

d) Perceived benefits of housing

There was some indication (Table 4) that overall farmers perceive benefits from their housing system for their business in terms of production, pasture management and animal condition (increases reported by 79, 83 and 83 percent of respondents, respectively) and decreases in labour costs and animal health costs (reported by 37 and 58 percent of respondents, respectively). Overall, 33 percent of respondents of the producer survey expressed an interest in expanding the housing system to include either more or bigger facilities.

3.3. PRODUCER WORKSHOPS

Information gained from workshop discussions has been divided into categories relating to cow adaptation, space requirements, inspection/monitoring, voluntary access, calving, and producer perceptions of housing.

a) Cow adaptation

There was general agreement that cows need time to adapt to an indoor system. Initially cow flow into the facility is difficult due to novelty of the environment. Cows can be familiarised with the indoor facility prior to their first lactation by feeding them in the facility before calving. Similarly, at the beginning of each period of use cows can be moved indoors for feeding and overnight housing at first, before moving to 24 hr housing. There may be issues around cows not resting sufficiently to meet their requirements during these initial introductions to the facility, but over time cows appear to become familiarised enough with the environment to rest sufficiently (assuming space requirements are adequately met). It should be recognised that there may be some cows that do not adapt. Thus, special vigilance during initial usage of housing facilities is important to ensure cows that are not resting adequately after a period of familiarisation are identified and removed.

b) Space requirements

In terms of feed space available per cow, producers at the workshops suggested that the best situation was to have enough space to allow all cows access at all times. However, 300mm per cow was suggested as workable if feed is available at all times (i.e. provided ad libitum).

Producers suggested that recommendations around other (i.e. non-feed related) space allowances per cow are needed. This was also strongly highlighted in the survey of veterinarians with every vet with experience with housing systems commenting that they would like to see space requirement recommendations and best practice guidelines developed. Further, in relation to cubicle housing, there is a need to provide recommendations for

cow/cubicle ratio and cubicle size. However, there are also outcome-based measurements that can assist with determining if stocking density is an issue or not in any given system (e.g. number of cows lying down at any one time). The dirtiness of cows, and in particular location of the dirt/faeces on the cow, may also provide some information about space; if cows that are lying down have been defecated on, there is probably not enough space available to accommodate lying requirements.

c) Inspections/monitoring

It was very clear from the producer workshop that monitoring of cows in indoor facilities is important. General surveillance of cow behaviour in terms of expected proportions of the herd behaving as typically observed on pasture (i.e. feeding, resting, idling), monitoring for injuries and sickness, and problems adapting are all important. Especially as cows become quieter due to closer human-animal interaction, more vigilance is required to detect such issues as lameness (because cows won't naturally get up and move away when the stockperson approaches). One method for detecting lameness and other problems is to walk all the cows out of the facility every few days around a portion of the farm tracks and note which cows lag behind or come back into the housing system last; these cows may need closer inspection. Recommendations and best practice guidelines for monitoring, including frequency and timing, and cues for identifying at-risk animals are required.

d) Voluntary access

Some producers expressed a belief that provision of voluntary access to either pasture or farm tracks was a beneficial management strategy providing exercise and assisting with inspections as described above.

e) Calving

Potential issues with calving indoors were discussed and included heavily pregnant cows becoming cast, mismothering, and ensuring adequate bedding and non-slip surfaces. There is a preference by producers to be able to calve outdoors if the weather is suitable and only calve indoors if weather dictates. Due to the decrease in fear of humans resulting from closer human-animal interactions in indoor systems, separating the calf and cow poses a potentially greater risk to farmers if cows show increased aggressive maternal responses (as compared with cows in outdoor systems, which may have greater fear of humans).

f) Producer perceptions

The three major advantages identified by producers in using a housing system is the ability to protect pasture from damage during wet conditions, the ability to secure a good feed supply to cows during wet weather and improved effluent management. Further, reduced supplementary feed wastage was a perceived benefit of housing systems, as was the increased ease of monitoring cows and early detection of health issues. The ability to house stock enabled some farmers to increase the overall stocking rate on their farms, due to the improved pasture utilisation resulting from less damage to pasture over the winter. In some circumstances, housing also enabled producers to keep cows on the farm during winter, which they would otherwise have not been able to do. Benefits from avoiding having to winter off cows in another location include better control of husbandry and feeding and that pregnant animals do not need to be transported.

Some potential, broad-level, welfare risks associated with indoor housing were highlighted by producers during the workshops, including:

1. The problem of lack of knowledgeable stock people available to the expanding dairy industry is exacerbated in the case of indoor housing because knowledge of monitoring cows in housing systems is even more limited within NZ.
2. If the industry is required to use indoor housing to comply with environmental requirements, some producers may take a cost cutting approach to providing housing because they didn't voluntarily change systems. Compared with outdoor systems, cost-cutting within indoor systems may hold a greater animal welfare risk.
3. Availability of bedding materials will need to be addressed if indoor systems become more widespread. For example, the requirement for straw in the average housing system is greater than the requirement for grain, meaning that if demand increases significantly, it could be bedding that becomes a limiting factor, rather than feed.

4. Summary and Conclusions

This investigation consisted of three parts; a veterinary survey, a producer survey and two workshops. These elements were designed to provide information about the following three areas: a) prevalence, types of housing and regional differences; b) management practices; c) perceptions of advantages, disadvantages and impacts on animal welfare.

