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The welfare of bobby calves sent for slaughter: a synopsis of the science literature within the context of New Zealand's export system and the problems and gaps in it

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Abstract

Most neonatal animals are healthy and vigorous but vulnerable, particularly during the first week of life, to hypothermia and starvation, infections and injuries, and predation. Information collated from the scientific literature and routine ante-mortem inspections indicates that the main factors predisposing bobby calves to death or condemnation are inadequate colostrum/feeding, and immaturity. Correct feeding regimes and transport protocols can minimise welfare compromises to healthy calves and most presented for slaughter were found to be strong, alert and well fed. However, small numbers of immature, weak, sick and injured calves were also presented. Dead or moribund calves had digestive tract disorders, umbilical infections or were undiagnosed. No curd in the rumen and immaturity were common secondary findings. What is less understood is the degree of hunger bobby calves may experience; the interaction between age/maturity, husbandry, feeding practices, transport and lairage; the limits of feed deprivation in 'marginal' calves; compromises to welfare amongst those animals which do not die or are condemned prior to slaughter; and the impacts of any procurement and processing requirements for periods in lairage.

Keywords: calves; transport; slaughter; animal welfare; mortality; health; hunger

Introduction

Calves presented for slaughter at export-licensed premises are routinely inspected on arrival by plant staff and veterinarians, and in the period they are held in lairage. A Ministry for Primary Industries programme, begun in 2008, monitoring deaths and those condemned and euthanized in lairage, in order to ensure and improve calf welfare, was reviewed by industry and regulatory interests in 2015. This contribution is a synopsis of the animal welfare compromises experienced by bobby calves produced as part of that review, collated from both scientific literature and the results of routine ante-mortem inspections, and reflection on the adequacy of this knowledge. In addition, with the subsequent public exposé of instances of poor calf welfare leading up to slaughter (e.g., Anonymous 2015), and the investigation and prosecution of offenders (e.g., Anonymous 2016), the opportunity was taken to consider if this knowledge aligned with the concerns of the public regarding the treatment of bobby calves.

Animal welfare compromises

When pregnancy and birth go well, and the animals are managed knowledgeably, most newborns are healthy and vigorous and show few, if any, signs of disability (Mellor & Stafford 2004; Dwyer & Baxter 2016). However, young neonates are vulnerable and the major factors predisposing them to death during the first 3-7 days after birth include hypothermia (either exposure to cold or an inability to produce heat), starvation (including maternal underfeeding and misothering), infections, injuries and/or predation.

Bobby calves face two additional risks to their welfare, food withdrawal and transport, the duration of which can both vary across differing management practices. Handling and transport can impact on calf welfare through factors such as the quality of stockmanship, social disturbance,

exposure to adverse novel and environmental conditions, fear, fatigue, injury and motion sickness. Inadequate colostrum intake can compromise a calf's ability to deal with these challenges. Prior to the onset of feeding after birth, energy is derived from the newborn's own tissues (e.g. liver and muscle) after which colostrum and milk become the source of energy (Mellor & Cockburn 1986). Dairy calves are managed differently to other production animals as they are removed from their dams at varying periods after birth. It is likely that this practice has reduced selection pressure for cows and calves to develop a strong relationship (intensely-selected dairy breeds show weak bonds – Phillips 2002) and so created the risk that calves do not feed correctly, evident in inadequate intake of colostrum (Vermunt et al. 1995; Wesselink et al. 1999; Lawrence et al. 2017). Low or a lack of colostrum intake can predispose calves to increased ill-health and risk of death (see Deaker & Fisher 2002).

The impacts of depriving animals of feed and water have been well documented in adult or prime animals being transported (Hogan et al. 2007), but there is a paucity of data on the effects of different periods of feed deprivation on bobby calf welfare. Furthermore, it is difficult to separate the effects of being deprived of feed from the effects of transport since the two are experienced concurrently. There may be additional energy demands during transportation associated with maintaining posture in a moving vehicle and thermoregulation in unfavourable conditions (Lawrence et al. 2004).

