



Variable Impact of Feed Fatty Acids in Corn Silage on Rumen Function

Over the last 10 years the fat component of milk has been a key driver for milk price paid to dairyman. The construction of the ration can have a significant impact on milk fat percentage and milk yield. Historically there has been a focus on starch and starch degradability as having a potential negative impact on the ability of the cow to realize higher milk fat production.

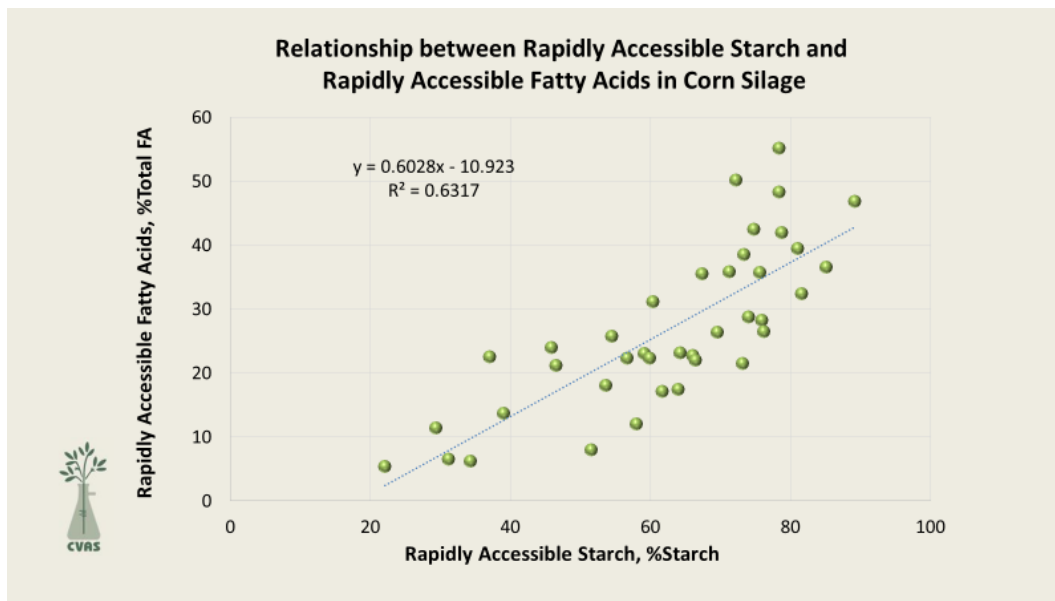
More recently researchers and nutritionist have come to an understanding that the perceived negative impact of starch containing feeds may not be related as much to the starch itself as it is the unsaturated fatty acid load contributed by the starch as it breaks down in the rumen.

Unsaturated fatty acids which are a key component of the oil in corn are antimicrobial in their action. Rumen bacteria must saturate these fatty acids through biohydrogenation to reduce their toxicity. If there is more fatty acid ingested by the cow than the bacteria can handle the function of fiber digesting bacteria is impaired and there is the potential creation of CLA (a type of fatty acid) in the rumen that acts as a potent metabolic suppressor of milk fat production.

When developing rations for high producing cows, considering only the amount of unsaturated fatty acids fed does not allow us to promote higher production of milk fat. In a survey of 21 high producing herds averaging over 100 pounds of milk and from 3.6 to 4.0% fat, Dr. Larry Chase of Cornell University observed a range in unsaturated fatty acid feeding that ranged from 518 to 928 grams. These higher producing herds were able to feed a range of unsaturated fatty acids successfully. The additional key consideration in feeding sources of unsaturated fatty acids is rumen accessibility – how quickly the fatty acids are released from the feed into the rumen environment.

Rumen accessibility of fatty acids varies significantly by feed type. In cottonseed, the fat is encapsulated and is released quite slowly. In corn distillers, the oil tends to be on the surface and may be released quite rapidly. Corn silage and corn grain materials, while lower in total and unsaturated fatty acids, have a variable rate of release of these fatty acids. It is important for a dairyman or nutritionist to understand the rumen access potential of fatty acids in these feeds if a ration is to be developed that can promote high milk and fat production.

The starch in corn silage and fermented corn grain can have significant range in potential rumen starch access (how quickly starch breaks down and is available to the rumen). Analysis of over 300 corn silage samples at Cumberland Valley Analytical Services from the 2019 crop year show the amount of rapidly accessible starch to generally run from 35% to 85% of total starch depending on processing. This range in rapidly accessible starch leads to a significant range in rapidly accessible fatty acids. Research at Cumberland Valley Analytical Services shows a strong relationship between rapidly accessible starch and rapidly accessible fatty acids as shown in the graph below.



The rate of release of fatty acids in the rumen is important to understand in order to develop rations supporting high milk and fat production. Laboratory analysis for starch degradability or rumen accessible starch will allow us to understand the potential rumen accessible fatty acid component of corn silage and fermented corn grain. As well the nutritionist can request an analysis for rapidly accessible fatty acids in various high fat feeds, corn silage, and corn grain materials.

You may contact Matt Michonski, Director of Technical Services at CVAS (mmichonski@foragelab.com) for more information on the new assays for Rapidly Accessible Starch and Rapidly Accessible Fatty Acids in corn silage, corn grain, TMR, and other feed materials.