In general there was substantial agreement between veterinarians and producers in terms of their observations comments and concerns relating to cow management and welfare issues in housing systems. These commonalities are noted in the following summary.

- a) **Prevalence, types of housing and regional differences:** Overall, this project confirmed that the number of dairy farmers using housing in New Zealand is still very small. Although relatively small in sample size, indication from the veterinary survey is that no more than 3 percent of dairy producers are using housing systems (as defined in this survey). There is some indication that for many producers, use of housing facilities is a relatively new practice (average of 2.7 seasons reported in the producer survey).
- b) **Management practices:** Data from the producer survey indicate that current decision making about managing housed dairy cows is generally focussed around weather or season/time of year, with motivation relating to either pasture and/or cow comfort. All producers surveyed used their housing system in winter, with half also using it in the summer. Provision of access to pasture was varied, with some cows on pasture at night, some for a fixed time during the day, and some not at all.
- c) **Perceptions of advantages, disadvantages, and animal welfare impacts:** In general, producers believe their housing system has impacted positively on their business. The three major advantages raised by producers in using a housing system were pasture protection, ability to secure a good feed supply to cows during wet weather and improved effluent management.

Both veterinarians and producers (during the workshops) expressed similar beliefs about the need for recommendations about space allowances in housing systems. Veterinarians expressed concern about the following specific health and welfare issues, which were also the three most commonly reported issues by farmers in the producer survey:

a) *Mastitis*

Preventative measures such as teat sealing, were highlighted as useful in the producer surveys, with veterinarians also supporting preventative measures, as well as provision of appropriate bedding and bedding management to maximise hygiene.

b) *Dirtiness*

Highlighted in producer workshops as a potential indicator of overstocking (cows lying down may get defecated on due to crowded conditions).

c) *Injury (other than hoof)*

These problems may also be associated with overstocking, and/or with lying down on concrete or rough surfaces.

A number of other key management areas were highlighted by both veterinarians and producers:

a) Cow adaptation

Gradual introduction to the housing environment may be a useful management tool to optimise cow adaptation. Vigilance in monitoring is important and insufficient lying time appears to be an important indicator of maladaptation. Important factors to encourage lying were discussed around provision of adequate bedding, careful management during adaptation, ongoing monitoring, and including provision for managing cows that do not adapt outside of the housing system.

b) Exercising and provision of access to pasture

The importance of exercise out of the housing facility is not clear; however the provision of an opportunity to inspect animals and identify sick or lame cows is an important outcome of a regular 'outing' for cows kept in housing systems.

c) Removing cows at risk (e.g. lame, not adapting)

Flexibility within the system to accommodate cows that don't adapt or that have health/welfare problems that are exacerbated by the housing environment is probably very important.

d) Monitoring/inspections

Housing provides better opportunity for monitoring cows due to intensified feed management, easy access for the producer, and potentially smaller flight distances in cows resulting from a reduced fear of humans. However, a possible flow-on effect from this may be to ensure all cows are observed standing and moving around, as reduced fear of humans may lead to cows remaining lying when approached.

e) Calving

While there are clear benefits to calving indoors, not all producers use their housing facility for calving (10 out of 29 in the producer survey), veterinarians report mixed perceptions about whether this is more desirable than calving at pasture (forty percent of veterinarians surveyed believed that cows were worse-off calving in housing compared with pasture and 20 percent believed that calves were worse-off in housing compared with pasture), and some producers reported a preference to calve outside if weather permitted.

RISKS FOR INDUSTRY

Three potential, broad-level, welfare risks associated with indoor housing were highlighted by dairy producers during the workshops. A lack of knowledgeable dairy stock people for the expanding industry is particularly problematic in relation to housed cows because knowledge of housing systems in NZ is limited. Second, some producers may take a cost cutting approach to housing if it becomes an environmental requirement, with compliance as a motivator rather than improvement of their business. Compared with outdoor systems, cost-cutting within indoor systems may hold a greater animal welfare risk. The third issue raised was related to potential increases in housing systems leading to demand for straw (for bedding) increasing beyond supply.

LINKS BETWEEN MANAGEMENT FACTORS AND HEALTH / WELFARE ISSUES

The current study was not designed in a way that allowed identification of cause and effect relationships between management and health or welfare issues, however, there are some possible linkages:

- Mastitis may be reduced through provision of appropriate bedding.
- Appropriate management of cow adaptation may assist with ensuring adequate lying times, which may in turn reduce lameness and hoof health issues.
- Lying times may be improved through provision of adequate bedding.
- Appropriate stocking rates may assist with reducing injury and lameness and promoting adequate lying times. Recommendations relating to stocking rates for indoor housing may be useful for the industry.

