ANIMAL WELFARE (DAIRY CATTLE)
CODE OF WELFARE 2010
REPORT

Introduction

1. The draft Animal Welfare (Dairy Cattle) Code of Welfare (the Code) has been developed by the National Animal Welfare Advisory Committee (NAWAC), pursuant to the Animal Welfare Act 1999 (the Act). This report accompanies the Code recommended by NAWAC to the Minister, as required by section 74 of the Act.

   The report notes:

   - the reasons for NAWAC's recommendations;
   - the nature of any significant differences of opinion about the Code, or any provision of it, that have been shown by the submissions; and
   - the nature of any significant differences of opinion about the Code, or any provision of it, that have occurred within NAWAC.

   In providing this report, NAWAC notes that it fully considered all submissions it received and reviewed relevant scientific literature, and that there was debate among NAWAC members on many points. This report is not required to, and does not attempt to, show every detail of the analysis and discussions that took place.

2. There are a number of minimum standards where the animal welfare implications are self-evident and require no explanation for their inclusion. NAWAC has decided that it will not provide comment on these minimum standards or recommended best practices, but will provide explanations on minimum standards which it believes are complex or controversial or on which it received submissions with significant differences of opinion. Minimum standards as drafted may have been amended for a number of reasons, including to make them legally robust, to ensure a more effective coverage of the issue, or to change from a recommended best practice to a minimum standard (or vice versa).

3. It should be noted that the Act does not define "significant differences". While there were a variety of opinions expressed in the submissions, NAWAC did not consider that all differences necessarily represented significant differences of opinion. NAWAC has taken the view that significant differences are either where there are large numbers of submissions which are contrary to a minimum standard in the Code, or where a submission puts forward a justification based on scientific evidence or good practice for a different or alternative minimum standard. NAWAC notes that some individuals or organisations may interpret "significant differences" in a way that varies from the NAWAC view.

4. The Code applies to all persons responsible for the welfare of dairy cattle. This includes all calves born from dairy cows until weaning wherever they are being reared and all dairy replacement stock wherever they are being raised. It also

includes dairy cattle that are kept as "house cows" and any bull brought onto the farm for the purpose of mating dairy heifers or cows. It does not include dairy cattle, once weaned, raised for beef production.

5. A dairy cattle code of welfare is needed because it is essentially the Government's statement of policy on how New Zealanders must care for dairy animals in their charge. There is no current code of welfare for dairy cattle. In addition to setting out the expectations of New Zealanders for the welfare of dairy cattle, it is an important statement to the international community and in particular, to overseas consumers of our animal and milk product exports of the welfare standards which prevail in New Zealand.

Code preparation and public submissions

6. The Act allows for any individual or organisation to draft a code of welfare. The Code was drafted by an industry writing group convened through Dairy Insight. In addition, as required by the Act, representatives (including farmers) of those likely to be affected by the Code were consulted during its preparation and before public notification.
7. NAWAC considered the Code to ensure that it complied with the purposes of the Act, that it was written clearly so as to be readily understood, and that representatives of those likely to be affected by it had been consulted. NAWAC wishes to point out that, at that time, NAWAC decided not to make any final decisions on the Code until it had received submissions. The Code is required to be publicly consulted, and for NAWAC to come to any conclusion prior to this consultation would have meant that NAWAC was not following due process by acting in a biased and predetermined manner.
8. The Code was publicly notified on 4 November 2006 by notices in the major newspapers in Auckland, Wellington, Christchurch, Dunedin, Hamilton, Palmerston North, and Invercargill. In addition, it was sent to all major libraries and to specific interested groups. The closing date for submissions was 19 December 2006.
9. A total of 43 submissions were received during the public consultation period. All submissions were read in their entirety and taken into account. A summary of the submissions received on the 2006 draft Code was prepared and NAWAC's responses to the submissions were noted.
10. All submissions were carefully considered by a subcommittee of four members appointed by NAWAC to review the Code. The subcommittee reviewed the Code in detail and all the submissions received on it. The subcommittee met for one full day in August 2007 and one member with the chair in December 2007. Throughout the period the Code was under review, subcommittee members worked in collaboration by email, and in consultation with MAF Animal Welfare Directorate staff.
11. The membership of the subcommittee had extensive experience of dairy farming. The subcommittee reported the Code back to NAWAC on 20 February 2008 for

final consideration and approval for recommendation to the Minister. The Code was subsequently peer reviewed by international welfare expert Professor Neville Gregory of the Royal Veterinary College, University of London.

Key issues

12. The following key issues represent the significant concerns raised from the public consultation on the draft Code.

- Scope of the Code
  Should this Code cover dairy bulls?
- Body Condition Score
  Should more detailed information on body condition scoring be included?

  What is the science concerning body condition and effects on welfare?
- Feeding newborn calves
  What are the appropriate feeding requirements for calves?
- Water
  What are the minimum water requirements?
- Shade and shelter
  Should this section specify shade, separate to shelter?

  Should this section be more substantial and consistent with other pastoral species codes?
- Housing
  Should more information on housing be included?

  What constitutes housing for the Code?

  Should more information on appropriate lying surfaces be included in the code?
- Droving
  Should the Code apply to on-farm as well as off-farm droving?
- Restraint
  Should a section on tethering of dairy cattle be included in the Code?
- Milking
  Should a section on once-a- day-milking be included in the Code?

  Should a section on drying-off be included in the Code?
- Calving
  Should requirements for dairy cattle differ from possible beef cattle standards?

  What should be the minimum frequency with which calving dairy cattle are checked?

  Should more information on inductions be included in the Code?

- Calf management
  Should bobby calves and calf care management be a separate section in the Code?
- Pre-transport selection
  Should more specific time restrictions be placed on transporting pregnant dairy cattle?

  Should the requirement for feeding of calves before transport be less prescriptive in the code?
- Lameness
  What definition of lameness should be used in the Code?

