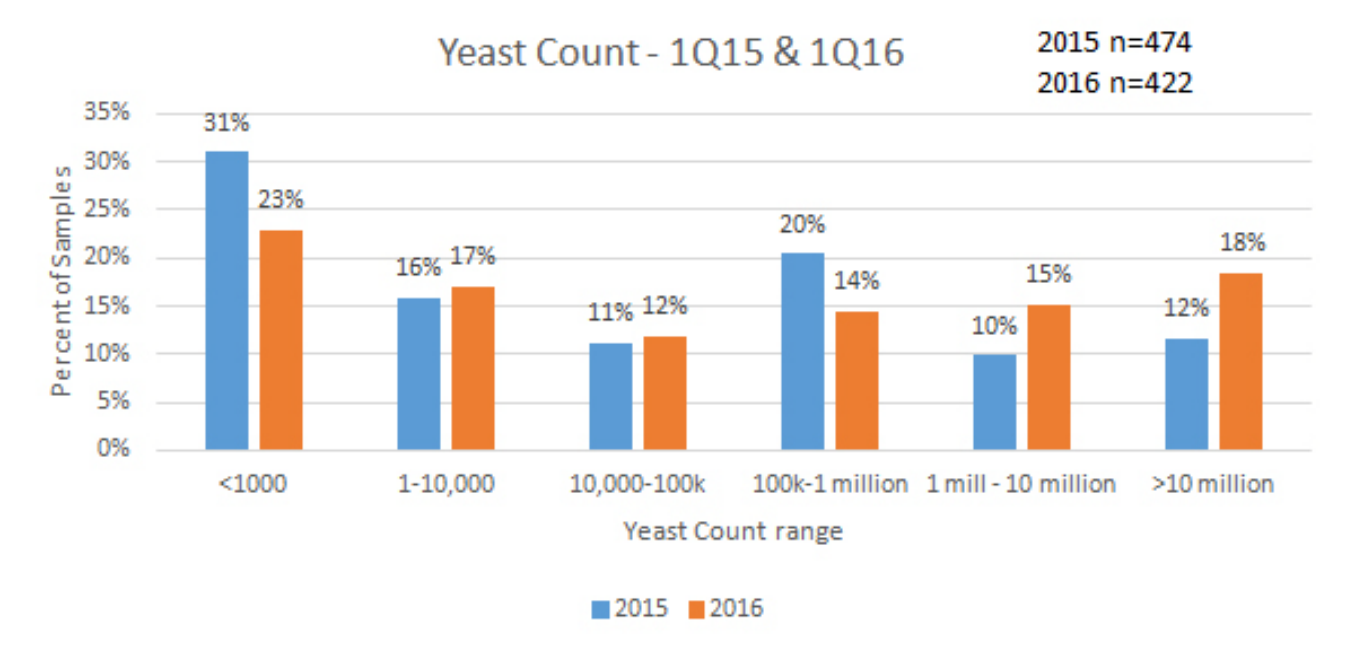
WILD YEAST IN CORN SILAGE: WHY IS IT A PROBLEM THIS YEAR?

Early in 2016, dairy nutritionists observed milk production issues when producers began feeding new-crop corn silage. Upon closer evaluation, laboratory analysis showed high levels of wild yeast in the corn silage. In some cases, wild yeast levels were over 50 million colony forming units per gram (CFU/g) when less than 1,000 CFU/g is desirable. At these high levels, not only is there an adverse impact on milk production, but also on health and reproductive performance. But why did this happen in 2016 and can we prevent it in 2017?

Anecdotal comments from dairy nutritionists caused the team at Kemin Industries to question how much more wild yeast was present in the 2016 corn silage crop versus what was usually present in prior years. Dairyland Laboratories, Inc., pulled all corn silage samples tested for yeast during January, February, and March of 2015 and 2016. From the data (Figure 1), a pattern emerged showing that 2016 samples had much higher yeast counts than 2015 samples. In 2016, 34% of corn silage samples sent to Dairyland Labs have more than 1 million CFU/g versus 22% in 2015.

Figure 1. Percentage of corn silage samples by range of wild yeast count – 2015 versus 2016



Source: Dairyland Laboratories

What is wild yeast and why is it a concern?

Strains of wild yeast, as opposed to beneficial yeast, degrade lactic acid in the presence of air. Because these wild yeast strains consume lactic acid, their growth and multiplication raises the pH of silage, allowing mold and other spoilage organisms to proliferate. The major species of these wild yeast are Candida, Hansenula, Pichia, Issatchenkia, and Saccharomyces (Woolford, 1990, Inglis et al., 1999).

Dr. Limin Kung, University of Delaware dairy nutritionist, discusses the “Domino Effect” from high yeast counts in corn silage (Kung, 2010). This cascade starts when yeast degrade lactic acid and elevate the pH of silage. Mold and aerobic bacteria grow as the pH rises and further degrade silage. In addition to increased growth, some strains of Saccharomyces may have a negative effect on performance, causing issues with acidosis due to overstimulation of fermentation and accumulation of volatile fatty acids or VFAs (Chung, et al., 2011).

Why does wild yeast grow in corn silage?

Poor silage pile management (often starting with facility design) is a significant reason for seeing high levels of wild yeast in fermented feeds. Researchers recommend producers remove 8-12 inches or more from their silage faces each day. The reason for this recommendation: oxygen infiltration can exceed 12 inches after new silage is exposed. If the silage bunker is too wide, daily silage needs might only require 4-8 inches of silage removal.

Another reason for reported high levels of wild yeast is what could be called the “face-to-feed” interval. Often the person who faces the silage pile at the end of his or her shift is not the one who prepares the feed later in the morning. The face-to-feed interval can stretch 3-4 hours in some cases – providing 3-4 hours for wild yeast to grow. This added exposure to oxygen allows secondary fermentation to start, raising the temperature of the dairy ration and reducing the feeding value.

What can we do about wild yeast in corn silage?

For ensiled feeds, the wild yeast or molds present at harvest are often not the same wild yeast and molds found in the silage during feeding. Thus, yeast and mold counts taken before ensiling do not accurately predict the count when the animals finally eat the feed (Oetzel, 2009). However, what we do at harvest can impact the quality of silage.

With increased usage of disk mowers and harvesters, laboratories are reporting higher levels of ash (dirt) in silage samples. Silage samples will always contain ash; forage plants take up ash in the form of minerals like calcium, magnesium, potassium, and phosphorus through their root systems. Pat Hoffman, Extension dairy specialist at the University of Wisconsin, determined normal ash values on a dry matter (DM) basis were as follows: legume-grass silage or hay, 9%; corn silage, 5%; and TMR, 9% (Linn, 2007). However, excessive ash (soil) in silage does not provide nutritional benefits and potentially serves as a vehicle for introduction of mold and wild yeast. Soil is a natural source of mold spores. Microbial contamination from soil may result in poor fermentation of ensiled feeds and introduce undesirable organisms like clostridia into the feed (Linn, 2007).

Minimum- or no-till systems will also impact the quality of forage crops, agronomists have found. Research in California with lettuce showed deep chiseling and ripping lead to higher fresh lettuce yield and lower symptoms of lettuce drop disease than the shallow minimum-tillage system (Jackson, 2002). These researchers found periodic deep tillage may bury sclerotia and thereby limit infection in the lettuce crop. This does not mean we need to return to plowing every field, every year. However, periodically introducing deep tillage into our cropping systems might reduce the mold and wild yeast that's being found in our silage.

References

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