ones, especially when they stop making milk. “If a cow’s too fat or lean, she won’t breed,” says Wilkerson.

Farmers also don’t want cows getting more nutrients than they need for optimum milk production. It inflates the feed bill. And excess nutrients either add body fat or exit the cow as potential pollutants.

But dairy farmers do want more milk. In the ARS study, cows produced 4-plus pounds more milk daily with high-moisture corn than dry corn—in the alfalfa-based diet. Processing also made a difference. Finely ground corn provided 5 percent more energy than the big chunks of rolled corn, increasing milk production by about 5 pounds a day, says Wilkerson.

Weiss says his committee will consider the data in revising the energy values for dairy feedstuffs, noting that the values may be higher than the committee will agree on. “All net energy values we use now are estimated on very old numbers.”—By **Judy McBride,** ARS.

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JOE LARSON NRCS

Unshelled feed corn.

Testing for Natural Aflatoxin Inhibitors

In the United States, corn with more than 20 parts per billion (ppb) of aflatoxin—which is the equivalent of just 1 ounce in 3,125 tons—is not considered fit for feeding to animals that produce meat or milk for humans.

A known carcinogen, aflatoxin is the metabolic byproduct of *Aspergillus flavus* fungi. Grain with more than 5 ppb gets thumbs down for making food-grade corn products. And in the South and in areas where occasional drought stresses corn and increases *A. flavus* levels, farmers may lose opportunities to produce corn valued for export markets.

Finding natural compounds in corn that affect the toxin-producing machinery of *A. flavus* is a first step toward identifying corn genes that might be modified to make the microbe less harmful. The strategy could be joined with efforts to breed corn that discourages growth of the fungus.

Now, a faster, cheaper test is helping researchers detect genetically regulated compounds in corn that inhibit or promote the ability of *A. flavus* fungi to produce aflatoxin. ARS chemist Robert A. Norton developed the new procedure at the National Center for Agricultural Utilization Research in Peoria, Illinois.

“We can now realistically test a much wider range of compounds for toxin-producing activity—including lipids—using 1 milligram [thousandth of a gram] or less of the test compound,” he says.

Norton purchases the compounds for testing, some of which cost up to hundreds of dollars per milligram, though most cost less. Despite the expense, Norton says that it’s cheaper to buy the compounds than to tediously extract them from corn.

“And with the new testing method, we don’t have to use as much of them,” he says.

His procedure involves placing the test compound, along with about 29 microliters [millionths of a liter] of a nutrient medium and *A. flavus* spores, on a small disk. The disk is hung by a pin from a Teflon cap inside a bottle containing a small amount of water. After 5 days, researchers measure fungal growth on the disk. They use a small amount of solvent to extract aflatoxin from the fungus; high-performance liquid chromatography measures the amount. The method saves time, nutrient medium, and solvent.

Norton currently tests up to 200 samples per week. So far, he has pinpointed several aflatoxin-synthesis inhibitors, including carotenoids that impart yellow color to modern corn hybrids and a colorless benzoxazolinone compound. He also plans to test colorless anthocyanin-related compounds that could be bred into yellow corn.—By **Ben Hardin,** ARS.

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