Effects of stocking density on behavior, productivity, and comfort indices of lactating dairy cows

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ABSTRACT

The objective of this study was to investigate the effects of different stocking densities of 82 (0.82 cows per freestall and feed bin), 100, and 129% on behavior, productivity, and comfort indices of lactating Holstein dairy cows. Twenty-seven lactating cows (15 primiparous and 12 multiparous) were assigned to 1 of the 3 treatments, which were balanced for parity, milk yield, days in milk, and body weight in a $3 \times 3$ Latin square design with 14-d periods. After 7 d of adaptation to the treatments, lying time and bouts were recorded at 1-min intervals for 3 d, DMI and feeding time were monitored electronically by feed bins, and rumination time was quantified at 2-h periods for 5 d during each period. The cow comfort index, stall standing index, stall perching index, and stall use index (SUI) were calculated using 10-min scan samples of video recording from d 8 to 10 of each period. Milk yield was recorded from d 8 to 12 and milk composition was determined from composite samples on d 12 in each period. Daily lying time, lying bouts, and bout duration did not differ among the stocking densities. The ratio of lying time $\geq 12$ h/d (the number of cows with daily lying time $\geq 12$ h/d divided by number of cows per pen) was higher for cows housed at 82% stocking density compared with those housed at 100% stocking density, with stocking density of 129% intermediate. Hourly lying time was lower at 100% stocking density compared with 82 and 129% stocking densities during the peak period (2300–0400 h), both cow comfort index and SUI were higher at 129 than at 100% stocking density. The SUI was lower 2 h after morning milking (0800–0900 h) for cows housed at 129% compared with those housed at 82 and 100% stocking densities. In conclusion, when compared with 100% stocking density, understocking contributed to natural behaviors of cows that including lying, feeding, and rumination behavior, whereas overstocking did not cause negative effect on behavior, productivity, and comfort indices of cows in this study.

Key words: dairy cow, stocking density, behavior, productivity, cow comfort

INTRODUCTION

Dairy cow welfare has become a hot topic in recent years, especially considering the rise of large-scale dairy farms. The most important concerns regarding dairy cow welfare include whether the dairy cow is feeling well, functioning well, and performing natural behavior (von Keyserlingk et al., 2009). Behavior and welfare of dairy cows is affected by the physical environment they are housed in (stall design, flooring type, feed bunk design, environmental quality, and so on) and by grouping strategy and stocking density (Krawczel and Grant, 2009). A practice employed by dairy farmers is to increase the herd size without extending housing facilities, which has resulted great farm to farm variation in stocking densities for stalls (number of cows per number of stalls × 100) and feed bunks (61cm/number of feed bunk spaces × 100) ranging between 71 to 197% and 58% to 228%, respectively, on North American dairy farms (von Keyserlingk et al., 2012), and stall stocking density ranging from 59 to 161% on commercial freestall farms in China (Chapinal et al., 2014).