

Improving Alfalfa Protein Content & Stability

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Alfalfa is a high-quality forage and a source of protein for dairy cows. Its nutritional value and suitability for sustainable agricultural production are also driving interest in the possible use of alfalfa for human consumption. This novel interest in alfalfa highlights some of the well-known challenges regarding its use in high-production dairy systems including post-harvest proteolysis. To address the issue of post-harvest protein degradation, we have developed a fluorescence intensity-based protease activity assay specifically for above ground plant tissue. Similarly, we have optimized a commercially available assay that measures the concentration of protein above 2.5 kilodaltons. We have used these two techniques to confirm that post-harvest protein degradation decreases the concentration of proteins larger than 2.5 kilodaltons within alfalfa leaves and stems. In addition, protease activity is modulated unexpectedly, with a sharp increase approximately six hours post-harvest. Understanding the plant mechanisms underpinning post-harvest control of protease activity may lead to new strategies for enhanced conservation of forage protein. Ongoing experiments will focus on screening alfalfa varieties for decreased protease activity and increased intact protein. Identifying these varieties could help with future breeding efforts or inform variety selection to increase alfalfa performance both as a dairy forage and potential as a human food source.