A New Zealand study suggested that with correct feeding regimes and transport protocols, and providing calves are healthy, then withdrawing food for up to 30 hours and transporting them up to 12 hours, then welfare compromises can be minimised when they are slaughtered within 30 hours of the start of transport (Todd et al. 2000).

An Australian study found that transport (6-12 hours) did not have a significant additional effect on calf welfare beyond that caused by the withdrawal of daily feeding, indicating that time off feed needs to be carefully managed (Fisher et al. 2014). Thus, transport may not be an additional significant stressor in some circumstances. However, there are indications that space and flooring during transportation are also important for calf welfare (Jongman & Butler 2014).

What is not known, but which is highly relevant, is the degree of hunger bobby calves experience. Changes in metabolites have been used to infer hunger, but it should be noted that, at least initially, these metabolites reflect normal homeostatic changes as the animal adapts. However, the point at which hunger becomes a welfare concern has not been identified (Gregory et al. 2009), mainly because hunger is not well understood scientifically, at least in farm animals (Lawrence et al. 2004).

Status of calves presented for slaughter

Stafford et al. (2001) assessed over 7000 bobby calves transported between 75 km and 300 km (up to eight hours on a truck) and presented for slaughter during one spring-calving season, and concluded that most were in an acceptable state of welfare. They were regarded as strong, observed to be walking freely, were round-sided, bright and alert and had a dry umbilicus. However, approximately 2% were classified as marginal, having a wet umbilicus, were hollow-sided, apparently immature, or weak, slow and unsteady on their feet. Calves lying down, 0.4% (27/7,169), were unable to walk, extremely weak or seriously injured, deemed unacceptable and euthanised on arrival. Plasma enzyme levels indicative of colostrum were lower in marginal and unacceptable calves, and also decreased in acceptable and marginal calves during the time in lairage. The authors concluded that calves classified as marginal failed to meet the requirements of the then animal welfare standards, which, if met, meant that calves could tolerate transport and lairage satisfactorily.

Causes of death or of needing to be euthanised

Thomas and Jordaan (2012) determined the reasons why bobby calves died or were euthanised prior to slaughter, or were condemned at post-mortem inspection. The 42,494 calves had been sent for slaughter at a single Southland slaughter premise during the 2011 spring-calving season. They had been transported from 15 mins to 9 hours (median five hours) prior to arrival, and were to be slaughtered the day following arrival at the plant (there was no indication of the times spent in lairage). The causes of 'death' of 247 out of 288 calves found dead on arrival or condemned, died or euthanised prior to slaughter (a mortality rate of 0.7%), were associated with digestive tract disorders (41%), navel ill including infections or omphalitis (23%), and miscellaneous or other causes, e.g., trauma, developmental disease, blood infections or

septicaemia, pneumonia, arthritis (8%). The cause of death was unknown in a further 29% of calves.

Calves with digestive tract disorders and navel complications were also found to have evidence of abomasal ulceration, diarrhoea, were immature, and/or had milk in the rumen and/or no curd in the rumen. (Other less frequent secondary findings included mild navel ill, mild diarrhoea, trauma and emaciation.) However, the most prevalent secondary findings were no curd in the rumen (25% of calves) and immaturity (21%). Omphalitis and septicaemia were also common findings in a further 180 calves that were condemned during routine post-mortem meat inspection. The authors commented that compliance with pre-transportation husbandry and feeding practices required further investigation where calves had no curd in the abomasum or were immature or emaciated.

