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Citrus Pulp
New information for an old feed byproduct

Dr. John Arthington
University of Florida/IFAS
Range Cattle Research and Education Center

For questions or comments regarding this publication contact
Dr. John Arthington

Introduction

As early as 1911, it was suggested that citrus pulp had potential value as a feed for cattle. In the 1930's, dried citrus pulp began to be produced commercially as a byproduct feed and since that time, the production and availability of citrus pulp has increased steadily. Over the past 5 years, we have witnessed a significant increase in the amount of citrus pulp being used on Florida ranches. This increase in use is a response to a decrease in demand for dried Florida citrus pulp in the world market.

A combination of the decline in export market opportunities and the high energy-costs associated with citrus pulp drying have resulted in Florida citrus juice plants offering wet pulp to area Cattlemen. This product is typically shipped directly from the citrus processing facility, placed in piles in the pasture and offered free-choice to cattle. The surface of these wet citrus pulp piles will quickly harden while the interior of the pile begins to undergo fermentation. Within a few days cattle will begin to rapidly consume the fermented product. Under this management situation, a large amount of waste is expected. The amount of product dry matter delivered along with wastage should be considered when comparing the value of dry and wet citrus pulp. Even though a considerable amount of waste is expected, the feeding of free-choice, wet citrus pulp requires less investment in feeding equipment and storage space compared to dry pulp, which will require some on-ranch investment in dry storage capability.

Citrus pulp is classified as an energy concentrate byproduct feed, containing low crude

protein and a moderate amount of digestible energy. Dry and wet citrus pulp sources should contain similar nutrient profiles, less the difference in dry matter content.

Energy Content

Book values typically provide a citrus pulp TDN content ranging from 80 to 84% on a dry matter (DM) basis. These values were likely obtained as much 30 years ago and have not been updated due to the regional use of citrus pulp and the lack of domestic interest over the past couple decades. With the current wide-spread use of both wet and dry citrus pulp in Florida, we have begun testing the current energy content. Current TDN values for Florida citrus pulp now appear to be significantly less compared to historic values reported in the literature. Our TDN values now range from 68 to 75%. This decrease in energy content is likely a result of improved processing technologies of our Florida juice plants. Compared to 30 years ago, juice plants are now probably better able to extract a greater amount of the citrus juices, leaving less sugar in the pulp byproduct. Today, I encourage the use of a TDN value of 70% (DM basis) when evaluating the energy contribution of citrus pulp to a cow's diet.

Protein Content

Protein has always been low in citrus pulp and the same holds true today. Our citrus pulp assay range from 5 to 9% crude protein (DM basis). I encourage the use of a crude protein value of 6% (DM basis) when evaluating the protein contribution of citrus pulp to a cow's diet. This value is insufficient to provide adequate supplemental protein to the diet of cows during the winter months.

Protein Deficiency

One of the common problems we've encountered recently is protein deficiency in Florida cows provided citrus pulp as a winter supplement. Many producers have replaced the previous winter supplementation programs with citrus pulp without giving consideration to the lack of crude protein in this byproduct feed. This can be a significant problem for the producer, leading to decreased forage intake and overall performance of the cowherd. Recently, Dr. Gbola Adesogan (University of Florida) and I have completed two studies that illustrate the importance of supplemental protein for forage-fed cattle provided citrus pulp supplements. In our studies, cattle provided citrus pulp with no additional protein voluntarily consumed 23% less forage compared to cattle provided a source of supplemental protein along with the citrus pulp. In these cattle, average daily gain was greatly improved with the addition of either a natural protein or non-protein nitrogen source (0.26, 1.63, and 1.24 pounds per day for cattle provided no supplemental protein, natural protein, or non-protein nitrogen supplements, respectively).

Calcium and Phosphorus

It is well known that citrus pulp is high in calcium. This calcium content may be further enhanced by the addition of calcium salts to aid in the drying process, suggesting that dry

and wet citrus pulp may differ in the content of calcium. This practice may vary greatly between production facilities causing calcium to be one of the most variable nutrients in citrus pulp. Care should be taken when balancing rations for calcium concentration using literature average values alone. Phosphorus concentration of citrus pulp is only 0.13% of dry matter. Phosphorus supplementation may be an important consideration when balancing diets containing citrus pulp, especially if citrus pulp makes up a substantial portion of the total diet. The calcium to phosphorus ratio of grazing cattle consuming less than 8 pounds of citrus pulp daily is likely not an important consideration.

Feeding Risks

The most commonly reported condition associated with citrus pulp feeding is ruminal parakeratosis, a digestive disorder associated with the feeding of high concentrate diets. This condition is described as the hardening and enlargement of the rumen papillae, and has been widely reported in ruminant feeding systems that utilize low roughage rations. As this condition progresses the ruminal papillae become keratinized and nutrient absorption is restricted. Citrus pulp at more than 60% of the concentrate mixture for cattle full-fed in feedlot can result in rumen parakeratosis. When supplementing citrus pulp to grazing cattle, make certain there is sufficient pasture forage available. It is unlikely that rumen parakeratosis would be a problem in grazing cattle unless the supplemental citrus pulp is their only feed option.