

Sarford's News

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getting the most out of steam flaking

In an important article published in the Journal of Animal Science by Dr. Richard Zinn and co-authors (2002), it states that the primary goal of steam flaking is to shear or rupture the protein matrix encapsulating the starch granules and thereby make the starch more available to be absorbed and used by the animal.

The question is how do we achieve this goal in the most cost effective way and how do we monitor the quality of the flakes? These questions are important to nutritionists, feedlot managers, feedmill operators and cattle owners alike.

This issue will focus on the various techniques available to quantify how well the steam flaking process is able to derive the full bene-

fit of steam flaking for the feeding of feedlot cattle. It is noteworthy that Trei et al (1966) observed that steaming or pressure cooking of milo grain without flaking had a small impact on increasing starch availability; whereas moist heat and flaking had a much greater effect. Thus, a combination of moist heat and shear is needed to rupture the starch granules to make it more available. *A secondary goal of steam flaking is to induce uptake of water in order to swell the starch granules making them ultimately more digestible after flaking.* We at SarTec recommend the use of SarTemp to aid in the rapid uptake of water into the processed grain.

Dr. Zinn and co-authors state that the, "primary barrier to digestion of native cornstarch ap-

pears to be the protein matrix that encapsulates the starch granules. With wheat, the protein matrix consists largely of glutelins; these are soluble in weak acid and base and are readily degraded in the rumen. In contrast, the protein matrix surrounding the cornstarch granule is composed primarily of the prolamin, zein (which is) insoluble within the ruminal environment." They conclude that, "Disruption of this protein matrix is essential for optimizing starch digestion."

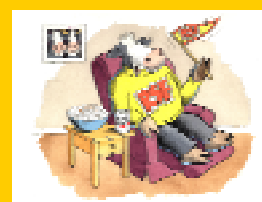
It has been generally recognized in the open literature that steam flaking increases the energy availability of corn. For example, a summary of published trials Huntington (1995) reported that steam flaking increased starch digestion an average of 7 percent. Dr. Zinn (1995) found that steam flaking increased starch digestion by 10%.

Inside this issue:

Feature on Getting the Most out of Steam Flaking	1-2
SarFord's Kitchen	2
Employee Highlight - Jerry Johnson	3

Special Points of Interest:

- The Keys to Getting the Most Out of Steam Flaked Grain.
- SarFord's kitchen - Grilled Steak Santa Fe.
- Employee feature: Jerry Johnson.



SarFord's kitchen

Grilled Steak Santa Fe:

Ingredients:

1-1/4 lb top round steak
 6 Tbsp. frozen margarita drink mix concentrate, defrosted
 2 Tbsp. chopped fresh cilantro
 2 Tbsp. vegetable oil
 4 cloves garlic, crushed
 2 tsp. ground cumin
 1/2 tsp. salt

1/4 tsp. pepper
 1 large avocado, diced
 1/2 cup chopped red onion

Preparation:

In a small bowl, make marinade by combining margarita drink mix, cilantro, vegetable oil, garlic, cumin, salt and pepper. Put 2 Tbsp. of the marinade in a small container, cover and refrigerate. Place the beef steak and remaining marinade in a resealable plastic bag and turn to coat steak.

Refrigerate 6-8 hours. Remove steak from marinade and grill uncovered for 16-18 minutes turning occasionally. Remove steaks and keep warm. Just before serving, in a medium bowl, combine avocado, onion and reserved 2 Tbsp. of marinade mixture. Toss gently to coat. Carve steak crosswise into thin slices. Serve immediately with avocado mixture.

- Enjoy and thanks, SarFord.

getting the most out of steam flaking (continued from page 1)

Flake density is a convenient method used for measuring the quality of steam-flaked corn. Zinn and co-authors (2002) have reported that flake density is highly correlated with both starch solubility ($r^2 = 0.87$) and enzyme reactivity ($r^2 = 0.79$), but most importantly should be combined with a fecal starch measurement in order to get the best assessment of flake quality. The flake density can be used to predict the starch availability of the flaked grain, but in the end the fecal starch measurement will definitively measure what actually happened as the grain was metabolized by the animal.

R. S. Swingle et. al. also report a similar correlation between enzymatic reactivity (starch availability) and flake density for milo ($R^2 = 0.87$ to 0.93). They concluded that, "the optimal flake (bulk) density for steam-processed sorghum grain appears to be 360 g/L (28 lb/bu), based on performance by feedlot steers, grain processing

costs, and diet digestibility of protein and starch. Professor Zinn and co-authors state that flake density be measured consistently, either within a few seconds after flaking or after the sample has been cooled.

The different methods of quality standards for measuring steam-flaked corn include flake thickness, flake density, starch solubility and enzyme reactivity.

The most practical and accurate program should combine both a flake density measurement and most importantly a consistent program that measures fecal starch and fecal pH. ***"Live animal measurements are the ideal indicator of the adequacy of the steam flaking process.***

(Furthermore), direct determination of fecal starch explained 68% of the variation in ruminal starch digestion and 91% of the variation in total tract starch digestion (Zinn 2002). This excellent correlation between fecal starch measurement and total tract starch utilization was found over a very large sample of 64 feeding trials and the fit line resulted in an equation relating fecal starch to total tract :

starch digestion percentage TDS = $-0.649FS + 100.5$ ($r^2 = 0.91$), where TDS is the Total Starch Digestion Percent and FS is the measured fecal starch percentage. Reliable estimates of fecal starch can be obtained from a composite of 10 fresh fecal samples taken over a 5 day successive period. Specific sampling procedures are listed on the SarTec web site (<http://sartec.com/pdf/fsp.pdf>).

Starch concentration of corn grain for 46 modern yellow dent corn grain hybrids from test plots across the United States averaged 71.0 +/- 0.4% of dry matter. The flaking of corn enhances the completeness of starch digestion in the animal which ideally occurs in the small intestine .

Lastly, a key to optimizing costs of steam flaking is the residence time (measurable by a simple dye test) of the grain within the steam chest. Too long a residence time leads to excessive costs, while too short a residence time results in decreased starch availability and higher fecal starch.

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SARTEC Employee highlight Jerry Johnson

This issue's employee highlight focuses on Jerry Johnson who has been a SarTec distributor for the past five years. Jerry has a very positive "can-do" attitude that puts his customers at ease. Jerry has been helping feedlots for over 35 years. He currently lives in London, Texas, but lived in San Angelo for most of his career. Jerry has a wife, Judi, and two grown sons, Tom and Jeff. Jerry went to Texas A&M and graduated with a degree in vocational agriculture. He served in the Army (1962-1964); then taught two years in

Nebraska; then has worked with feedlots in Texas ever since. For recreation Jerry enjoys working on his ranch and raising goats. Jerry comments that he enjoys working with the SarTec staff because of the commitment to excellence that they bring to the industry. SarTec has a strong tradition of innovation.

Jerry just turned 65 and says that his main goal is to continue doing what he is doing and to someday retire. Thanks, Jerry, for being an important part of the SarTec team!



SarTec Highlight of Jerry Johnson. Jerry has been a SarTec distributor servicing Texas since 1999. Above is a recent picture of Jerry at the 2003 SarTec Las Vegas Breakfast Seminar.

See inside: The Keys to Getting the Most Out of Steam Flaking and a Great New Beef Recipe.

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It's full of information about SarTec products, feeding trial results and previous newsletters!