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Exploration of climate resilient sheep genomic traits based on SNP technique and feeding resources using NIRS

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To identify genes underlying influence on the adaptation and metamorphic process, genotyped genome-wide single nucleotide polymorphisms (SNPs) of four major sheep breeds living at different altitudes in Nepal and downloaded SNP array data from additional Asian and Middle East breeds. Using a divalue-based genomic comparison between four high-altitude and eight lowland Asian breeds, discovered the most differentiated variants at the locus of FGF-7 (Keratinocyte growth factor-7), which was previously reported as a good protective candidate for pulmonary injuries. A SNP upstream of FGF-7 appears to contribute to the divergence signature. First, the SNP occurred at an extremely conserved site. Second, the SNP showed an increasing allele frequency with the elevated altitude in Nepalese sheep. Third, the Electrophoretic Mobility Shift Assays (EMSA) analysis using human lung cancer cells revealed the allele-specific DNA-protein interactions. Thus, it was hypothesized that FGF-7 gene potentially enhances lung function by regulating its expression level in high-altitude sheep through altering its binding of specific transcription factors. Especially, FGF-7 gene was not implicated in previous studies of other high-altitude species, suggesting a potential novel adaptive and metamorphic mechanism to high altitude in sheep

.Exploration of new feeding and pasture resources using NIRS was attempted in our study. In this study, Partial Least Squares Regression (PLSR) on Near Infrared (NIR) Spectroscopic data of Sorghum was used to select significant wavelengths for the prediction of Crude Protein (CP) content. A new calibration model is proposed using only one wavelength of 1449 nm which gives the Coefficient of determination (R^2) of 0.7930. Another calibration model is also prepared by using two wavelengths, which are 1485 nm and 1486 nm and gives the R^2 value of 0.8334. These wavelengths are considered to be significant for the prediction of CP content in sorghum and can be incorporated in hardware to make the quantification of nutrients less time consuming and inexpensive.

Using 50 different samples of Sorghum fodder grown were evaluated for their chemical composition (DM, crude protein, total ash, NDF, ADF, ADL, cellulose, silica and hemicellulose). The dry matter content varied from 11.82 to 38.19 with a relative mean value of 26.30 ± 0.50 per cent on DM basis. The mean crude protein content was 12.42 ± 0.47 per cent and exhibited a range of 15.95 per cent. The total ash content varied from 6.15 to 13.08 with a relative mean value of 9.18 ± 0.21 per cent. The per cent cell wall constituents were in the range of 70.13 to 82.19(NDF), 47.87 to 78.86(ADF), 1.32 to 22.18(ADL),

13.85 to 45.57 (cellulose), 0.33 to 8.33 (silica), and 0.34 to 28.38 (hemicellulose) and the mean values were 76.99 ± 0.41,

68.78 ± 0.86, 8.39 ± 0.58, 33.23 ± 0.71, 3.10 ± 0.21, 8.20 ± 0.79 per cent, respectively for NDF, ADF, ADL, cellulose, silica and hemicellulose. From this study it was concluded that Sorghum fodder was nutritionally superior cereal fodder for livestock in scarce rainfall areas.