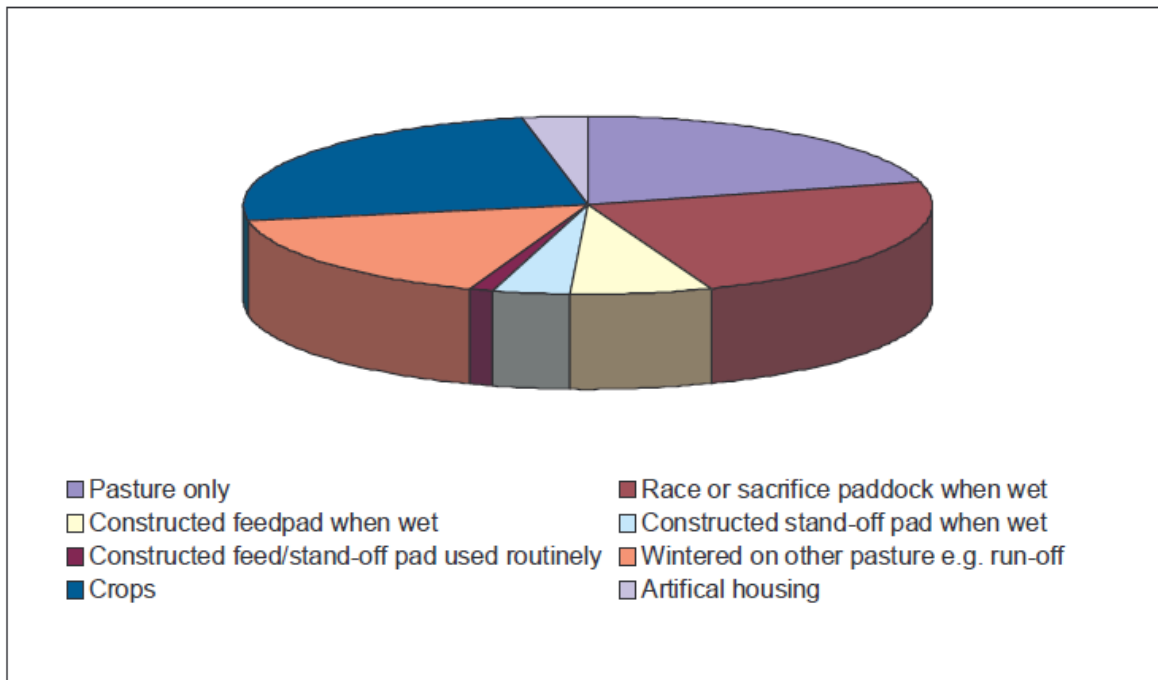


Figure 1. Proportion of total veterinary clients (n = 956) using each of the 8 identified housing/wintering systems.

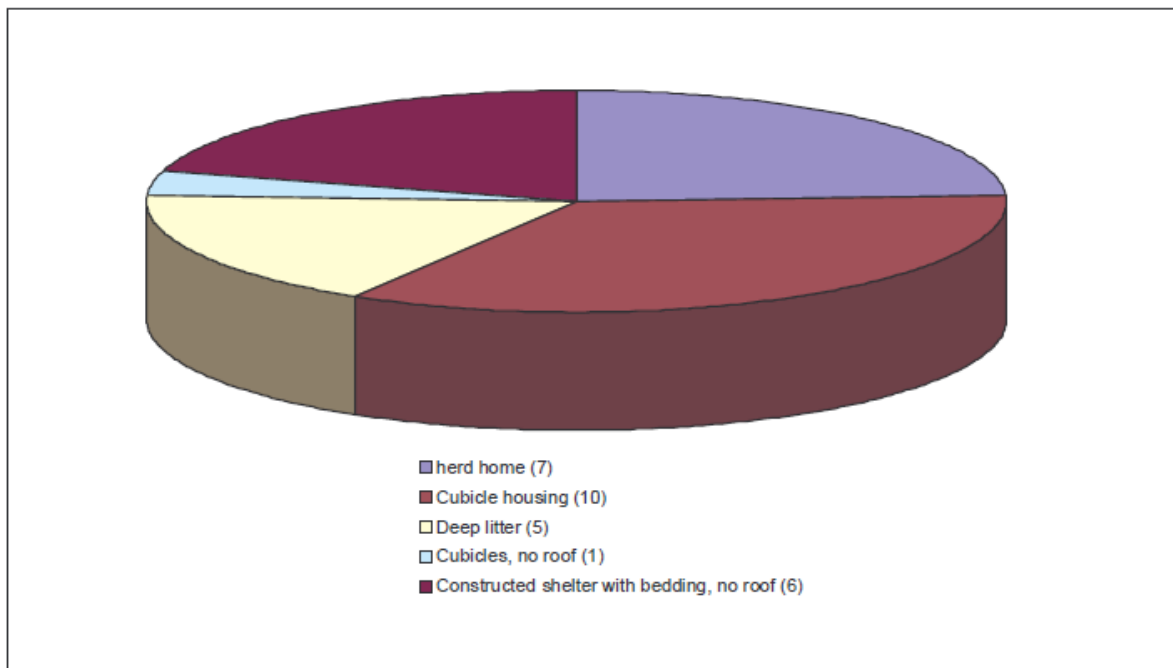


Figure 2. Proportion of veterinary clients with artificial housing systems (n=29) using each of the 5 identified systems.

