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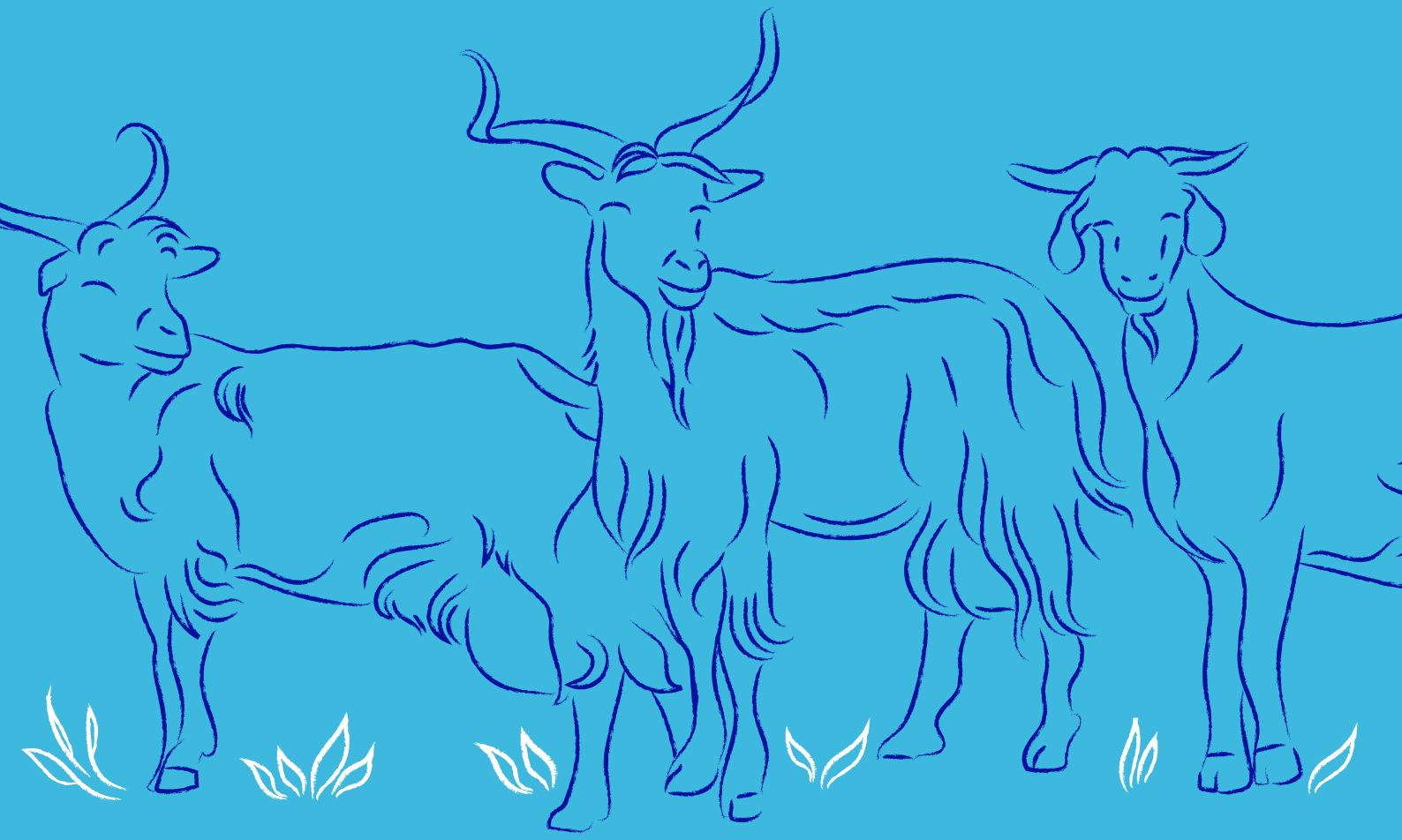

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Analysis of Immunoglobulin G in Goat Colostrum Using Data Science and Colour-Based Techniques

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In 2005, Anastasio Argüello et al. discovered that the concentration of IgG in goat colostrum could be predicted using multiple regression analysis based on colour samples (DOI:10.3168/jds.S00220302(05)72849-6). This discovery is highly relevant, as newborn kids must ingest colostrum for passive immunity, since maternal antibody transfer does not occur during gestation. The present study builds upon the data gathered in the previous research by applying Data Science techniques to evaluate potential improvements over the traditional statistical methods used in the original study. The dataset consisted of colostrum samples collected from Majorera goats, which were examined for their colour properties using the CIE LCh colour space, alongside measurements of IgG concentration. To assess predictive performance, two regression models, a decision tree and a neural network, were developed and trained on these data. By applying these new techniques, we improved performance across all the metrics established in the original study, achieving an accuracy of 98.16%. Additionally, new metrics were incorporated in this study, which show that the predicted values align closely with those obtained using ELISA in laboratory settings, resulting in a mean absolute error of just 0.32. The models developed could be easily implemented in the sector through mobile phones or low-cost devices in the future, ensuring an affordable and accurate method to estimate IgG concentration.