  Should more information on managing lameness be included in the Code?
- Emergency humane destruction
  Should more information on 'how to' be included in the Code?

13. **Scope of the Code**

(a) ***Should this Code cover dairy bulls?***

Dairy bulls have been covered by this code since its inception, as specified in the scope as follows "all calves born from dairy cows until weaning wherever they are being reared and all dairy replacement stock wherever they are being raised. It also includes dairy cattle that are kept as "house cows" and any bull brought onto the farm for the purpose of mating dairy heifers or cows."

It would be impractical to create a separate code of welfare for dairy bulls. Therefore NAWAC believes that their inclusion here is appropriate.

14. **Body Condition Score**

(a) ***Should more detailed information on body condition scoring be included?***

Submissions were received identifying that the Code needs to be a stand-alone document and suggesting that critical information must be provided. NAWAC believes that body condition is an important issue that needs to be covered sufficiently. The dairy industry uses a standardised scoring system which was described by Macdonald and Roche (2004) in a booklet format which has been widely distributed within New Zealand. There are a number of body condition scoring systems in place in different countries, but all incorporate a similar range of assessment points and are comparable (Roche et al., 2004).

NAWAC has recommended that the New Zealand scoring system be used and has included descriptive lists in an appendix as guidance along with reference to the Macdonald and Roche (2004) booklet for pictures and full information. NAWAC also believed that that there should be consistency between codes and hence the appendix also describes emaciation condition score 2, and condition score 1.

(b) ***What is the scientific information on body condition and effects on welfare?***

Modern dairy cattle have been selected for milk production levels which are far greater than are required to meet the needs of their calves so during early lactation a cow's appetite and intake cannot match its energy requirements. Body reserves are mobilised to support lactation and dairy cows in good condition lose about half their fat reserves in the first half of lactation (Heuer et al., 2001). Generally a cow loses condition for 6-10 weeks early in lactation, then builds up her reserves during late lactation and the dry period prior to calving. Within a population, body condition scores tend to be normally distributed (Compton and McDougall, 2006). A study of condition score (CS) records from cows on research farms from 1986 to 2003 showed that 72% of recorded scores were between 4 and 6, with 5% considered fat (≥6) and 23% thin (≤4). A cow in better CS at calving will lose more CS post-calving, but will still have a higher nadir CS than a cow that caved in thinner condition. 95% of cows lost less than 2.2 CS units and had nadir scores greater than 3 (Roche et al., 2007). Factors including genotype (especially the proportion of Holstein genes from cows selected for intensive milk production in North American systems; (Harris and Kolver, 2001), total dry matter intake, feed quality (e.g., proportion of starch-based concentrate supplements in the diet) and farm management system will all have an effect on the nadir body condition score (Roche et al., 2006, Macdonald et al., 2008). Reduced pasture availability in dry summer conditions may also lead to mobilisation of body tissue in late lactation in pastoral systems (Roche et al., 2007).

Despite the strong focus on the impact of body condition on productivity there are few publications that have addressed the welfare impacts of body condition score. Relationships have been found between body condition score and the probability of peri-parturient mastitis in dairy heifers, but this relationship is one in which animals carrying greater pre-calving body condition (≥CS 6) and having greater post-calving CS loss (>1 unit) had an increased likelihood of contracting mastitis in the peri-parturient period thought to be due associated with leakage of milk from the udder (Compton et al., 2006). Higher body conditions scores have also been associated with lower milk somatic cell counts (SCC) in first and second calving cows, but with greater SCC in later lactation cows, and there was no effect on the incidence of clinical mastitis (Berry et al., 2007b). Higher body condition scores in dairy cows have been associated with impaired health through immunosuppression (Lacetera et al., 2005), greater risk of metabolic disease especially at calving (Roche et al., 2007) and "fat cow syndrome" where excessive mobilisation of fat depots results in liver disease (Morrow, 1976).

Similar to the situation with mastitis, reports of the relationships between CS and calving-related problems are equivocal. Markusfeld et al. (1997) reported that poor body condition is associated with a risk of retained placenta and uterine infection after calving while Berry et al. (2007a) could find no relationship between body condition and dystocia or still births. Cows in low body condition have poorer reproductive performance even when data was adjusted to account for differences in yield (Pryce et al., 2001). Failure to get in calf, especially where the farming system has a high level of reliance on seasonal pasture growth, is a major cause of

culling in NZ dairy systems (Xu and Burton, 2000) hence survival characteristics and longevity are negative correlated to CS. However, the full extent to which this attribute of longevity is a valid indicator of welfare, particularly where shortened life is based upon a management decision to cull, is subject for debate.

Adequate body condition will assist an animal's ability to buffer against periods of cold stress. Cows with higher CS had more stable body temperature profiles during cold conditions (Tucker et al., 2007c).

The association between CS and hunger has not been elucidated for dairy cows. Cows with lower body condition score typically eat more if it is available (Hayirli et al., 2002; Tucker et al., 2007c). The mental consequences of thwarting grazing behaviour in a hungry cow are largely unknown though may be presumed to cause some level of discomfort (Gregory, 2004). Feelings of hunger in pasture grazing situations are likely to differ from those in other feeding systems because pasture which has a low overall dry matter content is bulky by its very nature and intake is often limited by rumen capacity even if dietary energy requirements for production are not met (Kolver and Muller, 1998).

Gregory et al. (1998) measured internal fat deposits and related these to body condition score. They observed considerable individual variation in the amount and location of fat reserves at any particular body condition score. This may be associated with the individual animal's genetic background as cows with higher proportions of Holstein genetics have been shown to vary in their sites of fat deposition (Macdonald et al., 2008). The Gregory et al. (1998) study, using a BCS scale of 1- 8, found those cows with less than 5kg of internal fat had mean CS of 2.5 ± 0.3, while cows with less than 5% fat in a dissected rib section had mean BCS of 2.8 ± 0.3. Mean BCS in both these groups was significantly less than that of the other cows in the study. Their data analysis identified that CS3 is likely to represent a basal level of fatness for the "average" animal. They observed that further loss of CS was associated with internal fat tissues becoming gelatinous suggesting that its composition was largely "non-lipid".