Mortality rates at processing

Numbers of bobby calves dying or having to be euthanised prior to slaughter have been routinely collated by Ministry for Primary Industries veterinarians since 2008. The 2015 and 2016 spring-calving seasons saw approximately 2 million calves presented for slaughter. The average mortality for all export premises was 0.25% in 2015 and 0.12% in 2016, made up of animals dead or condemned on arrival at meat processing plants, and those that died or were condemned while in lairage prior to processing (Table 1). In both years, there was variation between premises in overall mortality (0.02-0.46% in 2015, and 0.02-0.32% in 2016). The rate continues the trend towards decreasing deaths, evident over the last nine seasons (Figure 1).

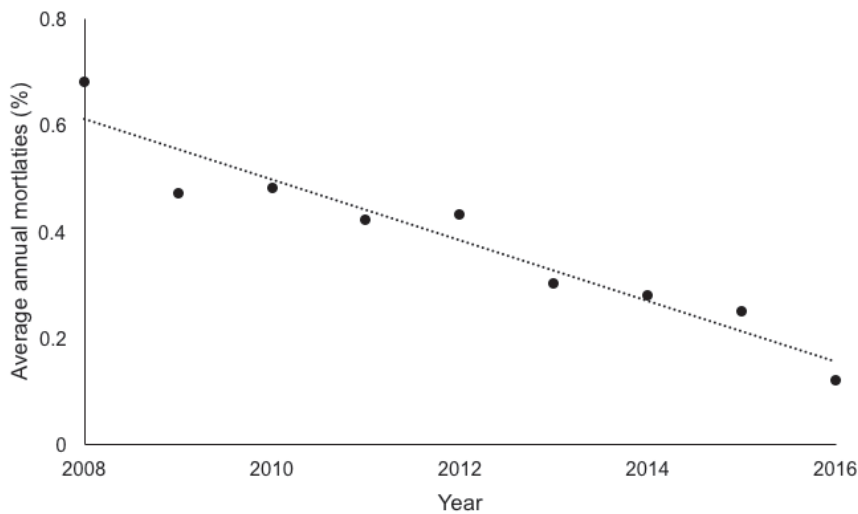
Public concerns with the treatment of bobby calves

In late 2015, the welfare of bobby calves awaiting transport for slaughter, and their treatment at a pet-food processing plant, was the subject of a covert Farmwatch and SAFE investigation and subsequent television exposé (Anonymous 2015). The appalling treatment of some calves resulted in the prosecution of one individual (Anonymous 2016), with charges laid against another. The exposé heralded much comment from farmers, industries, government, politicians, and the general public. In order to assess if our appraisal of the issues was consistent

Table 1 The number of bobby calves presented for slaughter at export-licensed slaughter premises in New Zealand during the 2015 and 2016 spring-calving seasons, and the number (%) dead or condemned on arrival, and died or condemned in lairage (K O'Grady & R Wild, unpublished data).

Year	Calves presented for slaughter	Calves dead or condemned on arrival	Calves died or condemned in lairage
2015	2,171,103	1979 (0.08 %)	3417 (0.16 %)
2016	1,935,054	968 (0.05 %)	1287 (0.07 %)

Figure 1 Average spring-calving annual mortality rates (calves died or euthanized on arrival or during lairage) at export-licensed processing plants in New Zealand from 2008 to 2016.



with public concerns, the subjects of 109 unsolicited emails received by the Ministry for Primary Industries in response to the exposé (via animalwelfare@mpi.govt.nz) during the period 29 November to 6 December 2015 were investigated. A qualitative content analysis extracted the main themes expressed in each email and their frequency (Table 2). Concerns were primarily related to a perceived lack of action or enforcement and expressions of disgust or distress at the video footage were voiced. More specific themes included concerns over the handling of the calves;

Table 2 A summary of the main themes expressed to the Ministry for Primary Industries in 109 unsolicited emails between 29 November and 6 December 2015, immediately following the public exposé of inadequate treatment of bobby calves.