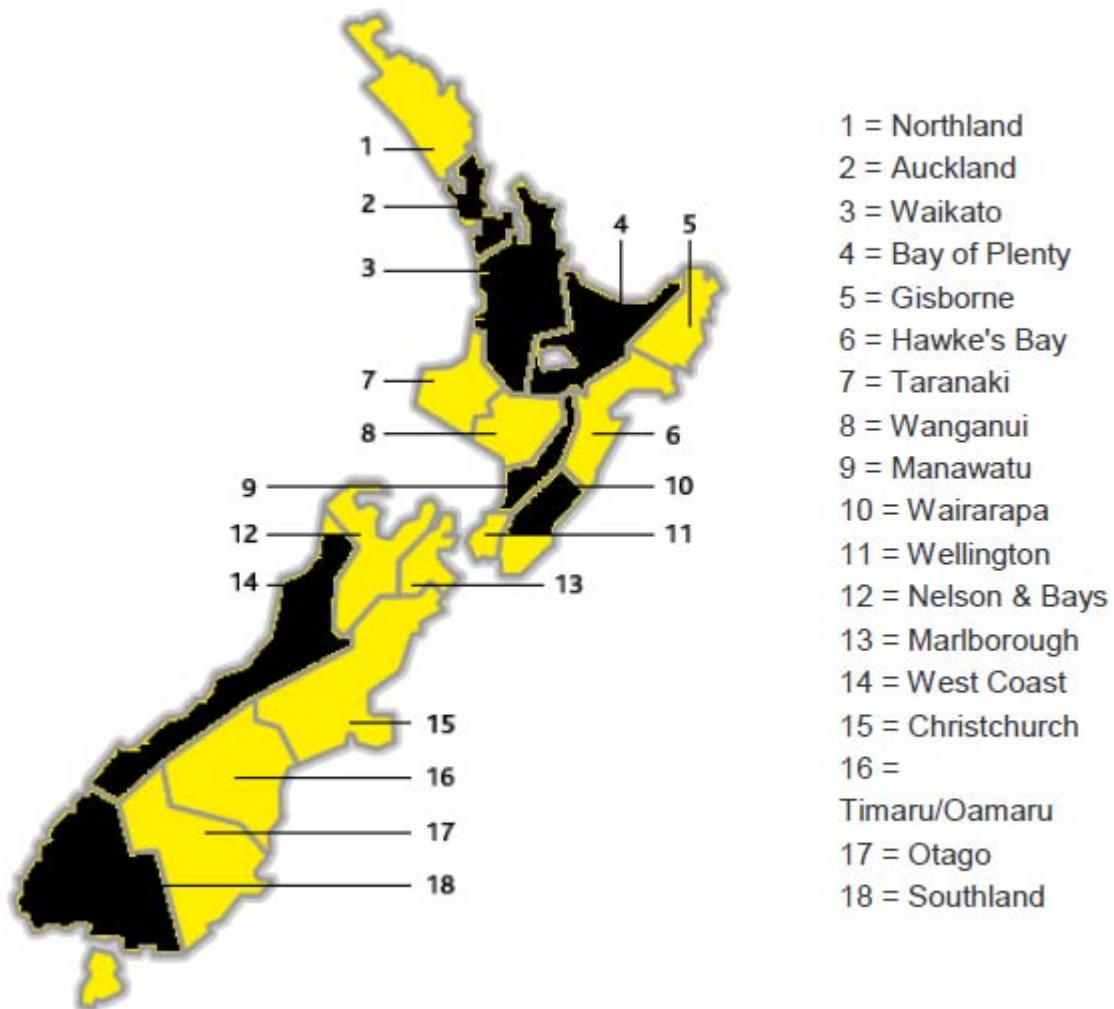


Figure 3. Map of New Zealand showing regional divisions with those from which data were obtained through the veterinary survey highlighted in black.

Table 1. percentage of clients from each region using each type of identified management system

Region	No of Respondents	No of Dairy Clients	Management System								
			Pasture	Race/ Sacrifice Paddock	Feed Pad (occasional)	Stand Off Pad (occasional)	Feed Pad/Stand Off (routine)	Run-Off	Crop	Housed	Total
Auckland	1	60	57%	17%	7%	2%	2%	15%	2%	0%	102%
Waikato	4	293	26%	17%	3%	0%	2%	25%	25%	0%	98%
BoP	1	75	47%	13%	4%	3%	4%	24%	4%	1%	100%
Manawatu	1	60	17%	50%	17%	0%	0%	17%	0%	0%	101%
Wairarapa	1	50	40%	12%	4%	0%	0%	24%	20%	0%	100%
West Coast	2	245	9%	48%	14%	12%	0%	4%	9%	4%	100%
Southland	2	173	1%	0%	0%	0%	0%	16%	74%	9%	100%
TOTAL	12	956									

NB. Figures are rounded, so row totals may not add to exactly 100 percent

Table 2. Number of clients from each region using a specific housing system

Region	No of clients	Type of Housing					
		Herd Home	Cubicle	Deep Litter	Cubicle (3 walls, no roof)	Bedding (3 walls, no roof)	Slats (3 walls, no bedding, no roof)
Auckland	0	0	0	0	0	0	0
Waikato	2	0	1	0	0	1	0
BoP	1	1	0	0	0	0	0
Manawatu	0	0	0	0	0	0	0
Wairarapa	0	0	0	0	0	0	0
West Coast	10	4	6	0	0	0	0
Southland	16	2	3	5	1	5	0
TOTAL	29						

Table 3. percentage of respondents in producer survey reporting reasons for use of their housing system, how the system is used, and factors affecting commencement and cessation of housing use.