As the relationship between "welfare state" and body condition has not been well elucidated, and there is limited scientific data upon which to determine the thresholds for minimum standards, best practice principles were also considered in the final decision. Current best practice recommendations for CS in the dairy industry have been based on measures of productivity rather than measures of animal welfare. Guidelines for condition score for optimal productivity include advice that a cow with CS of less than 3 is considered emaciated, and a cow with CS greater than 7 is considered obese. A target of CS 5 at calving for mature cows and 5.5 for first and second calvers is advised because cows calving at less than CS 5 will produce less milk and are more likely to have reproductive problems (Macdonald and Roche, 2004).

Some submissions considered that minimum standards should be set at a lower threshold than targets set to maximise productivity. The evidence from database studies (e.g. Roche et al., 2007) is that 95% of cows were able to achieve a post-calving nadir of CS that was greater than 3 supported the setting of CS3 as the

minimum, as this should be an achievable standard for healthy pasture-grazed cows. This level was also supported by the Gregory et al. (1998) study where the point below which fat reserves become depleted was in the region of CS3. Setting the target at CS3 also provides a buffer for differences in condition scoring techniques. While this technique is subjective, it is highly repeatable and reproducible by trained operators, and is unlikely to vary by more than 0.5 units between scorers. A minimum cut-off of CS 3 would allow a margin of 0.5 CS units to protect the welfare of animals at lower scores. NAWAC believes that setting a condition score of 3 as the minimal acceptable beyond which urgent remedial action is required will protect dairy cattle welfare.

Gregory et al. (1998) definition for BCS of 3, on a scale of 1-8, as emaciation is contentious. They measured internal fat deposits and found them to be 4.3, 4.8, 10, 8.6 and 17.9 kg for the BCS range 1-5. Due to the variability encountered, their analysis of variance for this parameter was unable to differentiate statistically between the individual condition score points in the ranges 1-2, 2-4, or 3-5. Their measurements of %fat found in a dissected rib section were 4.3%, 4.8%, 9.3%, 6.6% and 13.5% for the BCS range 1-5. For this parameter their analysis of variance was unable to differentiate statistically across the range of BCS from 1-5. Seven cows had less that 5kg of internal fat and their mean BCS was 2.5 ± 0.3 s.e., while 16 cows had less than 5% fat in the dissected rib section and their mean BCS was 2.8 ± 0.3 s.e. – mean BCS in both cases being significantly less than that of the remaining cows in the study. Linear regression analyses of condition score against the data for estimated total body fat%, %fat in the sample joint and internal fat deposits all showed a curvilinear relationship with the point of inflexion at BCS3. Gregory et al (1998) interpreted this to mean that a condition score of 3 effectively represents a basal level of fatness. Beyond this point, every additional score represents an additional 4.2 kg of internal fat while further loss is associated with the internal fat tissue becoming gelatinous suggesting that its composition is largely "non-lipid". Taken together these observations support the approach taken in the code for setting BCS3, on a scale of 1-10, as the minimum standard as there is good evidence from this data that it is below this point that fat reserves become depleted. Gregory's statement that this is the "point of emaciation" is thus open to challenge and might more accurately be described as the "point beyond which emaciation will be present in all cows".

15. **Feeding newborn calves**

(a) ***What are the appropriate feeding requirements for calves?***

Some submissions expressed concerned over a definition of "adequate" colostrum for newborn calves. Dairy industry best practice as outlined in the Fonterra Colostrum Code (2004) recommends feeding good quality colostrum at a rate of 10-15% of body weight over two feeds within the first 12 hours of life. Based on this a 15 kg Jersey calf requires 1.5-2.3 litres of colostrum while a 45kg Holstein-Friesian calf requires 4.5-6.8 litres. NAWAC believes that setting the minimum standard as a requirement for sufficient therefore requires that the stockperson considers the

needs of the individual animal. Sufficient is well defined in industry best practice and as well as in the recommended best practices within the Code.

Submissions also suggested this should be only for calves not taken from their mother. Leaving the calf with the dam beyond 12-24 hours of life has a high probability of compromising its ability to receive sufficient colostrum. Wesselink et al. (1999) observed that 8/21calves born to Friesian cows and heifers failed to suckle their dams within their first 12 hours of life. Samples to measure serum GGT levels were taken from 57 calves at the time of separation from the dam (range: 6 - 24 h after birth). About 45% of those calves had serum GGT below 200 U/l indicating that they had absorbed inadequate amounts of colostrum from their dams, and accordingly that they have also not received adequate early quantities of food. This supports the Recommended Best Practise for intervention to supplement colostrum intake which would be beneficial for a large proportion of calves.

16. **Water**

(a) ***What are the minimum water requirements?***

The minimum water requirements are not based on scientific recommendations. There is no allowance for different requirements for different individuals. For instance the water requirements for cows producing 2 kg milk solids per day are quite different than for cows producing 0.6 per day. NAWAC believes that setting the minimum standard as a requirement for sufficient therefore requires that the stockperson considers the needs of the individual animal.

Water requirements for dairy stock vary widely depending on factors including weather conditions and the nature of the feed e.g. proportion of pasture. Holmes et al. (2000) reported that the mean water intake of dairy cows measured over a one month period during summer varied from 15 to 90 litres/day. Bluett et al. (2000) measured water intakes of pasture-fed lactating Friesian cows for periods in November and January and found mean daily water intakes ranged from 8.4 to 63.2 litres/cow/day. Jago et al. (2005) found mean water intake for pasture fed cows in late lactation ranged from 26-53.7 litres/cow/day. This level of variation suggests that ‘sufficient’ needs to be interpreted in the context of individual situations as is explained in the introduction.

