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OPU-IVF

Impact of sires in genetic progress for milk production in sindhi bovines generated by *in vitro* fertilization

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This study aimed to assess the impact of bulls selected for milk production based on their predicted transmitting ability for milk production (PTA_MP), reliability (REL) and inbreeding coefficient (InC) of descendants generated by *in vitro* fertilization (IVF) in the Sindhi breed. The hypothesis is that bulls with higher PTA_MP and REL produce offspring with superior PTA_MP. Data from 86 Sindhi animals were evaluated, including 22 female embryo donors (first generation) and 64 IVF-derived descendants (second generation), resulting from the mating of 7 bulls and 34 cows. To ensure robustness in estimating genetic effects and minimize confounding from unequal progeny, only bulls with at least two offspring recorded were included. ANOVA, considering bull as a fixed effect was performed to test differences among sires, with means compared using Tukey's test ($p < 0.05$). Pearson correlations between PTA_MP and REL of bulls and their offspring were also estimated using R software. The correlation between bull and offspring PTA_MP was strong and positive (0.89), as expected due to the additive genetic merit transmitted from sire to progeny. This positive relation between PTA_MP suggests that bulls with a greater genetic merit tends to produce offspring with a greater milk production potential. The correlation between REL of bulls and their offspring was weak and negative (-0.06), reflecting the greater amount of information typically available for sires compared to their often younger progeny, which emphasizes that accumulating more performance data increases the reliability. These results highlight the importance of considering both PTA and REL in selection decisions. Significant differences ($p < 0.05$) in PTA_MP and REL were observed among sires. PTA_MP ranged from -15.82 to 190.09 kg, revealing substantial variability in the genetic potential for milk production across sires. REL varied from 3.86% to 38.87%, demonstrating considerable differences in the certainty of genetic evaluations. These magnitudes underscore the practical relevance of careful sire selection to optimize genetic gain. Notably, despite some animals showing high REL, their PTA_MP was low or even negative, reinforcing the need to evaluate both parameters concurrently when selecting bulls. The broad range observed in PTA_MP (206 kg) indicates that sire choice could lead to substantial genetic differences in offspring milk production. These findings, based on predictive genetic evaluations, provide essential guidance for reproductive decisions and genetic improvement programs aiming to enhance milk production in Sindhi cattle. However, validation through field data would be valuable to confirm the predictive accuracy and practical outcomes of these selection strategies. The strategic use of bulls with both high genetic merit and reliability has the potential to significantly advance genetic progress, thereby improving the efficiency of breeding programs employing IVF technologies.

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