Utilizing Near-Infrared Spectroscopy for Discriminant Analysis of Goat Milk Composition across Diverse Breeds and Lactation Seasons

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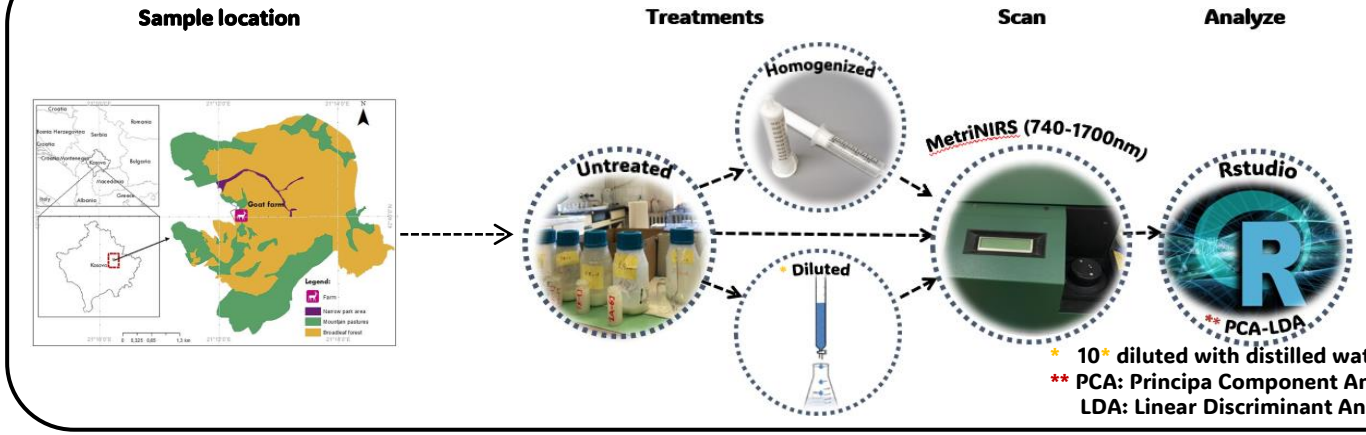
Introduction

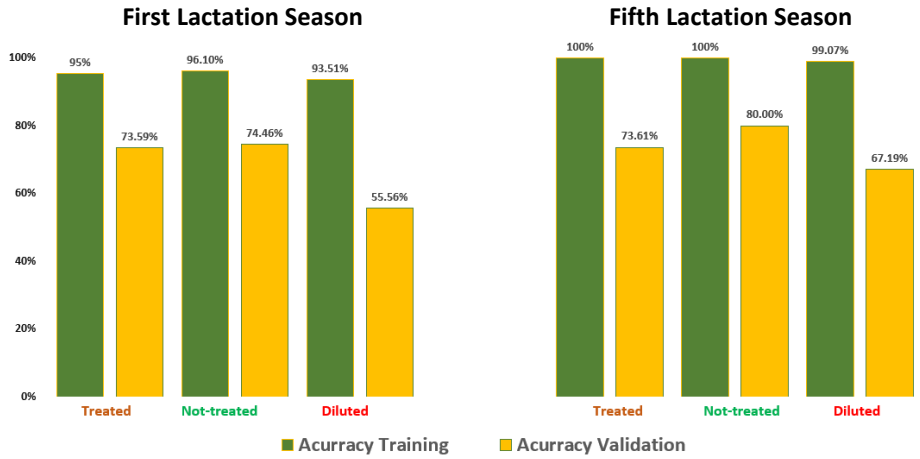
- Goat milk is a vital, sustainable dairy product source that contributes significantly to the global dairy market, and therefore, its composition and quality need to be monitored.
- Near Infrared Spectroscopy (NIRS), as a versatile and non-destructive approach, can be used to evaluate different milk parameters.
- The aim of this study is to develop NIRS models for classifying goat's milk samples between the native Red and Alpine Breeds during their first and fifth lactation seasons. By this, we seek to assess whether NIRS can replace traditional laboratory techniques for analyzing goat milk from various breeds and lactation seasons.

Materials and Methods



* 10* diluted with distilled water
** PCA: Principa Component Analysis
LDA: Linear Discriminant Analysis

Results



Classification results of goats' milk samples between the native Red and Alpine breeds that are in the first and fifth lactation seasons.

- The Linear Discriminant Analysis (LDA) model exhibited favorable performance when classifying goat milk samples derived from the Native Red and French Alpine breeds in their first and fifth lactation seasons.
- This was manifested by achieving a recognition accuracy of 95% and a prediction accuracy of 73.59%, regardless of whether the milk was homogenized with a syringe or untreated. Conversely, diluted milk yielded less favorable results.

Conclusion

- Our study effectively demonstrated significant differences in the chemical composition of milk between native Red and Alpine breeds during their first and fifth lactation seasons.
- This knowledge is paramount for optimizing nutritional quality, aligning with consumer preferences, and tailoring milk products to meet specific dietary and health requirements.
- Moreover, our results unequivocally endorse Near-Infrared Spectroscopy (NIRS) as a valuable, non-destructive tool for quality monitoring and milk analysis, providing essential insights to enhance decision-making in milk production and processing, thereby improving product quality and profitability.

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