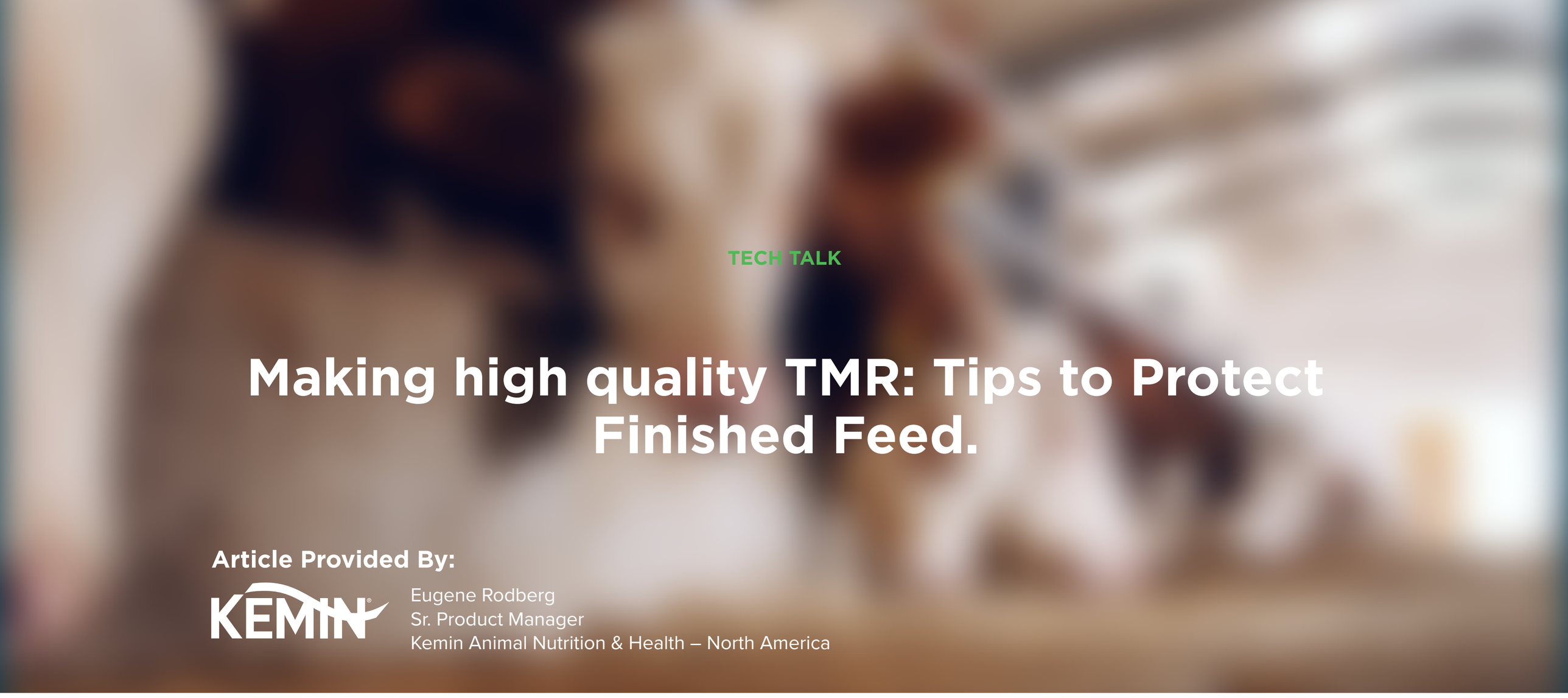

TECH TALK

Making high quality TMR: Tips to Protect Finished Feed.

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Total mixed rations (TMR) as we know them today are an invention of primarily the last 50 years. Prior to TMR, dairy herds were fed predominately forages with a limited amount of grain delivered at milking time. Dairy producers started moving toward TMR feeding as milk production per cow increased, herds became larger, free-stall and large-group handling of cows became more common, and milking parlors became more prevalent. The earliest known abstract reports in the Journal of Dairy Science on feeding “complete rations” or TMR may have appeared in the 1950s. The earliest full-length article on TMR in the journal was published in 1966.

