

Factors of cow comfort associated with herd-level reproductive outcomes on Canadian dairy farms

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We aimed to determine herd-level factors of cow comfort that are associated with reproductive outcomes on dairy farms. Animal (BCS, lameness, skin lesions and cleanliness) and environmental assessments were carried out on 130 freestall and 97 tiestall farms in Canada (AB, QC and ON) at a single visit to each farm. Herd reproductive variables were calculated from DH1 records: calving interval (CI), number of inseminations per cow year (NI), and conception rate (CR); days to first service was calculated as a covariate. All categorized variables were classified by the median of each farm type. The mean (\pm SD) CI, NI, and CR was 417 ± 22 d, 2.16 ± 0.34 inseminations (AI), and $34.1 \pm 6.7\%$ for freestall farms, and 427 ± 21 d, 2.30 ± 0.37 AI, and $29.9 \pm 6.4\%$ for tiestall farms. On freestall farms, knee lesion prevalence had negative relationships with all reproductive outcomes: farms with fewer knee lesions tended to have shorter CI (415 ± 2.5 vs. 422 ± 2.5 d; $P=0.07$), and had lower NI (2.04 ± 0.04 vs. 2.16 ± 0.04 ; $P=0.03$) and higher CR (36.0 ± 0.9 vs. $33.2 \pm 1.1\%$; $P=0.04$). Proportion of older cows (parity ≤ 3) was related to NI, where younger herds had lower NI (2.04 ± 0.04 vs. 2.16 ± 0.04 AI; $P=0.03$). Milk production per cow per year was related to CI and CR: farms that produced more milk per cow had better reproductive outcomes. On tiestall farms, CI was related to the proportion of older cows and power in electric trainers, younger herds (420 ± 2.5 vs. 431 ± 2.7 d; $P<0.01$) and those that did not power electric trainers (420 ± 2.7 vs. 430 ± 2.8 d; $P=0.01$) had shorter CI; CI was also shorter in herds that produced more milk ($P=0.01$). Knee lesions and insufficient stall length tended to be related to NI, where farms with more stalls having insufficient length for their cows (2.44 ± 0.06 vs. 2.31 ± 0.06 AI; $P=0.09$) and more knee lesions (2.44 ± 0.06 vs. 2.31 ± 0.06 AI; $P=0.07$) required more NI. Lameness prevalence was only related to CR on tiestall farms; farms with less lameness had higher CR ($P=0.01$). In conclusion, farms with poorer reproductive outcomes were characterized by a higher prevalence of knee lesions, higher proportion of older cows and produced less milk.

Implications: Cow-level assessments associated with cow comfort and health can be useful for understanding how to optimize herd-level reproductive success on dairy farms.