Volume requirements for water are well documented and readily available in industry guidelines and fact sheets (e.g. DairyNZ website) as well as in reference material. A more important factor that contributes to thirst in dairy cows is inadequacy of space at troughs and inadequate water flows during high load periods. Jago et al. (2005) found drinking was mainly a diurnal activity for grazing cows and an intake of 14.9 litres/ drinking event and this is the basis of the RBP for the rate of delivery of water within the reticulation system.

17. **Shelter**

(a) ***Should this section specify shade, separate to shelter?***

NAWAC discussed removing "shade" from the title, leaving the section to be covered by "shelter. It was agreed that shade is a type of shelter, and therefore this wording is not needed.

(b) ***Should this section be more substantial and consistent with other pastoral species codes?***

The draft code has always included a section and minimum standards on shelter. Many submissions were concerned, however, that the Code falls short of an adequate means of protecting the welfare of dairy cattle required by the Animal Welfare Act 1999.

The amount of information provided in the introduction lays out the key points about the need to provide shelter and is fully consistent with the deer code which is the only other pastoral code that has been completed. NAWAC is of the opinion that the Minimum Standards are substantial and sufficient to protect dairy animals. The key requirement under Section 4 of the Act is to provide all classes of animals with the means to minimise the effects of adverse weather as is stated in Minimum Standard; however the Act also recognises that such provision must appropriate for the needs of the animals in the context of the particular situation. There is also specific stipulation about provision of shelter for those classes of animal at greater risk and requirement that priority be given to remedial action when weather conditions result in animals developing health problems.

Within the context of farmed livestock, NAWAC takes shelter to encompass such factors as those related to the weather (sun, rain, wind, snow, etc), as well as other aspects of shelter (e.g. from humans, herd mates, predators etc). NAWAC takes 'adequate' to mean sufficient to maintain core body temperature within a range that does not produce tissue damage that is irreversible and therefore potentially life-threatening damage (i.e. animals can be hot or cold, but not so hot or cold that it is noxious or damaging to their health.)

New Zealand has a temperate climate but there are marked regional contrasts. Healthy cattle are relatively robust in their ability to tolerate the extent of cold conditions encountered in such a climate including its wet and changeable nature and a number of management methods, including the provision of additional feed, may be used to provide protection during cold conditions. The Code gives no specific definition to the nature of provision of needs or what remedial action should be taken, however further information is provided in the document to assist with interpretation. It does not mean that there must be shelter in every paddock which NAWAC recognises would be impractical, nor is there specific requirement for windbreaks or other shelter structures whether natural or artificial to be provided all the time. It may mean the provision of additional feed to mitigate the effects of bad weather for the more robust classes of animal or that cows are moved to an area with additional shelter when conditions are severe.

NAWAC believes that this position is well supported by scientific knowledge. Homeothermic animals maintain their body temperature within a thermo-neutral zone in a regular diurnal pattern that is influenced by feeding, activity and ambient temperature and within which the animal will utilise a variety of mechanisms to maintain itself within the thermo-neutral zone such eating more and seeking shelter. Cold stress occurs as the Lower Critical Limit (LCL) of the thermo-neutral zone is approached (core body temperature around 36.5 °C for cattle) associated with metabolic changes such as severe shivering and developing hypothermia. Adult dairy cattle can withstand relatively harsh environmental conditions before their core body temperature drops towards their LCL. Well-fed lactating cows that are dry and with no air movement can withstand temperatures as cold as -30 °C while non-lactating cows can withstand conditions to -20 °C. Young growing stock and calves are more sensitive and their critical limits for withstanding cold are met at approximately 5 °C (Kadzere et al., 2002). Wind chill and rain have a significant impact on the animal's ability to maintain body temperature. Rainfall greater than 1 mm/h will reduce the insulation value of the coat by 30% (Turnpenny et al., 2000) while air speed of 2 m/sec increases the air temperature at which lower critical limits are met from -10 °C to 0°C (Higgins and Dodd, 1989).

The extremes of weather conditions in New Zealand were demonstrated to have an impact on animal welfare during studies of non-lactating dairy cows in winter conditions in the North Island's Central Plateau when the mean outdoor daily temperature range was -3.7 to 10.3°C. The cows, held on an outdoor woodchip pad without shelter from wind and snow and fed to appetite on good quality silage, showed an increase in levels of plasma and faecal cortisol and serum total thyroxine (Verkerk et al., 2006). Cows spent less time lying and adopted postures to reduce heat loss as well as shivering. Cows in these winter conditions with lower body condition (CS 4 vs CS 9) spent more time eating and also adopted more extreme heat conservation postures (Tucker et al., 2007c). Despite the extreme conditions mean minimum core body temperature remained above 38 °C indicating that the robust bovine constitution in combination with coordinated physiological and behavioural responses had successfully mitigated the effects of the cold weather.

Tucker et al. (2005) surveyed management practices on 131 farms with a mean herd size of 910 cows. During extreme weather, 75% changed their grazing programme and 51% practised stand-off management. With stand-off areas, 16% provided purpose built shelter and 46% provided natural shelter. Shelter belts were near to some paddocks on 70% of farms, while 17% had shelter belts near at least half of their paddocks. Farmers used a number of other strategies during bad weather with 84% indicating that they supplied additional feed. The survey was carried out on larger herds where provision of shelter is arguably more problematical, so one might assume that the ability farmers of smaller herds to provide shelter is at least similar and quite possibly superior to that of the surveyed farms. Taken together this suggests that the majority of dairy farmers have the means to meet the minimum standard by providing shelter.

