

A Novel Approach to Expand Our Understanding of Alfalfa Hay Spoilage & Improve the Efficacy of Hay Preservatives

Juan Romero, University of Maine

Seanna Annis, University of Maine

Andre Brito, University of New Hampshire

Juan Alvez, University of Vermont

Luiz Ferraretto, University of Wisconsin-Madison

A meta-analysis of published articles (n= 85) was conducted to assess the performance of hay preservatives as affected by forage type, moisture concentration, application rate, and preservative type. Our analysis identified that legumes are less responsive than grasses to organic acid-based hay preservatives (P= 0.045). This is due to the higher buffering capacity in legumes vs. grasses and the negative impact of higher pH values on the antifungal properties of organic acids, as measured in *Aspergillus*, *Penicillium*, *Mucor*, and yeast alfalfa hay isolates. Thus, this project seeks to evaluate the interaction between the application rate of hay preservatives and the proportion of grass in alfalfa-grass hay mixtures to develop new recommendation rates that distinguish between these forage types and optimize the use of preservatives. Our meta-analysis also indicated that propionic acid was more effective than buffered organic acids at decreasing visual moldiness (P= 0.001), but other measures of spoilage seemed not to be affected. We have recently tested this in the field and observed no differences in the preservation of high-moisture alfalfa hay between propionic acid, ammonium propionate, and a complex organic acid mixture. Other objectives of our proposal seek to assess the divergence of fungal communities in alfalfa hay across the northeast and northcentral regions and the first effort to assemble a hay mold fungal library to study hay spoilage during storage. We also seek to evaluate for the first time the fungal microbiome dynamics across storage in alfalfa hay treated or not with a propionic acid-based preservative. Lastly, we also seek to assess the interaction between cutting at baling and bale wrapping on the preservation of nutrients of high-moisture alfalfa hay.

Keywords: hay, preservatives, molds