Challenges
The challenge associated with feeding cows these nutritionally complete diets is we are also feeding a complete diet to beneficial and non-beneficial microorganisms. When non-beneficial wild yeast, mold and bacteria grow in the TMR, thermal and aromatic related off-feed events, milk fat depression and other digestive upsets are likely to occur.

Summer temperatures and humidity increase the challenges posed by the growth of mold and bacteria in the TMR. Summer heat and humidity dramatically increase the growth of these non-beneficial microorganisms. Of course, the growth of these microorganisms is fueled by nutrients in the TMR that were targeted for the dairy cow.

Additionally, a byproduct of microorganism growth and metabolism is heat. Thus, not only do the non-beneficial microorganisms reduce the nutrient density of the TMR, they also render the TMR less desirable to the cow as the ration temperature increases.

What causes the ration to heat?
Well fermented silage resists heating when exposed to fresh air (oxygen), a condition called aerobic stability. Silages that take longer to heat after facing are considered more aerobically stable than silages that heat quickly. In addition to aerobic stability, blending different feed ingredients in a TMR allows microbes access to additional nutrients along with air. This process, along with a hot feed bunk and higher humidity, creates the perfect growing conditions for molds and wild yeast to rapidly grow. The fermentation of the feed generates heat and in return, increases the temperature of the TMR. It’s also possible a dairy is adding more moisture to the ration by adding green chop forages or seasonal wet by-products which are not ensiled. The moisture content of the TMR may also increase as water from cow cooling sprinklers drifts onto the feed.

Measuring temperatures of the TMR and taking readings throughout the day is a great way to monitor secondary fermentation. Producers are often surprised to learn how quickly the TMR heats up. In just a few hours, wild yeast and mold counts grow exponentially. Feed samples, sent to a lab for analysis, may not represent the extreme situation of a cow’s experience. Your best indication of a problem is to monitor the TMR temperature and watch how the cows eat their ration. When the cows back off, feed quality may be the issue.

The quality of a TMR can degrade quickly in summer conditions. Preventing secondary fermentation and its accompanying heat spike is so important and is especially true if the forage or feed quality is already marginal.

Key feed management practices to keep feed fresh:
- Feed twice per day. If possible, provide fresh feed when conditions are relatively cool. Consider offering two-thirds of the TMR in the late afternoon/early evening and one-third in the morning.
- Push-up feed frequently.
- Carefully manage the face of an upright silo, bag or bunker. Removing 12 inches a day is recommended, and it is best to remove from the entire face.
- Use preservative products such as bacterial inoculants and a blend of organic acids at the time of harvest.
- Always use a thermometer to check temperatures. Feeling the temperature of the feed with your hand will not give you accurate results.
- Use highly concentrated, buffered, broad-spectrum mold inhibitors. Buffering the blended organic acids makes them less corrosive and much safer to handle.

Research and solutions
If wild yeast is a problem, adding an organic acid blend with propionic acid and other acids to mixed feed will be highly effective at controlling secondary fermentation and heating of the TMR. Single acid treatments often fail to control a wide variety of molds or wild yeast. For example, propionic acid will control some molds species but is ineffective on other strains. At the same time, propionic acid has limited efficacy on wild yeast. A mold inhibitor with a higher total acid content containing acetic, benzoic and/or sorbic acids has demonstrated efficacy in controlling yeast growth. Multiple acid formulations are highly effective at controlling yeast.

Research conducted at the University of Delaware evaluated the use of a buffered blend of organic acids (propionic acid, potassium sorbate, and sodium benzoate; 87% active ingredients) to reduce TMR heating and improve aerobic stability of corn silage. When silage was exposed to air, untreated corn silage was stable for 35.3 hours before heating. Silage treated with a blend of organic acids was stable for 49.3 hours. In addition, the application of organic acids reduced the peak temperature of the corn silage when exposed to air.

Summary
Weather is unpredictable. When labor is limited, feed quality is not optimal, and when conditions dictate, incorporating a premium mold inhibitor into the TMR can help to protect your investment.

For more research or product information, please visit kemin.com/feedquality or email keminag@kemin.com.

References available upon request.

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