Conditions that cause heat stress operate by perturbing core body temperature towards the Upper Critical Limit (about 40.5 °C), and when unable to be managed result in hyperthermia. Cattle rely to a large extent on evaporation from the lungs and to a lesser extent from the skin to lose excess heat so increased respiratory rate is evidence that core body temperatures are under threat of heat loading. Factors such as the ambient humidity and also coat colour will influence the extent of heat loading. NAWAC noted that weather conditions that can generate heat stress for dairy cattle occur more frequently than those that generate cold stress.

The likelihood that heat stress may occur can be estimated by considering a calculated temperature-humidity index (THI) that may also incorporate black globe temperature as an estimate of radiant heat input. When the THI moves towards 72, as occurs with an ambient temperature of 25 °C and relative humidity above 50% then lactating cows will initiate homeostatic heat control mechanisms to protect core body temperature (Buffington et al., 1981; Blackshaw and Blackshaw, 1994). Studies in New Zealand have shown that grazing cows without voluntary access to shade produced less milk when ambient conditions are hot, and that cows offered shade will adjust their grazing patterns to eat more at night (Fisher et al., 2008, Kendall et al., 2006). Grazing cows with access to shade had lower core body temperatures during the middle of the day but this advantage was lost when cows walked to the dairy for milking. Individual cows in these studies experienced core body temperatures above 40 °C and so approached the UCL for hyperthermia to occur.

Heat stress may be managed in a number of ways other than merely the provision of shade. Cattle may not always choose shade, even on hot days. Where shade is limited in hot conditions, it is particularly important that water supplies are plentiful. Heat stress can become a problem in dairy yards, after the herd has been walked in on hot summer afternoons, and it may be difficult to dissipate the heat. The thermal environment can be directly regulated e.g. by mist or water spraying or by provision of shade or fans to create air movement. Sprinklers and shade provided at the dairy yard were both effective in reducing core body temperature and respiration rates (Kendall et al., 2007). In their survey of management practices in large herds, Tucker et al. (2005) reported that a third of farmers occasionally changed milking time in summer while 61% used paddocks closer to the dairy shed on hot days and 40% used sprinklers to cool cows in the yards for milking.

It is NAWAC's view that trends for increased use of housed wintering systems in southern areas and constructed stand-off areas for management of non-point source nitrogen leaching in the North Island appear to offer opportunities to provide better shelter than open fields. These changes are part of emergent farm systems which will assist productivity increases through intensification processes and that should also develop to meet the needs of cows as well as environmental responsibility. The key is to ensure that developments in dairy cow management systems do not place other elements of cow welfare in jeopardy such as the provision of suitable surfaces for lying down.

18. **Housing**

(a) ***Should more information on housing be included?***

Housing systems and their associated management practices are in a stage of rapid evolution in New Zealand and future systems will be seasoned with a good deal of Kiwi ingenuity and lateral thinking. NAWAC is of the opinion that while information about management of cows in housing systems overseas should be considered cautionary, it may have limited relevancy as housing use patterns in New Zealand are unlikely to copy those overseas. The provisions of the Code recognise this and are flexible and animal outcome-based to ensure continuing relevancy during the life of the code. The reader is directed to dairy industry sources for further information and recommendations about construction.

(b) ***What constitutes housing for the Code?***

The nature of housing and the patterns of its use in New Zealand are unique. Cows in our pasture-based dairy systems spend much of their lives outdoors and even where provision is made to bring animals off pasture for periods of time into stand-off or housing facilities, their use tends to be intermittent and largely in respond to wet weather conditions which can occur at all times of the year. Most unweaned calves are housed for the first 6-8 weeks of life, and dry cows brought into wintering facilities will likewise be there for periods of 6-8 weeks. Once lactating, cows will be given pasture to graze daily, and may simply be offered free access to the housing area shelter if they choose.

NAWAC has taken housing to mean a roofed structure with or without walls where an animal may be kept (other than the farm dairy) and that is permanent or semi-permanent. A housing definition was added to the Glossary. Welfare while on stand-off and feed-pad facilities which do not provide a roof and may have limited shelter have been considered in a separate section.

(c) ***Should more information on appropriate lying surfaces be included in the code?***

The amount of time spent lying down resting by dairy cows makes a significant contribution to their comfort and welfare. NAWAC recognises that floor characteristics and spacing allowances are important components of what provides a comfortable area for cows to lie down. Fisher et al. (2003) found that the total time spent lying per day was greatest for cows on a woodchip pad compared to a concrete yard, farm laneway or small muddy paddock area. In addition to reduced lying times, cows held on a concrete yard had increased stress hormone levels and increased lameness. Housing facilities and management practises vary considerably in New Zealand and opportunity to rest can be provided in a number of ways, e.g. cows may be put onto pasture for periods during the day. NAWAC believes that setting the minimum standard as a requirement for the cow to be able to lie down and rest comfortably provides a standard that best meets the welfare needs of the animals in any housing/management system.

19. **Droving**

(a) ***Should the Code apply to on-farm as well as off-farm droving?***

NAWAC considered whether droving in the code applies to on-farm as well as off-farm, it was agreed that droving refers to off-farm only and a droving definition was added to the Glossary.

20. **Restraint**

(a) ***Should a section on tethering of dairy cattle be included in the Code?***

A number of dairy cattle may spend periods of time tethered – they include pet calves and show animals. While the principles of the Code apply to this group of animals, it is not the intention to address them directly – their preferential treatment and high degree of habituation to humans ensure that they will be well supervised, and they serve an important function to develop stockmanship skills in the young and to raise awareness of animal welfare. NAWAC considers that tethering is covered sufficiently, without requiring a separate section.

21. **Milking**

(a) ***Should a section on once-a- day-milking be included in the Code?***

Once-a-day (OAD) milking has been a common farm management practice on New Zealand dairy farms (Holmes et al., 1992) and it is increasingly used for all, or a significant part, of a milking season. Cows milked OAD retain higher condition scores and young cows will have better reproductive performance associated with reduced energy deficits. Cows in OAD systems are generally run at a slightly higher stocking rate to compensate for lower individual production and genetic selection for cows with lactational persistence will also improve productivity outcomes (Beukes et al., 2004).

