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Influence of calf sex on milk nutrition and fatty acid profile of Gir and Sahiwal cattle breeds of Karnataka, India

Colostrum, the vital first milk produced by mammals, is a complex biological fluid that provides essential nutrients and immunoglobulins to the newborn. In cattle, the composition of colostrum is highly variable and influenced by a myriad of factors, including breed, nutrition, genetics, management techniques, parity, lactation period, and age of the cow. While extensive research is done on these factors, literature on the influence of calf sex on bovine colostrum composition, especially in Indian indigenous breeds, remains limited. The study addresses this specific knowledge gap, focusing on two prominent Indian indigenous cattle breeds —Sahiwal and Gir—to determine if calf sex would influence the composition of the nursing cow's colostrum. This research is crucial in providing insights into less-explored areas of maternal investment and could have significant implications for dairy farming and calf management.

The study aimed to bridge this gap by examining the physical characteristics, proximate composition, and fatty acid profiling of colostrum from the first lactation of Sahiwal and Gir cows nursing male and female calves each. The colostrum nutritional analysis resulted in 0.7-0.9% ash, 7.2-12.7% proteins, 4.1-10.3% carbohydrates, and 2.3-8.1% fats with 75-80% moisture content, followed by the physical properties like pH ranging from 5.9 to 6.5, 0.4-0.1% titratable acidity, and density ranging from 1080 to 1100 kg/m^3.. Fatty acid profiles by Gas Chromatography–Flame Ionization Detector (GC-FID) revealed 6.4% and 2.9% higher saturated fatty acids (SFA) and 5.6% and 3.9% higher mono-unsaturated fatty acid (MUFA) in the colostrum for male calves than that for the female calves in both the studied breeds, leading to the conclusion of the presence of influence of calf sex on fatty acid composition in the tested breeds. This direct correlation suggests that the sex of the calf can indeed influence the fatty acid composition of the mother's colostrum, a phenomenon likely driven by biased maternal investment. Although the underlying mechanism is not clearly understood, a potential explanation ought to be as a result of the influence of fetal endocrine signals on maternal lipidogenesis. Another intriguing possibility is microchimerism, a process where fetal cells migrate into the mother's body and persist, potentially influencing the mother's physiological processes, including mammary gland function and milk synthesis. Understanding the influence of calf sex on colostrum composition can inform dairy producers about optimizing calf nutrition from birth, potentially leading to improved growth, health, and productivity of future dairy herds.

Author: R, JYOTHI (Christ - Deemed to be University)

Co-author: Dr KOPPADA, Umashankar (Christ - Deemed to be University)

Presenter: R, JYOTHI (Christ - Deemed to be University)

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