	Herd home (%)	Cubicle (%)	Other (%)	All combined (%)
Producer reasons for use				
Environmental (e.g. effluent management)	27	50	0	25
Animal (e.g. cow health)	47	25	33	42
Pasture (e.g. prevention of damage)	40	50	50	42
Stocking rate/production	27	25	0	21
Animal occupancy factors				
System used for lactating cows	87	75	17	74
System used in winter only	40	50	50	50
Cows shut in during winter	100	100	100	100
Cows shut in during summer	33	100	100	54
Cows are let out to graze (winter)	80	75	60	79
Management factors:				
1. Triggers to use housing:				
Inclement weather	66	50	33	63
Season/time of year	40	75	0	42
Pasture protection	33	50	20	42
2. Triggers to stop using housing:				
Weather improvement	33	50	67	46
Pasture saturation reduced	6	50	50	20
Start of lactation	6	25	16	16
Never stop using housing	33	0	0	25

Table 4. percentage of respondents reporting perceived increases and decreases in labour, animal, production, pasture factors attributed to use of the housing system on their own farm

Perceived impact	Labour costs (%)	Animal health costs (%)	Overall costs (%)	Production (%)	Pasture condition (%)	Animal Condition (%)
Decreased	37	58	33	0	0	0
Increased	17	13	29	79	83	83
No effect	37	20	29	8	8	4

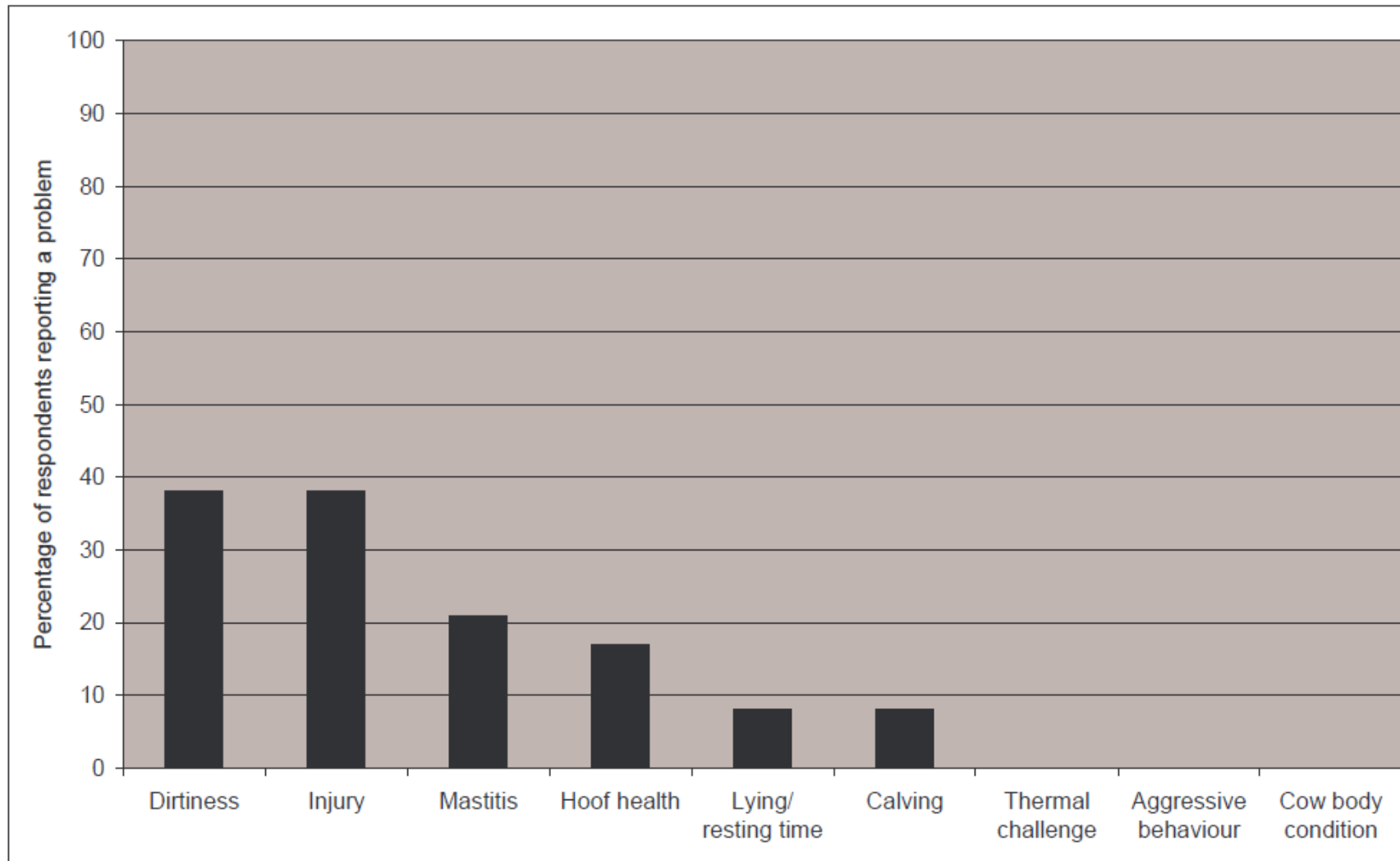


Figure 4. percentage of respondents in the producer survey reporting issues with dirtiness, injury, mastitis, hoof health, lying/resting times, calving, thermal challenge, aggressive behaviour, and cow body condition.