The most common welfare concerns with OAD systems relate to udder health. Lacy-Hulbert et al. (2005) compared intramammary infection rates and somatic cell counts (SCC) of cows in OAD systems with counterparts milked twice daily across four lactations. They found that milking frequency did not alter the incidence of clinical mastitis, but that cows milked OAD had double the number of somatic cells. Cows with uninfected quarters that were milked OAD had a range of mean SCC of 99-125 x 10^3 cells/ml across the four lactations compared with cows milked twice daily with a range of 42-64 x 10^3 cells/ml. The difference in SCC developed as lactation progressed and was evident after 8-12 weeks of lactation. The authors were unable to explain this effect and considered it could be associated with the level of nutrition. As it occurred independent of the rate of intramammary infections and as basal SCC remained well within the range defined as ‘healthy milk’, this should be of no concern with respect to cow welfare.

Tucker et al. (2007a) observed cow behaviour and udder characteristics of cows milked OAD at peak lactation and also in cows during transition from twice daily to OAD milking in mid lactation. They found that cows milked OAD at peak lactation were more likely to lie with their hind legs touching their bodies but

found no difference in udder firmness or undesirable behaviour at milking compared to cows milked twice daily. Cows had increased udder firmness as they changed from twice daily to OAD in mid-lactation, but lying time and posture as well as faecal glucocorticoid levels were similar to those of cows that maintained their previous milking frequency. They concluded that they could not find changes to indicate that welfare of cows was impaired by OAD milking.

Following submissions on the topic, and as no welfare issues specific to OAD milking systems are evident, NAWAC believes there may be welfare benefits for some cows from using OAD systems. Given that management of cows in OAD systems must equally meet all aspects of the minimum standards with cows milked at other frequencies, NAWAC did not consider that a separate section relating to OAD milking was justified.

(b) ***Should a section on drying-off be included in the Code?***

Following submissions on the topic NAWAC believes that drying-off is an issue of such significance that it should be afforded separate discussion from other aspects of milking and a section was added after consideration of industry best practice and relevant research papers.

Change in milking frequency and restriction of feed are both used to lower milk volumes at the time of drying off and are considered important to reduce udder congestion. Lacy-Hulbert et al. (1999) demonstrated that a reduction in feed from 16 kg DM/day to 8 kg DM/day reduced milk yield by 36%, while reducing milking frequency to once a day reduced milk production by 13%. Reduced milking frequency resulted in changes in milk composition suggestive of increased intramammary pressure and disruption of tight junctions between alveolar cells, while these changes were not evident with the feed restriction treatment suggesting that the latter reduction in milk flow is likely to be due to the short-term acute reduction in available feed. These findings form the basis for best practice management for drying off cows that are producing in excess of 10L milk per day i.e., to reduce feed intake to maintenance levels from 2-3 days before drying off until 7 days afterwards (Managing Mastitis – a practical guide for NZ dairy farmers).

A further study reported by Lacy-Hulbert et al. (1999) compared the effect of milking every-other-day with once or twice daily milking until drying off. Cows that were milked every other day had significantly higher SCC and increased levels of clinical mastitis infection. Consequently every-other-day milking is not recommended as a means to reduce milk production before drying off.

NAWAC is of the opinion that the period around drying-off can present some challenges to ongoing cow welfare. Feed restriction as a recommended management practise associated with the potential for pain from udder congestion when milking ceases are both potential concerns. These issues were investigated by Tucker et al. (2007b). They recorded lying postures and behaviour associated with hunger as well as indicators of udder congestion in cows at varying feed levels milked once or twice daily at drying off. Cows on restricted feed intakes had lower milk yields at drying off and had softer udders, but udder temperature did

not differ, and they also vocalised more. Cows that were fed at 16 kg DM/day throughout drying off had more milk leakage and were less likely to lie with their legs contacting their bodies. This difference was evident both before and after drying off so was interpreted to be associated with differences in rumen fill rather than udder comfort. This work supports the industry best practice of feed restriction to assist with drying off, but the authors noted that animals did experience hunger and suggested that provision of a low-energy diet rather than just a reduction in intake may meet the animals' needs better. This point has been included in the general information section of the code.

22. **Calving**

(a) ***Should requirements for dairy cattle differ from possible beef cattle standards?***

While some standards for dairy cattle and beef will be essentially similar (e.g. feed and water) there will be some that are specific to each type of animal according to the purposes for which they are farmed and the nature of the farming system. For example, dairy cows are relatively well habituated to handling and appear to tolerate a degree of confinement and human presence around the time of giving birth. In contrast, beef cattle may be less tolerant of confinement and supervision could also be detrimental for the welfare of both mother and young. Given that there may also be different relative risk of difficulty at calving between beef and dairy, it would appear appropriate to have different standards of supervision for dairy and beef cattle.

(b) ***What should be the minimum frequency with which calving dairy cattle are checked?***

Submissions raised concerns that the time period of 24 hours was too long and it was suggested that inspection should to be more frequent. NAWAC agrees and has amended the minimum standard to the effect that dairy cows close to calving should be inspected at least twice in every 24 hours.

The matter of frequency of supervision has been keenly debated during the code development process. The context of the minimum standard relates to inspection of mobs of cows that are due to calve over a specific period. The requirement for inspection twice every 24 hours matches industry practice for cows close to calving and allows for daylight hours. Given that normal calving may take as much as 12 hours from the onset of the birth process to delivery the calf, any cow that encounters difficulty would be detected within a reasonable timeframe to protect her welfare. It is NAWAC's opinion that despite this safeguard, more frequent inspection should be encouraged. Accordingly after debate about suitable time intervals and acknowledging that the frequency will be based on the best judgement of the stockperson, the recommended best practice was amended to recommend six hourly inspections.

