Next-generation analytics for next-generation forages

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AT A GLANCE

Well-managed forage programs are a key aspect of any dairy operation, and tools such as MILK2024 are valuable metrics to help make decisions on both the quality and quantity of feed harvested.

Corn has been a pillar of domestic civilization for centuries and continues to make up a huge portion of our daily lives. The way we utilize it has changed immensely since its domestication, and as we look back over the last handful of decades, the changes in corn silage alone have been substantial. Average corn silage production in the 1980s averaged around 13-15 tons per acre, whereas from 2014-18 corn silage averaged nearly 20 tons an acre. That's a nearly 50% increase in the yield-per-acre potential in just 30 years (**Figure 1**).

Likewise, we see the growing importance of corn silage demonstrated by the increasing production, year over year, during this time frame. This has fostered the introduction of key genetic modifications, such as brown midrib (BMR) and *Bacillus thuringiensis* (BT) corn varieties.

Just as our genetics and productivity have changed, so has our analytics for crop quality assessment. While maximizing both yield and quality has been the goal for quite some time, assessing quality has changed quite a bit. Back in the '80s, feed analysis reports would have consisted of proximate analytes likely completed by wet chemistry methods. Now, most reports will contain major nutrient parameters and even digestibilities for some nutrients. The majority of analyses are performed with near-infrared (NIR) technology, offering a much faster turnaround time. Our analytic capabilities to assess both nutrient quantities and digestibilities are always evolving and creating a need to translate these values into decision-making tools. Enter MILK2024.

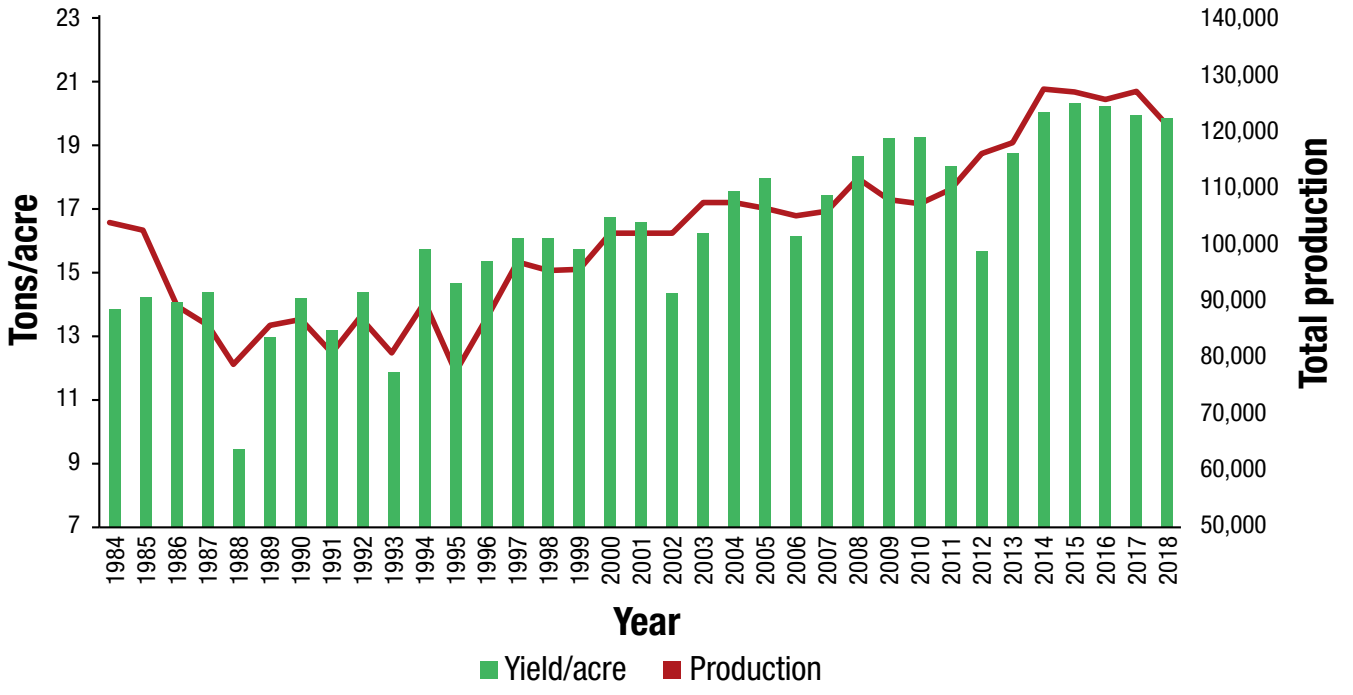
The first generation of the "Milk predictions" arrived in 2000, followed by updated equations in 2006. These calculations used nutrient values and digestibilities to help producers, nutritionists and seed companies relate these nutrients to a unit we all understand: milk. This system offered the industry "milk per ton of forage produced" or even "milk per acre," which took advantage of yield data. Since 2006, laboratories, research organizations and universities have developed new assays and new total digestible nutrient (TDN) equations to further fine-tune these milk predictions.