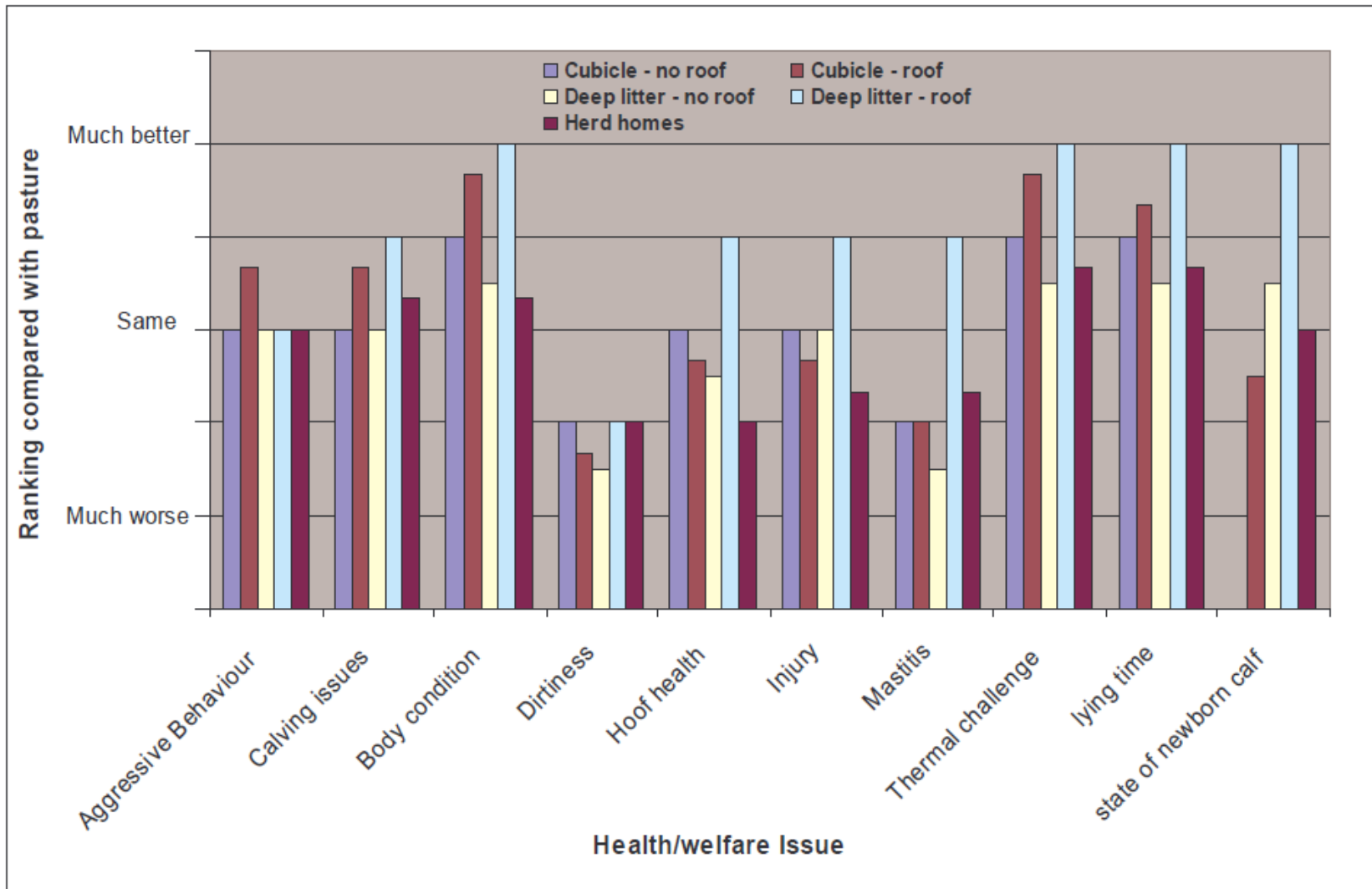


Figure 5. Mean veterinary ranking of specific health and welfare issues in each category of dairy housing system compared with pasture based management