Concerns were raised during public consultation over the earlier version of the minimum standard in which a two hour wait before taking remedial action for calving difficulty was implied. Additionally since vigorous and regular abdominal straining are indicative of second stage labour whether the birth is progressing

normally or not, this could be interpreted as requiring intervention whenever a cow is discovered calving. NAWAC is of the opinion that whenever a cow is found having calving difficulty, then urgent action is required and hence that there should be a relevant Minimum Standard. The minimum standard was re-drafted to indicate that appropriate intervention must be taken whenever a problem is detected. No time period for observation for "non-progress of birth" has been stated due to the difficulties outlined above. NAWAC believes that the minimum standard now implies the necessary urgency for supervision and assistance that the trained stockperson can apply in their best judgement.

NAWAC also considered at some length where the term "close to calving" was too vague but decided that it should be retained as it is a term that is well understood by the trained stockperson. There is a great deal of variability in the signs that cows are about to calve. While the general pattern is for a period of udder development and relaxation of the tail head and perineum, the extent and time course of these changes vary markedly from cow to cow, so "close" is a difficult issue to define.

(c) ***Should more information on inductions be included in the code?***

The Introduction clearly states the NAWAC view that calving induction has the potential to adversely affect animal welfare. It also identifies the NZVA/ DairyInsight owned Code of Practice relating to routine induction of parturition which sets criteria for cow selection and standards for the management of inductions. The code of practice, approved under the ACVM Act 1997, controls the use of dexamethasone esters and stipulates that induction cannot be performed without the supervision of a veterinarian.

In the code version that was the subject of public consultation, there was a minimum standard which required that farmers could not induce cows unless the criteria from the Code of Practice were met. NAWAC discussed the relevance of referring to the code of practice, as it is already legislation and has to be adhered to anyway. Furthermore the code of practice currently has an expiry date in 2010. It was also noted that the dairy industry is already making clear moves away from the induction process. Accordingly the specific minimum standard was changed to require inductions to be undertaken under the direct supervision of a veterinarian but the recommended best practice, that induced calving should not be carried out except for therapeutic reasons in the treatment of an individual animal that would otherwise be at risk, remained.

NAWAC was concerned nevertheless that its position on the issue was not clearly identified. Thus the Introduction was reworded to state that NAWAC does not support the use of induction of otherwise healthy cows in order to manipulate calving patterns because it has the potential to affect the welfare of both cow and calf adversely.

23. **Calf management**

(a) ***Should bobby calves and calf care management be a separate section in the Code?***

NAWAC discussed submissions requesting bobby calves to be covered by a separate section in the code. This request was not supported by the committee, as the calf industry is relatively small and current sections in the code are relevant and belong where they are. The scope clearly states that the code "includes all calves born from dairy cows until weaning wherever they are being reared" and it was agreed that the message the committee is trying to convey is that bobby calves are the same as any other calf, and should be treated so. Bobby calves are therefore covered under the calf management section and this sentiment has been conveyed in the Introduction to the section.

NAWAC also decided to retain the formatting where issues relevant to calves are dealt with in each section as relevant (e.g. food and water, shelter) rather than group them in one single calf management section. This is because most sections are equally applicable to calves even if they are not specifically mentioned.

Submissions had raised the issue of specifications for the care of calves penned for collection by the bobby-calf truck. NAWAC was advised that industry practice now requires that bobby calves for collection are kept in normal calf pens with the stock trucks now coming off the road to collect the calves. It was agreed therefore that the minimum standard requiring their careful handling covered all further requirements for adequate care of calves not covered elsewhere in the code.

24. **Pre transport selection**

(a) ***Should more specific time restrictions be placed on transporting pregnant dairy cattle?***

One of the key issues here is that it is very common practice to transport animals between run-offs and the farm area where they are kept for milking. This will often occur in late pregnancy and could occasionally be within a few days of the cow giving birth. The movement of animals to run-off and crop is an important management practice to allow pasture to accumulate for lactating cows and so ensure their adequate feeding during early lactation. Removing the cows also serves to protect pasture from treading damage during the wetter winter periods. These run-off areas vary in their distance from the home farm and anecdote suggests that it could be between 2 and 50 km. Cows are frequently moved to run-off areas soon after drying off where they are fed either conserved pasture and baleage, or winter crops. Current practice is to return them to the home farm in several groups based on calving date but generally at least 10-14 days before calving. There are no statistics available to identify what proportion of cows is subject to this winter management practice, but anecdote suggests that it could apply to as much as one third of the cows in New Zealand.

NAWAC believes a prescriptive minimum standard that prevented cows or heifers from being transported during the final four weeks of pregnancy, as suggested in submissions, would have several negative impacts. First it would reduce the period

that cows could be kept at the run-off and require that an additional 300 kgDM per cow (based on 14 days at 10 kgDM and 14 days at 12kgDM for a 450kg cow undergoing transition which is about 7% of total annual feed requirement) would need to be found on the home farm. This would place severe pressure on the accumulated food supply which must provide for cows before active pasture growth starts. Options for providing this additional feed could be either by purchase of additional baleage and other supplement at a cost of at least $150-$200 per cow or by reducing the carrying capacity of the home farm by 7% which would reduce production efficiency. The added grazing pressure during late winter will also increases the likelihood of pasture damage from treading and could lead to reduces pasture growth by up to 20% later in the spring which will add to the pressure on feed supply (Judd et al 1994). Farmers viewed the risk associated with transport in late pregnancy as minimal compared to the downstream welfare problems associated with running out of feed in spring.

