Effects of stocking density during the dry period on dairy cow physiology, metabolism and behaviour

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Supplementary File

Materials and methods

Animals and housing

The layout of the cubicle pen and the straw yard is illustrated in Figure S1. The treatment groups were balanced for parity (H: 3.0±2.0, L: 2.6±1.9), and 18 primiparous cows (first lactation cows dried-off for the second calving; High: n=9, Low: n=9) and 30 multiparous cows (cows calved more than once, High: n=16, Low: n=14) were enrolled in this study. Milk yield (MY) during the previous lactation (305d MY) and at dry-off, and somatic cell count (SCC) at dry-off did not differ between treatment groups (data not shown).The number of cows dried-off each week ranged from one to six cows, and non-experimental cows (cows to be culled or sold, or dried-off too early) were also added to the dry group. Group size and composition changed every week due to a dynamic social grouping system and the addition/removal of non-experimental cows. This is unavoidable due to a limited availability of space and dry cows.

Treatments and data collection

Details of the experimental setting and data collection points are illustrated in Figure S2. Treatment setting for the high stocking density group was designed based on recommendations by UK Red Tractor Assurance – Dairy Scheme (2017). The lying space allowance for the high stocking density group was in line with Red Tractor's minimum recommendation (at least 1 cubicle or 6 m^2 lying space allowance per cow), and the feed bunk space allowance was a half of the industry recommendation (0.6 m per head).
Bars and wood panels were used to adjust to the appropriate stocking densities every time group size was changed. Behavioural observation was conducted by a single observer, but the blinding of the observer was impossible as the treatment was obvious from the video clip.

Figure S1. Layout of the cubicle pen (above) and the straw yards (below) for the Low stocking density group (High stocking density group had a symmetric design). Gates enclosed dry cows within an appropriate number of lying stalls and yokes in the cubicle pen, and an appropriate lying space for the straw yard, and wood panels blocked excess feeding space in the High stocking group.

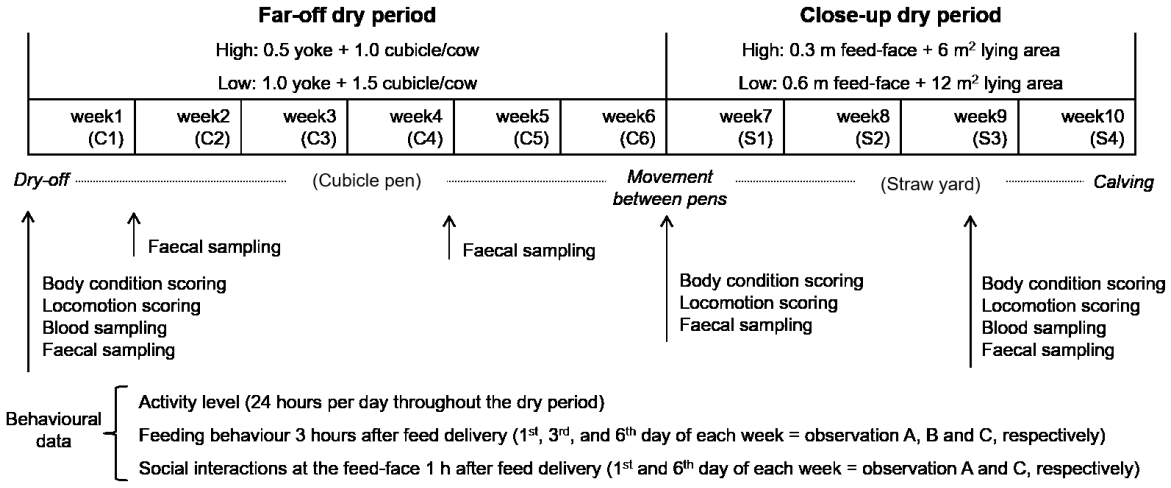

Figure S2. Experimental setting and data collection points (arrows) during the stocking density treatment period (from dry-off to calving). Cows were kept in a cubicle pen after dry-off until 21±4 days before the expected calving date (far-off dry period), and then moved to a straw yard until calving (close-up dry period). Bracketed variables (C1-C6 and S1-S4) indicate the week in the cubicle pen or in the straw yard. Behavioural data were collected throughout the dry period.