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Comparison of time budgets of growing Hereford bulls in an uninsulated barn and in extensive forest paddocks

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Abstract

The housing of growing cattle in forest paddocks has recently become more common in Finland. Besides economic reasons, the practice could be justified by increased behavioural freedom of the animals. Since the behaviour of growing bulls in extensive housing has scarcely been studied, we conducted a study to investigate the behaviour of Hereford bulls in an uninsulated barn and in forest paddocks during summer. Bulls born in spring were housed from November onwards in either partly bedded pens in an uninsulated barn (two groups of five bulls, 6.4 m^2/bull) or in forest paddocks (two groups of five bulls, 1000 m^2/bull). All animals were fed a total mixed ration *ad libitum*. The following summer, the behaviour of the bulls (age 15–18 months) was observed for 24 h (00:00–00:00) in July and for 15 h (06:00–21:00) in August and September. Instantaneous sampling with a 5-min sampling interval was used. The paddock bulls performed more self-grooming and walking, and less drinking and other behaviours (e.g. idling in standing position) than the pen bulls during all or most of the observations. There were no differences between the groups in time spent on eating at the feeding trough, object manipulating, ruminating, social licking, butting or resting during any or most of the observations. Furthermore, the paddock bulls spent also some time on grazing and browsing. Stereotyped tongue-rolling or bar-biting was not found in either housing environment. The results of the present study show that the bulls readily utilise the opportunities for more diverse behaviour (e.g. foraging, locomotion) in the paddocks. In the pens, drinking behaviour was disturbed, probably due to the lower space allowance and the rather slow refilling rate of the water bowl. Otherwise also the relatively spacious, partly bedded pens in the uninsulated barn seemed to be satisfactory in regard to the bulls' welfare, because clear behavioural signs of distress, such as stereotypies or severe aggression, were not observed in the pen bulls.

Keywords: Bulls; Forest paddock; Uninsulated barn; Behaviour; Time budget; Welfare

1. Introduction

European agricultural policy reforms have resulted in great changes in the beef sector. In a high cost country such Finland, these reforms have important

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implications for the economics of the beef sector and for farmers' incentives to rear cattle (Pihamaa and Pietola, 2002). Because profitability in beef production requires large production units, many beef producers have been investing in larger production units in recent years (Jalonoja et al., 2004). Production costs can be reduced also by using simple housing solutions and, therefore, extensive housing of growing cattle has become more common in sparsely populated parts of Finland. In this practice animals are raised year-round in spacious enclosures that are built up in forested areas (Uusi-Kämppä et al., 2007).

Besides economic reasons, the housing of growing cattle in forest paddocks could also be justified by the increased behavioural freedom for the animals compared to conventional housing in tie-stalls or group pens. However, the behaviour of growing bulls in extensive conditions has been scarcely studied. Studies with cows and heifers have shown that at pasture the animals e.g. behave in a more synchronised fashion (O'Connell et al., 1989; Miller and Wood-Gush, 1991; Krohn et al., 1992), have fewer agonistic interactions (O'Connell et al., 1989) and exhibit less stereotyped tongue-rolling (Redbo, 1990) than animals housed in close confinement in cubicle houses or tie-stalls.

We hypothesise that a complex and spacious environment such as a forest paddock could have positive effects on the welfare of growing bulls, e.g. by allowing the bulls better opportunities for normal species-specific behaviour. In the present study, we aimed to compare the behaviour of Hereford bulls in an uninsulated barn and in forest paddocks during summer months. The possible welfare effects of these two housing systems are also discussed.

2. Materials and methods

2.1. Animals, environments and feeding

This study comprised 20 Hereford bulls. They were born in spring 1999 at the Tohmajärvi Suckler Cow Barn (62°20′N, 30°15′E) of MTT Agrifood Research Finland. The bulls were kept on their first summer at pasture with their dams. In autumn 1999, the bulls were weaned and transferred to the North Ostrobothnia Research Station (Ruukki, 64°44′N, 25°15′E) of MTT Agrifood Research Finland where the present experiment was conducted.

In November 1999, the bulls (age 6.8±0.5 (mean±SD) months) were divided into four groups of five animals according to their live weight and placed in two different housing environments. Two groups of five bulls (pen bulls) were placed in an uninsulated barn in two adjacent pens (4×8 m). The uninsulated barn was covered with a roof and it had solid wooden walls on all sides except the front that was left open. In the pens, the space allowance was 6.4 m^2 per bull, which was 2.4 m^2 per bull more than the minimum recommended space allowance for the cattle over 500 kg live weight (LW) in this type of housing in Finland (Ministry of Agriculture and Forestry, 1997). The rear half of the pen area was a straw bedded lying area and the fore half with a solid concrete floor was used as a feeding area. A feeding trough was situated in the front of the pen, and there was 0.8 m feeding space per bull at the feeding trough. There was one water bowl between the two pens providing water for all ten bulls.

Two groups of five bulls (paddock bulls) were placed in two adjacent forest paddocks (50×100 m) that were constructed in young forest. The vegetation of the paddock area consisted mostly of young conifers mixed with some birch (Uusi-Kämppä et al., 2007). At ground level there were twigs and grass. The two adjacent paddocks were separated with a wooden fence. The other three sides of the paddocks were enclosed with an electric fence. In the paddocks, the space allowance was 1000 m^2 per bull.

A simple, roofed, three-walled shed (8×4 m) was available for the bulls between the two paddocks. The floor of the shed was deep straw bedded. In front of the shed was a feeding area (8×4 m) with a solid concrete floor. The shed as well as the feeding area were split in two with wooden walls so that each group of paddock bulls had access to a 4×4 m shed area and a 4×4 m feeding area. A feeding trough with 1.0 m feeding space per bull was situated in front of the feeding area opposite to the shed. There was one water bowl in the feeding area providing water for all ten bulls.

All bulls were fed with a total mixed ration (TMR) *ad libitum*. The dry matter (DM) of the TMR was composed of grass silage and rolled barley, 500 g/kg DM of each. The TMR was supplemented with appropriate minerals and vitamins.

2.2. Behavioural observations

The behaviour of the bulls was observed three times during the summer in 2000. Observations were carried out during the daylight hours, i.e. in July for 24 h (00:00–00:00) and in August and September for 15 h (06:00–21:00). At the outset of the behavioural observations in July, the bulls were 15.4± 0.5 months old and weighed 665±52 kg. During all observations, the weather was dry most of the time. During observations (06:00–21:00 h) the average rainy hours were 0.7, 1.9 and 0.0, the maximum temperatures +23.7, +21.9 and +15.1 °C, the minimum temperatures +6.4, +5.6 and +4.6 °C and the mean temperatures +18.5, +15.1 and +10.9 °C in July, August and September, respectively.

The bulls were observed directly using instantaneous sampling with a 5-min sampling interval (Martin and Bateson, 1993). The posture and activity of each bull were registered according to a classification that is presented in Table 1. Each bull's location (bedded lying area, concrete floored feeding area, forest) in the pen or the paddock area was also registered.

Both groups of the pen bulls were observed simultaneously whereas the two groups of the paddock bulls were observed