Given the importance of grazing off during winter for many farmers, one response to the submission suggesting more restrictions on transport of heavily pregnant cows might be to calve cows at the run-off and then transport them home. NAWAC's view was that this would compromise overall welfare of both the cow and calf more than the potential problems with transport. The animals are not under the same level of supervision as they are some distance away and not able to be checked frequently as calving approaches. Furthermore, facilities at run-offs generally do not provide adequately (or even at all) for dealing with calving and metabolic problems, e.g., there is rarely any electricity for light or hot water, or area in which a cow which for example required a caesarean section could be safely operated on. The risk of problems from transporting a recently calved cow and her newborn calf would also be greater. In addition NAWAC noted that transport by truck was preferable for cows in very late pregnancy rather than have to walk them potentially long distances. Further 'calving date' is an uncertain science. Gestation length has a standard deviation of ±4 days, so a cow under going a normal gestation may calve ±10 days around her due calving date. Added to that is natural variation in the accuracy of pregnancy testing data especially when mating dates are not known such as often occurs with later calving cows that have conceived to natural matings rather than to AI. As a result of these sources of variation, infringements could occur by chance, making the standard unworkable.

In summary, the overall implications of introducing a minimum standard that limits transport of late pregnant cows or heifers are complex and extensive. Unless farm management practices were changed on a significant proportion of farms, NAWAC believes the net effect would be deterioration in cow welfare on many farms due to insufficient feed supply, poorly supervised calving management and having to undertake very long walks in late pregnancy. The cost of remedying the situation could be significant to the farm business. Most farmers stated that they commonly transported animals very close to calving without issue, pointing to the need for care and good management at this time. Others suggested that the health and condition of the animals was a more important determinant of fitness to transport and more useful than setting an arbitrary date.

(b) ***Should the requirement for feeding of calves before transport be less prescriptive in the code?***

NAWAC considered how to best protect calf welfare, particularly bobby calf welfare, across the farming, transport and meat processing industries and related three codes. The minimum standard required that calves be been fed at least half a day's ration of colostrum or milk not more than two hours before transportation. Submissions received on this draft ranged from considering that two-hour limit to be impractical, to requesting more detail for bobby calf transport.

NAWAC therefore proposed that:

- the dairy code provide that all calves to be transported must have been fed at least half a day's ration of colostrum or milk not more than *two hours* before departure;
- the transport code provide that calves must be transported for no longer than *necessary*; and
- the commercial slaughter code provide that bobby calves must be slaughtered within *28 hours* of being loaded for transport.

NAWAC's intent is that once this code and the commercial slaughter code have been gazetted, the maximum allowable time from a bobby calf's last feed to its slaughter (or a second feed) will be 30 hours. NAWAC notes that, with correct feeding regimes and transport protocols, welfare compromise in young healthy calves can be minimised when they are slaughtered within 30 hours of their last feed (Todd et al., 2000).

Some submitters were particularly concerned that while it may be desirable that calves be fed colostrum as close to transport as possible, the movement of stock trucks is ultimately beyond the farmers' control. NAWAC notes that in 2008 several resources have been developed to help farmers identify and meet the welfare needs of bobby calves both on the farm once they have left the farm as part of a project involving the dairy, transport and meat processing companies. The key elements for calves being fit for transport are that they are healthy, strong and fed.

25. **Lameness**

(a) ***What definition of lameness should be used in the Code?***

NAWAC discussed the definition of lameness. It was agreed that lameness in the dairy code was referring to lameness which has a negative welfare aspect.

(b) ***Should more information on managing lameness be included in the Code?***

NAWAC discussed the varying levels of lameness, and it was agreed that the introduction should not state "very painful" as pain levels can range from mild to severe. The prevalence of lameness factors were discussed and given the importance of driving pressure it was moved to the top of this list in the introduction.

Chesterton (2006) describes the five "Golden Rules" rules to implement on farms where lameness is a problem. One example of these is that dairy cattle should never be driven so hard that the cows have to lift their heads and therefore cannot watch the ground where they are placing their feet. NAWAC agreed that advice such as this should be included in the Code. The 'Golden Rules' have, therefore, been incorporated into the recommended best practice along with a recommendation for the use of pain relief when needed.

NAWAC also discussed the need for farmers to distinguish between the levels of lameness, to allow early recognition before animals become seriously lame. Locomotion scoring is being used increasingly often as a management aid to detect lame cows early, and technology development on a number of fronts such as walk-over weighing systems and pedometers are focusing on early detection. Mention of emerging detection technologies and also the DairyNZ 'Healthy Hoof' a programme is to help farmers reduce lame cows through improved management of cows and people has been added to General Information.

26. **Emergency humane destruction**

(a) ***Should more information on 'how to' be included in the Code?***

NAWAC considered emergency humane destruction a critical welfare issue that must be addressed carefully. It was agreed that this section would be amended to include minimum standards, recommended best practices and substantial general information within the code, rather than just a reference to other sources of information.

The Minimum Standard enforces that killing should be effective and humane, with all staff trained in appropriate techniques. NAWAC also considered it important to state that all farmers should own a captive bolt device, which would increase the use of this preferred technique. While the availability of these devices has previously limited, a commercial source of a device that is suitable for euthanasing an adult dairy cow has recently become available for a reasonable price. These devices are safer for the operator, and more humane in terms of the nature of the stun delivered and because their use is less prone to errors in their operation which could increase animal suffering. Farmers who have used these devices have noted that they much prefer this method than what they have previously used and expressed a wish that they had had them available earlier.

Other issues considered by NAWAC

27. Some submissions requested more human safety information to be included in the code. NAWAC considers that this code is OSH for animals, not OSH for humans. NAWAC also recognises that repeatedly long hours are not unusual on a dairy farm, but that animal welfare would be affected if humans were not there and there are certain times of the year when this is required.

28. NAWAC has considered how the Code aligns with other relevant codes and regulations both in New Zealand and internationally. NAWAC is not aware of any examples where the Code deviates significantly from these documents.

The nature of any significant differences

29. All significant differences of opinion about the Code, or any of its provisions, have been set out above or in NAWAC's response to submissions.

Dr Peter O'Hara
Chairman, National Animal Welfare Advisory Committee
15 December 2008

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