Determining a suitable time off feed for bobby calf transport under Australian conditions

A summary of research commissioned by Dairy Australia and the Department of Agriculture Fisheries and Forestry (Fisher *et. al*. 2010, in preparation) to support the development of a science-based maximum time-off-feed (TOF) standard for bobby calves.

The *Australian Standards and Guidelines for the Welfare of Animals: Land Transport of Livestock* were endorsed by the Primary Industries Ministerial Council (PIMC) on 21 May 2009. As part of this decision, PIMC also resolved that, in relation to the management of bobby calves, a science-based standard for maximum allowable time off feed was to be prepared through Animal Health Australia (AHA) for consideration by PIMC, and that this would require the completion of a Regulatory Impact Statement and a public consultation period.

The Australian study, which is yet to be published, concluded that transport was not a significant additional impost on bobby calves and that 30 hours, with good practice in other aspects of calf management and transport, was a suitable maximum time-off-feed limit for bobby calves. This finding is supported by the results of research on the calf transport issue conducted in New Zealand in 2000, where there is a comparable bobby calf industry. The published scientific study from the Institute of Veterinary, Animal and Biomedical Sciences at Massey University indicated that bobby calf welfare was not unduly compromised by a time off feed of up to 30 hours (Todd *et al*. 2000, Research in Veterinary Science 68:125-134). The study measured a range of blood biochemical variables in the calves, and the authors concluded that food withdrawal for up to 30 hours and transport for up to 12 hours had no detrimental effects on the metabolism of healthy calves. The study concluded that with correct feeding regimes and transport protocols, welfare compromise in young, healthy calves being transported for up to 12 hours can be minimised when they are slaughtered within 30 hours of the start of transport.

The Australian study was conducted in 2009/10 by Dr Andrew Fisher and colleagues from the University of Melbourne and the Animal Welfare Science Centre. It has provided data for Australian conditions.

The objectives of this experiment were:

1) to determine the welfare and metabolic state of 5- to 10-day-old dairy calves in response to increasing time off feed- up to 30 hours, in conjunction with three transport scenarios; and

2) to use these results to provide objective scientific evidence, along with the published New Zealand information, to support the Australian development of an appropriate standard for maximum permissible time–off-feed for the bobby calf supply chain.

Materials and Methods - in brief

The study was conducted in three replicates over three consecutive weeks from late August to mid September on a commercial dairy farm in Gippsland, Victoria. A total of 60, 5 to 10-day-old male dairy calves were studied across four treatments all involving 30 hours without feed (n = 15 per treatment):
1) Control - remain in situ without feed for 30 hrs;
2) No feed for 30 hrs including transport for 6 hrs to a new environment;
3) No feed for 30 hrs including transport for 12 hrs to a new environment;
4) No feed for 30 hrs including transport for 6 hrs in two trips with an intervening 6 hrs interval in a new environment.
These different treatments were designed to simulate the types of transport scenarios to which bobby calves are currently or likely to be subjected as part of commercial practice.

The day before treatment, 20, 5- to 10-day-old male calves were randomly assigned to one of the four treatments (n=5) balanced for age. Prior to this calves had been managed by farm staff in accordance with standard farm practice. On the day of treatment, calves were offered their normal daily milk allocation of 5L at 0600h. To satisfy a requirement for calves to be fed within 6 hrs of transport, calves in treatments 2, 3 and 4 were loaded at 1200h and transported. A recognised calf transporter was commissioned to transport the calves in a standard commercial vehicle regularly used for transporting these animals. During transport, calves were on unbedded flooring and confined to one of the dividing pens on the truck at a stocking density of $0.3m^2$ per animal. The transport driver took a similar predetermined route on each of the 3 transport days returning to the farm at regular intervals to allow the calves to be checked.

The study concluded at 1200h on the second day after 30 hr of feed withdrawal. At this point all calves in treatments 1 to 4 were fed milk and handed back to the farm to manage.

Prior to treatment calves were fitted with behaviour loggers to measure standing, lying and walking behaviour. Calves were also fitted with rectal temperature loggers. Blood samples were collected by jugular venepuncture from all calves at the following time points: Day One 0600h (Pre-feeding); 0900h (Post-feeding); 1200h (Pre-loading); 1800h; 2100h; 2400h; Day two 0600h; 1200h (immediately before re-feeding).

Blood samples were analysed to measure biochemical variables indicative of:

- metabolic state (glucose, 3-hydroxybutyrate, lactate)
- hydration (packed cell volume, total serum protein)
- colostrum feeding (gamma-glutamyl transferase)
- muscular exertion and bruising (creatine kinase)

Calves were weighed immediately prior to transport on the day of treatment (approximately 6 hours off feed) and at the conclusion of the study the following day at 30h off feed- this final weight was prior to the calves being re-fed.

Results and Discussion.

Behaviour and temperature data did not reveal major effects. The blood results indicate that transport *per se* was not a significant additional impost on the animals in terms of the key variables indicating metabolic status and hydration. Muscle enzyme levels did increase somewhat in the 12-h transport group compared with the other groups. Most variation in blood variables measured was due to time off feed, rather than transport duration.

Hydration levels appear to be relatively unaffected by the time off feed. In terms of energy status, plasma glucose concentrations were the most altered variable. These increased after feeding, declined slowly for some hours, and then declined more steadily after about 18 h off feed, which is consistent with the expected pattern of a typical daily feeding cycle. Mean glucose at 30 h was close to, but not below published reference values for dairy calves less that 2 weeks of age. A proportion of calves (~12%) were below the lower reference value at this time point, and this proportion was slightly greater than would be assumed by chance.

Conclusions.

In the Australian study, transport was not a significant additional impost on the animals. The period of feed withdrawal did not adversely affect hydration, behaviour or body temperature, but did induce metabolic effects. Based on the data, and the conclusions of the similar New Zealand study, the Australian study's authors concluded that 30 h with good practice in other aspects of calf management and transport was suitable as the maximum time off feed limit for bobby calves. This study is being prepared for publication in a peer reviewed journal.

The Australian study report has been considered by the Bobby Calf Working Group to be a relevant scientific report for the development of a recommended standard permitting up to 30 hours time off feed for bobby calves, in association with existing bobby calf transport standards.