Improving the welfare of feedlot cattle

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Introduction

In modern times the trend in beef cattle production has been towards large production units and large group housing in feedlots. While in some ways this trend improves welfare, for example by allowing full social contact, it also introduces a range of problems, including frustrated motivation, competition and poor animal-human interactions. These factors can have a negative impact on health and production (Lidfors & Jensen, 2003; Underwood, 2002). While there has been substantial research carried out regarding the welfare of pigs and poultry in intensive systems, there have been relatively few carried out for cattle (Wilson, Fell, Colditz & Collins, 2002).

Discussion

The results of several studies have suggested that climatic conditions can result in significant discomfort in feedlot cattle, with affected animals showing signs of disturbed behaviour, impaired physiological function and subsequently reduced weight gain and increased mortality (Hahn, 1994; Lefcourt & Adams, 1996). These factors can have severe economic impacts for producers (Mader, 2002). To address this problem, two recent studies have investigated two different ways of alleviating heat stress in feedlot cattle.

To determine the effect, if any, shade had on performance, immunology, carcass traits, respiration rate and behaviour of heat-stressed feedlot heifers, Mitlöhner et al (2002) conducted a 121-day study in Texas that began in mid-June. In conditions similar to that in a commercial feedlot, 168 heifers were housed in 12 soil-surfaced pens. Half of the pens were provided with a 4m high, galvanised, steel-roofed shade (providing 2.12m2 shade/heifer), while the other six served as unshaded pens. Throughout the course of the study, performance measures (dry matter intake, body weight, average daily gain, gain:feed) were measured and dietary NEm and NEg concentrations were calculated. Blood samples were taken to measure immunological responses, behaviours were assessed, respiratory rates were measured and carcass traits were collected at slaughter.

Results showed that shaded heifers had higher dry matter intakes, average daily gains, and final body weights than control heifers. Grain:feed ration and NEm and NEg concentrations were the same for both groups. While most carcass traits did not differ between the treatments, more carcasses from shaded heifers were graded United States Department of Agriculture Choice compared with unshaded heifers. Respiratory rates and numbers of circulating neutrophils were lower in shaded animals, and shaded heifers spent more time lying down, less time standing and showed less agonistic and bullying behaviour than the unshaded control heifers. The study concluded that shade improved performance and altered behaviour of feedlot heifers in the hot summer climate of Texas.

In a different approach to reducing heat stress, Mader et al (2002) used 84 15mo *Bos taurus* crossbreed steers to investigate the effects of limit-feeding feedlot cattle in hot climatic conditions. To achieve this, pens of seven steers were fed feedlot-finishing diets and randomly assigned one of three treatments: 1) restricted to ~75% of ad libitum for 21 days; 2) restricted to ~75% of ad libitum for 42 days; 3) feed offered ad libitum. There were 4 pens per treatment. Tympanic temperatures (TT) were then logged via thermistors inserted into the ear canal. The results showed that restricting feed intake reduced tympanic temperature and decreased the incidences of panting and bunching behaviour in both the 21 and 42-day treatment groups when compared to the ad libitum group. It was hypothesised that this was most likely due to a reduction in metabolic heat load and/or a concurrent reduction in metabolic rate. The ad libitum group

displayed a greater number of bunched steers panting when compared to the other groups, and it was also noted that dark-coloured cattle tended to bunch more. Bunching behaviour is thought to reduce radiant heat absorption as animals provide shade for each other (Lefcourt and Schmidtmann, 1989). Dark-coloured steers also had the greatest percentage of individuals showing moderate to severe panting and had TT 0.2 - 0.6ºC higher than those of the light-coloured steers. Hence, the researchers not only concluded that limit-feeding feedlot cattle in a hot environment is a successful way of enhancing animal comfort by alleviating the combined effects of high climatic and metabolic heat load, but also that dark coloured cattle tended develop more heat-stress than lighter coloured cattle.

In addition to suffering from climatic stress, feedlot cattle spend the majority of their time idling, and it is hypothesised by some (Pelley et al, 1995) that the lack of stimulation in bare environments leads to frustrated motivation and the development of aggression and abnormal behaviour, and that environmental enrichment may relieve frustrated motivation acting to improve welfare and production (Pelley et al, 1995). While previous studies have had mixed results (Wilson et al, 2002; Pelley et al, 1995), Mench (1998) suggests that negative results may reflect the wrong choice of enrichment devices for the animals involved.

The final study aimed to address this by assessing the appropriateness of several potential enrichment devices for feedlot cattle. In this study, Wilson et al (2002) set up three feedlot pens in which they placed ten Charolais cross heifers. The heifers were then observed over 22 days, for frequency and duration of use of five potential environmental enrichment devices (EEDs). The percentage of animals interacting with each device was also monitored. The devices employed were a scratching/rubbing walkway, a moveable scratching/rubbing device, and three scented devices (lavender, milk-scent and a non-scented control). Use of the scratching/rubbing device decreased in frequency and duration but stabilised by day 16, whereas the movable device fluctuated by remained constant between days two and 22. More animals used the scratching/rubbing than the scent devices. Use of the milk and lavender releasing devices was higher on day 2 than that of the non-scent device, but there were no differences for the remainder of the study. Thus, the results indicate that scratching/rubbing devices are good environmental enrichment systems, whilst scent devices are of little use.

Once ways of enhancing welfare and increasing productivity have been identified through research, the ultimate challenge is to apply the results of research into practice in commercial industry. There are several ways in which improvements in farm animal welfare can be achieved, such as providing stockpersons with knowledge and training, by introducing financial incentives through consumer demand or subsidies, and through supporting legislation (Knierim et al, 2003).

Conclusion

The results of the above studies have the potential to improve the welfare of cattle housed in intensive feedlots. They suggest that environmental modifications aimed at reducing heat stress can improve animal comfort thus positively influencing productivity. Potential modifications include the provision of shade and the selection of light-coloured cattle. In addition limit-feeding feedlot cattle is an effective means of reducing heat load. In addition, it seems that provision of appropriate environmental enrichment devices holds promise for enhancing welfare.

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