

2020 USAFRI Research Project Objectives

Development of New Alfalfa Products in Combination with Almond Hulls for Emerging Domestic and International Markets University of California-Davis - Putnam

Project Award: \$48,358

Justification:

- There are over 2.2 million tons of almond hulls produced each year as a by-product from the nearly 1.5 million acres of almonds currently being grown in California (for reference, the state produced 4.1 million tons of alfalfa hay in 2019). The amounts of almond hulls are likely to increase since currently nearly 1/3 of the CA plantings are young trees, even if the increase in acreage stabilizes. In many cases almonds have taken over land previously occupied by alfalfa, and some alfalfa growers also grow almonds on the same ranch. The phenomenal change in land-use from alfalfa (and other agronomic crops) to almond (and other permanent crops such as walnut and grape) has been a phenomenon worrisome to alfalfa growers in California. Profitability has been the main driving force for the expansion of almond acreage in this state, with approximately 75% of the almond nuts going for export. Labor factors and the need for more precise water stewardship are other factors. Although alfalfa acreage has been reduced in recent years, alfalfa is still produced on over 580,000 acres in California, and the state remains one of the nation's leading producers and the nation's leading dairy producer. Almond hulls (the soft by-product of harvesting the almond nuts) were previously given away, but currently are purchased primarily for the California dairy markets, and have become a highly valued, cheap, energy-dense feed, often competing with alfalfa in the ration.

While almond hulls serve as an excellent high-energy and fiber rich by-product feed, they lack sufficient protein and effective fiber for optimum rumen function. Alfalfa has many of the characteristics required by ruminants and is highly valued, particularly for its digestible energy, effective fiber, and digestible protein. Is it possible that combinations of almond hulls and alfalfa could provide a unique package of nutrients desired by feed buyers or synergies in nutritional value?

Alfalfa growers are very interested in new uses and new markets for their crop, as are almond growers. We hypothesize that combinations of alfalfa with various amounts of almond hulls may produce a synergy of nutritional value that would be of strong interest to dairy producers, regardless of their location (domestically or overseas). Exports of alfalfa are estimated to be >17% of the 7 western states' production (Putnam et al., 2018), and there is a demand for other (high energy) feeds as well (corn grain, etc). These markets are primarily in the far East (China, Korea, Japan) and the Middle East (Saudi Arabia, UAE). Hay exports from the west coast, primarily from CA and WA have exceeded 5 million metric tons in recent years (about 50% alfalfa and 50% grasses).

Different combinations of alfalfa and almond hulls would utilize the strengths of each product, potentially producing a 'synergy' in combination, and could develop new products that open up new markets for alfalfa. Pricing of such combinations would also be different, with alfalfa being more expensive, and almond hulls less, making high energy, high protein products potentially attractive to buyers. This data from this project would provide the analysis and testing of such concepts that would then be considered by nutritionists as a choice in the feeds market. The strongest interest may be in improving the lower-quality alfalfa hay types, which would potentially benefit more from a high-energy combination. Cubing or other modes of re-combination could be used to deliver such products, suitable for long-distance transport, either domestically or internationally. Applications are likely to

be primarily dairy purchasers, but could also include horse and beef markets. Research would include laboratory testing of a range of combinations of different qualities of alfalfa and almond hulls, with a range of percentages, from 100% pure crop to different combinations. These would be tested in the lab for common composition analyses as well as in vitro gas production and NDF digestibility. A sheep feeding trial on selected mixes would measure the digestibility and energy yield of various selected alfalfa-almond hull mixes. Research would be conducted over 1.5 years at UC Davis in cooperation with the California Alfalfa & Forage Association and private companies. This project fits squarely with NAFA's priorities to examine new uses, new products, analysis and alfalfa feed value improvement and consistency. Is it possible that the correct alfalfa-almond hull mix would be valued for its consistency vs. more variable hay crops?

Objectives:

- The objectives of this project are to 1) measure the forage quality characteristics of various combinations of alfalfa-almond hull mixtures in cubes and develop innovative products centered upon alfalfa; 2) project and model the potential economic value of these mixes and project their potential role in long-distance markets; and 3) evaluate the digestibility and palatability of alfalfa-almond hull pelleted mixes compared with a pure alfalfa utilizing sheep studies.