Association among genomic breeding values for daughter pregnancy rate and heifer conception rate and estrous characteristics and fertility of Holstein heifers

Anderson Veronese, DVM[1]; **Odinei Marques**, DVM[1]; **Rafael Moreira**, DVM[1]; **Anna Belli**, DVM[1];
Francisco Peñagaricano, PhD[2]; **Ricardo C. Chebel**, MPVM[1]
[1]Department of Large Animal Clinical Sciences, University of Florida, Gainesville, FL 32608
[2]Department of Animal Sciences, University of Florida, Gainesville, FL 32608

Introduction

Genetic selection of dairy animals until the early 2000s was focused on productive traits while disregarding reproductive traits. It is believed that such selection strategy was associated with compromised estrous expression and reproductive performance. Since the mid 2000s, genetic selection of dairy breeds has included reproductive traits. We hypothesized that genomic breeding values for daughter pregnancy rate (GDPR) and heifer conception rate (GHCR) are associated with estrous characteristics. Therefore, the objectives of the current experiment were to evaluate the association among GDPR and GHCR with estrous characteristics measured by an automated device.

Materials and Methods

Holstein heifers (n = 1,019) were enrolled in the experiment at approximately 11 months of age, when they were fitted with a collar containing a microphone and accelerometer (SCR Ltd., Netanya, Israel). The device recorded activity and rumination in 2 h intervals and determined the occurrence of estrus according to changes in activity and rumination. Using the DataFlow2 (SCR Ltd., Netanya, Israel) software, estrous characteristics (onset, duration, activity peak, rumination nadir, and heat index) of spontaneous (SPE) and PGF2α induced (PIE) estruses were recorded. Continuous variables were analyzed by ANOVA using the GLM procedure. Binary variables were analyzed by logistic regression using the LOGISTIC procedure. Hazard of estrus was analyzed by the Cox proportional hazard ratio using the PHREG procedure. Statistical significance was considered at $P<0.05$ and tendency at 0.05.

Results

Duration of the SPE tended to increase according to GDPR ($P=0.08$), but it decreased according to GHCR ($P<0.01$). Rumination nadir on the day of SPE decreased according to GDPR ($P=0.03$) but it increased according to GHCR ($P=0.05$). GDPR tended ($P=0.09$) to be associated with likelihood of activity peak > 80 (0-100) of SPE, whereas GHCR was not ($P=0.22$) associated with this outcome. There was a tendency for GDPR ($P=0.06$) and GHCR ($P=0.08$) to be positively and negatively associated with heat index > 80 (0-100) of SPE, respectively. Hazard of PIE increased ($P<0.01$) according to GDPR. There was no association among GDPR ($P=0.24$) and GHCR ($P=0.28$) and duration of PIE. Rumination nadir on the day of PIE decreased according to GDPR ($P<0.01$), but it was not associated with GHCR ($P=0.34$). There was no association among GDPR ($P=0.74$) and GHCR ($P=0.49$) and heat index > 80 of PIE.

Significance

Genomic breeding value for DPR was positively associated with characteristics of SPE. Conversely, the associations of GDPR and GHCR with PIE were not as clear. Further experiments are needed to elucidate physiological differences among dairy animals differing in GDPR and GHCR.