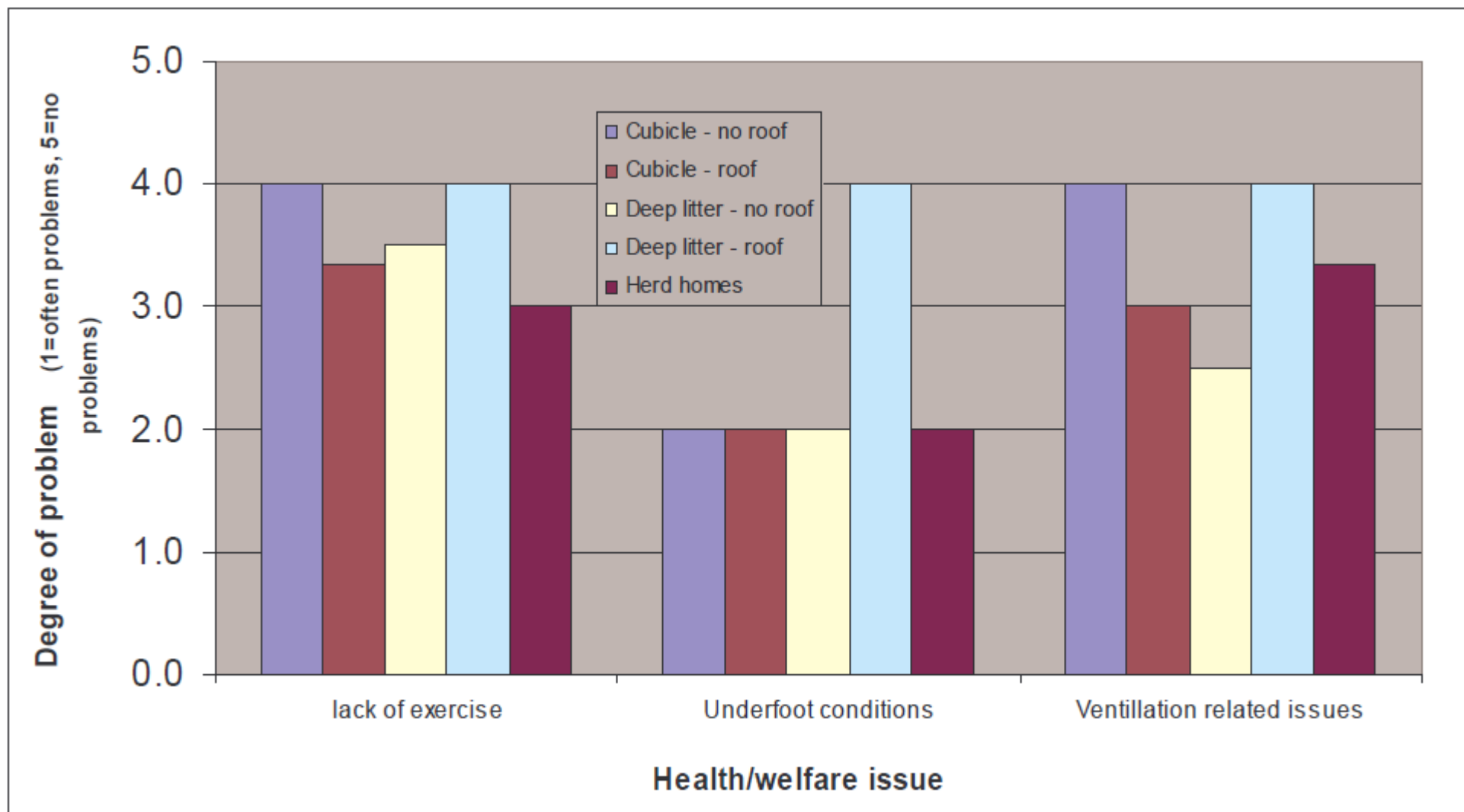


Figure 6. Rating of perceived severity of problems observed by veterinarians in housing systems related to lack of exercise, underfoot conditions and ventilation related issues.

5. Appendices

Appendix 1. Veterinarian Survey



Winter Housing Questionnaire

Thank you for assisting us with our research project. This project is funded by MAF and DairyNZ (formerly Dexcel/Dairy InSight) with the objective of gathering specific information about the prevalence of winter housing systems for dairy cattle and to survey their potential benefits and disadvantages.

BY COMPLETING AND RETURNING THIS SURVEY YOU WILL RECEIVE A GIFT VOUCHER!

Name:		Practice:	
Location:		Number of dairy farmers that you service:	

1) Below is a list of common winter management systems used by New Zealand dairy farmers. Please identify the approximate number of your clients that use each type:

Pasture Systems with cows kept on the milking platform	No. of clients
Exclusively kept on pasture	
Use races, sacrifice paddock or other similar area during wet periods	
Use a constructed feed pad during wet periods	
Use a constructed stand off pad (i.e. provide a bedded area) during wet periods	
Use a constructed stand off pad/ feed pad routinely (not just during wet periods)	
Pasture Systems with cows wintered off the milking platform	
Wintered on other pasture grazing i.e. a run-off	
Wintered on crop i.e. brassicas	
Artificial housing systems (i.e. constructed or partially constructed shelter with either windbreaks (natural or artificial) and/or a roof used, at a minimum, for routine overnight shelter)	

2) For those clients with artificial housing systems, please indicate the numbers that use:

NOTE – If you have no clients currently using artificial housing systems, please continue to Question 3	
Type of system	No. of clients
Herd Home™	
Cubicle housing (enclosed by at least 3 walls and a roof)	
Deep litter (enclosed by at least 3 walls and a roof)	
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with cubicles	
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with deep litter (e.g. straw, post peelings, wood chips, etc)	
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with slats	

3) In terms of specific animal health and welfare issues, please indicate what you are seeing in cows that are wintered in different **artificial housing systems** (described above) including **stand-off pads**, compared with pasture, using the numerical scoring system below:

NOTE – If you have no clients currently using any of these systems, please leave that column blank

	1 Much worse than pasture	2 Worse than pasture	3 The same as pasture	4 Better than pasture	5 Much better than pasture		
						Herd Home	Cubicle - roof
							Cubicle - no roof
							Deep litter -roof
							Deep litter - no roof
							Slats - no roof
							Stand-off pad*
Aggressive behaviour							
Calving issues							
Cow body condition							
Dirtiness							
Hoof health							
Injury (other than foot/h hoof)							
Mastitis							
Shade/shelter and thermal challenge							
State of new born calves							
Sufficient lying/resting time							

* Refers to constructed stand-off pad with no roof and no windbreaks.

4) For those clients **with artificial housing systems**, please indicate the percentage that uses the housing system for calving?

5) In general, using the scoring system below, how would you rate the welfare of the cow and calf in artificial housing systems compared with pasture?

