Harvest Timing & Fall Dormancy Impacts on Soluble Protein

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As the world's population continues to grow, there is a critical need to enhance food and feed quality. Alfalfa is the fourth largest commodity in the US and contains high amounts of leaf protein, which makes it a possible source of human-based plant protein. Research focuses on optimizing the nutritional value of alfalfa, a high-protein plant.

This project aims to determine how harvest timing and fall dormancy impact soluble protein concentration. We screened for functional proteins in alfalfa by comparing six fall dormancies across three harvesting times grown in California. Plant material was collected at each time point. Plots were divided, with half the plot being harvested and oven-dried while the other was freeze-dried. Both types of material were ground to 1mm. Crude protein and forage fiber was quantified using NIR. Soluble protein concentration determination was done using the Pierce bicinchoninic acid protein assay.

The crude protein levels and soluble protein were similar in the freeze-dried material irrespective of FD or harvest timing. However, when samples were oven dried, soluble protein concentrations dropped significantly compared to the expected crude protein levels (~10% reduction). Results suggest that fall dormancy ratings may impact the amount of soluble protein lost after harvest. Harvesting alfalfa at the vegetative and late flowering also increased the amount of soluble protein lost during the drying process.

Research on alfalfa's fall dormancy and harvest timing reveals beneficial insights for farmers. By adjusting harvest timing and selecting specific fall dormancy traits, farmers can increase their alfalfa's protein content, and enhancing alfalfa quality, potentially leading to better market prices, and increasing demand for alfalfa as a high-protein feed and human dietary sources. Adopting these practices may be crucial for enhancing global food and feed quality, improving land and resource efficiency, increasing profitability, and promoting sustainable agriculture.