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Short communication

Impact of elastic stall partitions on tied dairy cows' behaviour and stall cleanliness

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ABSTRACT

The aim of this study was to investigate the effects of soft elastic stall partitions on the positions in own or neighbouring stalls by dairy cows, faeces and urine, and of contact between animal and partition. There were two designs of a soft elastic partition, here called *I*-partition and λ-partition. The study was performed on a commercial dairy herd where the partitions had been developed. After clinical examination 16 lactating cows were selected and used as focal animals, and paired for video recordings. The animals were placed, according to their size, on stalls with different breadths and lengths. Each pair of focal animals was video recorded continuously for 9 days according to the following sequence: (1) with partition 3× 24 h; (2) without partition 3× 24 h; (3) with partition again 3× 24 h. Before each such session each focal pair was again clinically examined. Behaviours were analysed per hour, summarised per 24 h and analysed with a mixed linear model or Wilcoxon Rank Sum test.

Without partitions more urine ($p < 0.05$) and faeces ($p < 0.05$) landed on the neighbouring cow's stall and the time standing 45° to the manger was longer ($p < 0.01$), whereas the time standing 90° to the manger was shorter ($p < 0.01$). Without partitions three out of the 16 cows were standing and three were lying parallel to the manger. Presence or absence of partitions did not influence the total lying time per 24 h. Cows with the λ-partition defecated more seldom in neighbouring stalls than cows with the *I*-partition ($p < 0.01$). It is concluded that without partitions between tied animals more eliminations on neighbouring stalls and more deviations from the 90° position in relation to the manger occurred. This seems to be the first experimental study of how partitions influence the behaviour of tied cattle and the results support the general advice that tied cattle should have partitions.

1. Introduction

General advice to have partitions on both sides of tied cattle is often given in order to prevent disturbances or intrusions by neighbouring animals and to prevent stalls from getting dirty by droppings from neighbouring animals (*e.g.* Bakken, 1978). The motive is to avoid intrusion by adjacent animals which could cause traumatic injuries and cause animals to get dirty through manure and urine. However, no experimental or epidemiological studies showing the efficiency of partitions seem to have been published. Indirect evidence is that more cases of mastitis have been reported when partitions were missing (Klastrup, 1978).

Traditional partitions are usually constructed of iron pipes, either as an upside down "U" shape with the ends

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fixed in the stall floor, or L-shaped with one end fixed in the floor and the other in the manger. However, the solid construction involves risks for the stockman becoming squeezed or might injure sick cows that are not able to rise. Some farmers hesitate to install partitions or install them only between every second cow. A farmer in Sweden therefore, for his tied dairy cattle herd, constructed two types of soft and elastic partitions.

The aim of this study was to evaluate if the presence or absence of these two types of partition, here called type *I* and type λ, influenced the cows' intrusive and eliminative behaviour in neighbouring stalls, and to find out if one of the designs had any advantage over the other.

2. Material and methods

2.1. Animals, housing and management

The study was performed in a Swedish commercial dairy herd with 50 cows of the Swedish Red (SR) and Swedish Friesian (SF) breed. The cows were tied with cross-chain ties at the manger, and there were two parallel mangers equipped with lockable feeding barriers between stalls and manger. The barriers were open during feeding and locked during resting periods when the animals could eat the uncut oat straw used as bedding. At the manger there were 23 stalls per side with a breadth of 105–120 cm and a length of 202–210 cm. The farmer placed each animal according to its size on the different stall sizes. The gutters behind the stalls were 50 cm wide and 20 cm deep. The stalls were regularly cleaned and manure and soiled bedding put into the gutter before each milking and before the morning and evening spreading of new bedding, and at about 22:00 h with the last daily check of the animals. When dirty cows were discovered they were immediately cleaned with a brush.

2.2. Stall partitions

The partitions, made of elastic nylon cloth straps, consisted of an upper and a lower part connected about 1 m above the floor with a ring and fixed stretched vertically between the ceiling and the floor between two stalls (Fig. 1). The upper part was 4 cm broad and the lower 10 cm broad. Whereas type *I* just formed a vertical band type λ was like an upside down "Y". The type *I* was fixed to the floor 115 cm from the feeding barrier, the fore strap or "leg" of type λ was fixed to the floor 100 cm and the rear 150 cm from the feeding barrier.

2.3. Experimental design

In order to select the most suitable cows for the behavioural observations the following information was recorded for all cows: age, size, lactation number, milk production, clinical health, disease history, breast width, temperament and other behavioural characteristics. Simultaneously a clinical examination was made on: condition of visible mucous membranes, body temperature, heart rate, breathing frequency, rumination frequency, frequency of elimination, status of the skin (sensitivity, scratches and abrasions), body condition and nutritional condition, shape of joints and hooves, condition of udder and teats. Considering these parameters 16 focal cows were selected. Prior to each 3× 24 h video recording session each focal animal was again clinically examined. For the focal animals no health problems were discovered at any of the health checks.

The focal cows selected were 15 SR and one SF cow (nine in first lactation, seven in 2nd–5th lactations). The cows were selected as pairs standing next to each other and so that four pairs had the *I*-partition between each pair and four pairs had the λ-partition between each pair. On the other side of a pair there was no partition; in this way there was a partition between every second cow in the barn. In order to avoid bias because of cow size related to stall size the animal size determined the stall size chosen for each pair of focal animals. There was a significant positive correlation between stall width and breast width for cows with the λ-partition ($p < 0.05$, $r = 0.79$, $n = 8$), but not for cows with the *I*-partition (n.s., $r = 0.58$, $n = 8$; Spearman rank correlation).

The behaviour was recorded by video cameras equipped with infrared light fixed under the ceiling behind the animals, covering the focal pair and the two neighbouring animals and stalls, partitions, gutters, feeding barrier and manger. Cameras were moved between pairs of cows over 16 weeks in order to video record all pairs. The time-lapse method with one picture per second was used, and this method made it possible to record the exact time for each event.

In order to test the effect of having partitions or not each pair of focal animals was recorded continuously over nine days according to the following sequence: (1) with

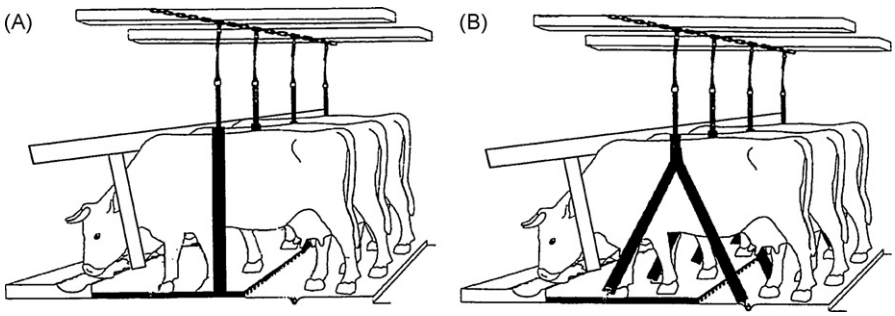

Fig. 1. Drawing of the two designs of elastic stall partitions: (A) *I*-partition and (B) λ-partition.