NOTE – If you have no clients currently using any of these systems, please leave that column blank

	1 Much worse than pasture	2 Worse than pasture	3 The same as pasture	4 Better than pasture	5 Much better than pasture		
						Herd Home	Cubicle - roof
							Cubicle - no roof
							Deep litter -roof
							Deep litter - no roof
							Slats - no roof
							Stand-off pad*
Cow							
Calf							

* Refers to constructed stand-off pad with no roof and no windbreak

6) In terms of issues specifically related to housing systems, please indicate the extent of what you are seeing as problems for cow health and welfare, using the numerical scoring system below:

NOTE – If you have no clients currently using any of these systems, please leave that column blank

1	2	3	4
Often problems/of major concern	Sometimes problems/of some concern	Rarely problems/of minor concern	No problems/no concern

	Herd Home	Cubicle - roof	Cubicle - no roof	Deep litter - roof	Deep litter - no roof	Slats - no roof	Stand-off pad*
Confinement/ lack of exercise							
Underfoot and bedding conditions							
Ventilation-related issues							

* Refers to constructed stand-off pad with no roof and no windbreaks.

7) For those clients **that winter off**, how many use the following systems to keep their springing cows on their return?

	No. of clients
Managed on pasture only	
Use a constructed feed pad or stand off pad without a roof until the cows calve	
Use a constructed feed pad or stand off pad with a roof until cows calve	
Use an artificial housing system (as described in question 1)	

8) How many of your clients have asked you for advice concerning animal shelter in the last 18 months?

9) Do you have any other comments relating to the health and welfare of animals in winter housing systems?

10) On balance, do you believe that winter housing systems are better or worse for cows than outdoor wintering systems in your area?

Much worse	Worse	The same	Better	Much better

11) If recommendations for the management of cows in winter housing systems were to be developed to ensure their health and welfare, what would you:

a) Like to see included:

b) Prefer not to see included:

12) Would you be prepared to be contacted in the near future to provide names of 2/3 clients who we could interview via telephone about their housing system?

Yes - please provide your contact details below.

No

Thank you for taking the time to complete this questionnaire.

Appendix 2. Producer Telephone Survey

Dairy Housing Phone Survey

Location / Area

Name

Phone Number

Installation and performance

1. What housing do you currently use for your adult stock? (categorise into the following definitions)	
Herd Home™	1
Cubicle housing (enclosed by at least 3 walls and a roof)	2
Deep litter (enclosed by at least 3 walls and a roof)	3
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with cubicles	4
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with deep litter (e.g. straw, post peelings, wood chips, etc)	5
Constructed shelter with no roof (enclosed by at least 3 windbreaks) – with slats	6
Other Describe	

2. How many seasons have you been using this system?	
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3. What did you use before it was installed? (categorise into the following definitions)	
Exclusively kept on pasture	7
Use races, sacrifice paddock or other similar area during wet periods	8
Use a constructed feed pad during wet periods	9
Use a constructed stand off pad (i.e. provide a bedded area) during wet periods	10
Use a constructed stand off pad/ feed pad routinely (not just during wet periods)	11
Wintered on other pasture grazing i.e. a run-off	12
Wintered on crop i.e. brassicas	13
Other Please describe	

4. What's the main reason that you adopted your current housing system?

↓

If answer is production, financial, milk yield, etc

↓

“Can you explain that a bit more?”

Use of the housing system

5. Do you put lactating cows in your housing system?	
YES	NO

6. Do you use your housing system in summer only, winter only, or both summer and winter?		
Summer Only	Winter only	Both
7. Do you shut the cows in the housing system?		
Summer Only:	Winter Only:	Both
Shut In	Shut in	Not shut in during Winter
Not Shut In	Not Shut In	Shut in during Winter
		Not shut in during Summer
		Shut in during Summer

8. Do you have a method or rule of thumb which helps you to decide when to use your housing system?

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9. When cows are in the housing facility, do you let them out to graze?

YES	NO
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10. Do you have a guide or plan that influences when to stop using your housing facility?

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11. How do you decide when your cows have 'had enough' in the housing facility?

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Impacts of the housing system

12. In the first season of using your housing system, did you have any problems with...? Tick for Yes	
a. Aggressive behaviour	
b. Calving	
c. Dirtiness	
d. Cow body condition	
e. Hoof health	
f. Injuries (other than foot/hoof)	
g. Mastitis	
h. Getting enough lying/resting time	
i. thermal challenge – too cold or too hot	
j. other	

13. In subsequent seasons, have you had any problems with...? Tick for Yes	
k. Aggressive behaviour	
l. Calving	
m. Dirtiness	
n. Cow body condition	
o. Hoof health	
p. Injuries (other than foot/hoof)	
q. Mastitis	
r. Sufficient lying/resting time	
s. Shade/shelter and thermal challenge	
t. other	

The next question only relates to while your cows are in the housing system –

14. How many times per day do you check your cows for health and injury problems?

Number:

15. Has your housing system increased, decreased or had no effect on labour costs?

Increased

Decreased

No effect

16. Has your housing system increased, decreased or had no effect on animal health costs?

Increased

Decreased

No effect

17. Has your housing system increased, decreased or had no effect on costs overall?		
Increased	Decreased	No effect

18. Has your housing system increased, decreased or had no effect on production?		
Increased	Decreased	No effect

19. Has your housing system improved, reduced or had no effect on pasture condition?		
Increased	Decreased	No effect

20. Has your housing system improved, reduced or had no effect on cow condition?		
Increased	Decreased	No effect

21. What modifications/changes would you make if you could?



Prompt with - 'anything else'??

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22. Is there a different system you are interested in?	
Herd Home™	1
Cubicle housing	2
Deep litter	3
Constructed shelter with no roof	4
Constructed shelter with no roof with deep litter (e.g. straw, post peelings, wood chips, etc)	5
Constructed shelter with no roof with slats	6

Other factors affected by housing system.
(only if the respondent answers this during the course of the phone call)