Theme	n
Concern at the lack of regulatory care or action	108
Feeling of disgust or distress in reaction to the footage	66
Concern for New Zealand’s reputation	30
Concern over the handling of calves (throwing, dragging, kicking)	26
Concern over cruel slaughter techniques	22
Statement that they will stop consuming milk and/or hope others will	19
Calves need extra care because they are vulnerable	19
Calves are left in loading facility too long before pickup	8
Concern over removal of calves from mothers	8
Inadequate shelter provided to calves	7
Belief that money is more important to industry than calf welfare	6
Calves should not be slaughtered just because they are unwanted	5

inadequate or cruel slaughter techniques; the need for extra care compared to other animals because calves are especially vulnerable; that calves are left in loading facilities too long before pickup; that calves should not be removed from their mothers or that the removal should be more humane; inadequate shelter; and that calves should not be slaughtered just because they are unwanted or unprofitable.

Discussion

Collectively, the scientific literature indicates that providing calves are fit and healthy, they seem to be able to tolerate transport and time off feed, and

any compromises to welfare are minimised by slaughtering them as soon as possible. However, a small number appear to be inadequately prepared and/or were unfit for transport. This, together with the information collated at export slaughter premises indicating plants/processors vary in the number of calves dying or condemned, raises the possibility that some suppliers, transporters, plants and/or processors can improve calf management. Variations in average death rates could potentially reflect differences in the health status, maturity or fitness of calves selected for transport, transport quality, and/or climatic conditions. Perhaps it also reflects how well calves have been fed in the first four days of their life. Dwyer and Baxter (2016) suggested there is scope to make greater use of the behavioural abilities of both cows and calves to, for example, produce stronger bobby calves. In addition, variations in the number of calves dying or condemned might also reflect differences in the period of time, and the conditions, in which calves are held in lairage awaiting slaughter, in part influenced by procurement and processing arrangements, especially at the end of the season.

As bobby calves have few energy reserves, it would seem sensible to conclude that they would experience hunger the longer they are deprived of feed. Consequently, it is essential that they are slaughtered as soon as possible without unnecessary delays that would be expected to exacerbate hunger. While the difficulties in procuring livestock for efficient plant operation and the necessity to hold animals in lairage for varying periods is acknowledged, it is also necessary to give consideration to the impact of those practices on calf welfare. The higher death rates recorded at some plants suggest that at least some calves are reaching the limits of their tolerance to metabolic depletion. More sophisticated means of judging hunger in bobby calves, e.g., the motivation to feed, or suck, should not be too difficult to research (e.g., de Passillé 2001, Viera et al. 2008) and would help to determine the impact of the

limits of feed deprivation on the animals' wellbeing.

Other factors which are deserving of scrutiny include the interaction between the different factors affecting calf welfare, the effects of age/maturity on welfare, and the acceptable limits of feed deprivation in 'marginal' and 'acceptable' calves. Finally, our focus on the number of deaths or calves requiring to be euthanised, overlooks the compromises to welfare amongst those animals which do not die, but may experience suffering. The causes of, and contributing factors to, dairy calf morbidity and mortality are being further investigated in an Operational Research project commissioned by the Ministry for Primary Industries and currently being undertaken by Massey University and AgResearch.

As animal welfare and ethics are connected (Tannenbaum 1991; Fisher 1998), and one understanding of ethics is the systematic and rational reflection of moral issues in the public sphere (Lassen *et al.* 2006), it is not surprising that animal welfare is increasingly being determined by what society sees as acceptable. While public concerns may or may not be valid, they provide a focus for discussion, suggesting scientific endeavours need to be aligned with them where relevant. The responses of a somewhat provoked public concur with the scientific literature, acknowledging the vulnerability of bobby calves and the need to treat them humanely and enforce standards. They also suggest that attention should be given to animal handling, slaughter techniques, and the conditions prior to transport, e.g., the provision of shelter and the duration of time before being picked up. In addition, there was concern surrounding the breeding of essentially 'unwanted' bobby calves in the first place. This suggests that industries not only need to demonstrate better care of young and vulnerable animals and justify their slaughter, but consider other means of making better, more humane, use of them.

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