TRANSLATIONAL RESEARCH IN VETERINARY SCIENCE

THE ANOGENITAL DISTANCE IN DAIRY HEIFERS: 1) THE ANOGENITAL RATIO AS AN INDICATOR OF REPRODUCTIVE PERFORMANCE IN DAIRY HEIFERS, 2) BIRTH SEASON AND DAM PARITY AFFECT THE ANOGENITAL RATIO IN DAIRY HEIFERS

Translational Research in Veterinary Science Vol. 5 No. 1-2 (2022) p. 6

Beci B., Van Eetvelde M., Vanlommel L., Opsomer G.

Department of Internal Medicine, Reproduction, and Population Medicine, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

In dairy cattle, the anogenital distance is described as the length between the center of the anus and the clitoral base (AGDc). In other species, the anogenital distance from the center of the anus to the dorsal commissure of the vulva (AGDv) is also considered to be a predictor of fertility. We aimed to explore the correlation between AGDv and AGDc, as well as their association with reproductive performance in 512 Holstein Friesian heifers between 12-15 months of age. A mean AGDv of 63±8.0 mm and AGDc of 108±9.4 mm were recorded, resulting in a mean vulva length (AGDc-AGDv) of 45±9.0 mm. The anogenital ratio (AGR defined as AGDv/AGDc) was 58.5 ± 6.7%, varying from 40.1 to 79.6%. Heifers with a longer AGDc tended to be older at first AI (P=0.06), but AGDv varied more amongst heifers and had a stronger association with age at first AI (P<0.001). We found the AGR to be a better indicator of fertility than AGDc: heifers with a smaller AGR were younger at first AI (P<0.001) and at conception (P=0.002). A ROC curve was used to determine the threshold of the AGR above which a lower pregnancy rate could be expected. Based on a threshold of 59.6%, heifers were divided into 285 animals with a small (<59.6 %) and 227 animals with a large (≥59.6 %) AGR. Pregnancy rate at first AI was 72.9% in heifers with a small compared to 62.6% in heifers with a large AGR (P=0.01). Hence, heifers with a small AGR have 60% higher odds of being pregnant at first AI (P=0.02). Results suggest that, rather than only measuring AGDc, both AGDv and AGDc should be measured, as the AGR might be a better indicator of reproductive performance in dairy heifers. Studies have shown that AGD is not associated with postnatal body growth. We explored the influence of prenatal factors on AGD in 427 Holstein Friesian heifers of 14±1.1 months old. Maternal and reproductive data of the heifers were collected. Linear mixed models, with herd as random factor, were built to explore the effect of birth season and dam parity on both AGDs. AGDc nor AGDv were influenced by birth season. However, the anogenital ratio (AGR defined as AGDv/AGDc) tended to be greater in heifers born during summer compared to winter-born heifers (LSMean ± SE respectively 60.0±1.0 and 57.5±0.6 %, P=0.05). Summer-born heifers were 457±8.6 days old at conception, compared to 444±7.6 days for winter-born heifers (P=0.12). Dam parity had no

effect on offspring AGDc, but AGDv tended to be 1.5 mm shorter in daughters from multiparous than from primiparous dams (P=0.07). Hence, daughters of multiparous dams had a smaller AGR than heifers born out of primiparous dams (58.1±0.6 and 59.9±0.6 % respectively, P=0.002). Daughters of multiparous dams had better fertility results: they were 11 days younger at conception (441±7.7 vs. 452±7.9 days, P=0.03) and tended to need less inseminations to conceive (1.37±0.06 vs. 1.53±0.07, P=0.06). The results suggest that birth season and dam parity affect the AGR and fertility results in dairy heifers. Further research is needed to study the link between prenatal factors, AGD and fertility in dairy heifers.

Keywords: heifers, anogenital ratio, dairy cattle