Key change and what to expect

So, what does the next generation of forage look like? Fiber and fiber digestibility still play a vital role. Advancements in analytes such as undigestible neutral detergent fiber at 240 hours (uNDF240) have been pulled in alongside neutral detergent fiber digestibility (NDFD) 30 or 48. These values determine the rate of fiber digestibility and total *in vivo* fiber digestibility of the feed. Starch digestibility is now directly calculated in MILK2024 using 7-hour starch digestibility values. This is an important consideration, as we've long noted the large variation in starch digestibility between corn silage. Not only is this nutrient variable, it makes up a large portion of the potential energy in the feed.

The new MILK2024 equation also looks at TDN in a completely

FIGURE 1 U.S. corn silage production from 1984-2018



Source: Data adapted from USDA NASS

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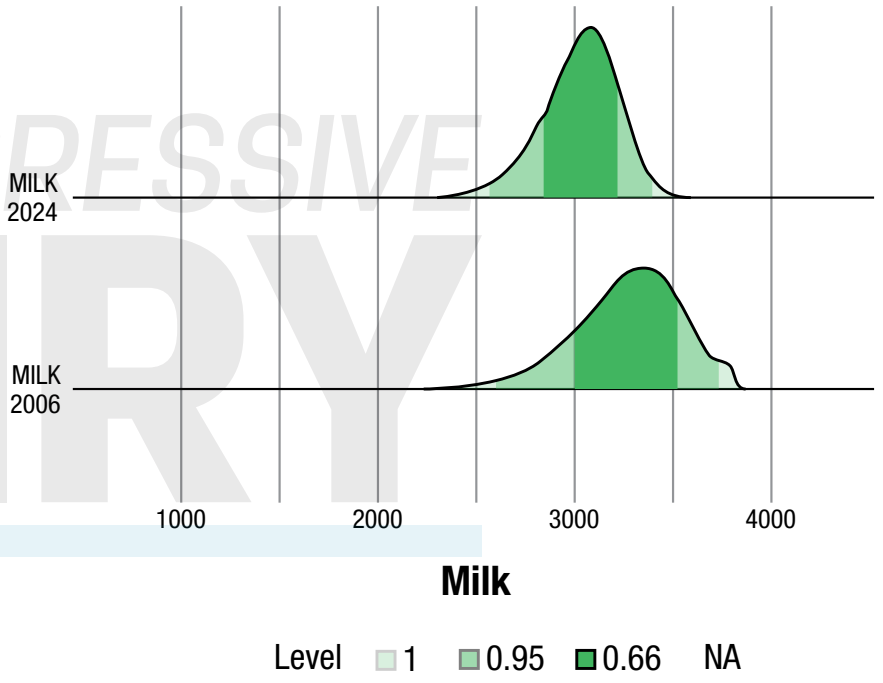
different way. This is based on 2021 NASEM updates, which calculate the TDN of the total ration rather than individual feeds. With this in mind, TDN is no longer calculated alongside the MILK2024 predictions. The MILK2024 equation also takes into account a basal ration to account for this change. The basal diet used was based on a Midwestern-type diet, including 30% corn silage on a dry matter (DM) basis. However, it only uses the corn silage portion of the ration to predict the estimated milk yield, keeping true to its goal of assessing the impact of different corn silages on milk production potential.

These changes to the equation led to distribution changes between MILK2006 and MILK2024 predicted outputs. Notably, there is a reduction of the starch digestibility (SD) and range of outputted milk per ton estimates. This means that small changes should be given more weight than in previous calculations – after all, we know small changes can make a big difference. **Figure 2** showcases the difference in predicted MILK2006 and MILK2024 milk ton values from roughly 400,000 corn silage samples tested at our laboratory. This data highlights a slightly reduced estimate of milk per ton yield from the MILK2024 predictions. While approximately 33% of the values were above 3,500 pounds of milk per ton with the MILK2006 model, very few samples will fall in this range with the improved prediction equation.

Well-managed forage programs are a key aspect of any dairy operation, and tools such as MILK2024 are valuable metrics to help make decisions on both the quality and quantity of feed harvested. As technology implementation increases, it is critical to assess what works for an operation and what doesn't. Understanding the potential impact of these decisions on milk production can help producers do just that. I'm sure when we look back from decades in the future, we'll be amazed at the progress that's been made.

FIGURE 2 Distribution of MILK 2006 and MILK 2024 from corn silage samples tested at Rock River Laboratory, Inc.



Courtesy image.