Mycotoxin contamination in silages

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Silages made from different forage crops constitute an important component of modern dairy diets. The typical parameters utilized to measure silage quality many times exclude mycotoxin analysis.

Mycotoxins are toxic secondary fungal metabolites that can contaminate feeds (including forages) in the field, during harvest, during storage and processing (including the ensiling process), and even during feedout. Our knowledge base on molds and mycotoxins in silages is minimal in comparison to that of cereal grains and proteinaceous feed materials.

Molds are ubiquitous in nature and exist as plant pathogens. During growth, forage crops can be infected with several different fungi, some of which can produce mycotoxins. Therefore, forage crops can be contaminated with several mycotoxins at harvest, or when directly grazed upon.

Proper silage preparation creates conditions (anaerobic and rapid pH change) in which further mold growth and mycotoxins production can be controlled. Some molds, however, can survive in these extreme conditions and still manage to produce mycotoxins. Furthermore, toxins existing prior to ensiling will be present in the silage even if proper silage fermentation occurs.

If we consider the state of many silages seen in the field, where anaerobic conditions are not always maintained (improperly compacted, improperly covered, tears on the plastic or improperly managed silo face), it is not hard to imagine that many silages are, in fact, contaminated with these harmful toxins.

The primary toxin producing molds are Fusarium, Penicillium and Aspergillus species. Other molds like Mucor and Alternaria species should also be considered as potential mycotoxins producers in forages. These molds produce hundreds of known mycotoxins including the Aflatoxins, Deoxynivalenol (DON), Nivalenol, Zearalenone, PR toxin, Patulin, and Citrinin.

Most mycotoxins affect animals either by interfering with nutrient absorption and metabolism, by affecting endocrine and neuroendocrine function, or by suppression of the immune system.

Several studies have examined the presence of mycotoxins in forage crops prior to and after ensiling. These studies have frequently found high concentrations of tricothecenes mycotoxins (i.e. deoxynivalenol) and of zearalenone. A 12-year evaluation of samples submitted by farmers for analysis in the Southeastern U.S. revealed a high frequency of DON, zearalenone and fumonisins in corn silage samples. Other studies have found high concentrations of the mycotoxins aflatoxin B1 and ochratoxin A in silage samples.

Little or no data is available on the presence of Penicillium-produced toxins like Roquefortine C, PR toxin. This is quite

Western Dairy News is a collaborative effort of Dairy Specialists from:
The National Institute for Occupational Safety and Health (NIOSH) has awarded a $504,000 two-year grant to a consortium of 11 university-based agricultural safety and health research centers, including centers in the Pacific Northwest, California, and Hawaii, which enables the centers to join in an unprecedented team effort on this compelling public health issue,” said NIOSH Director John Howard, M.D. “Finding effective ways to promote tractor safety is a tremendous national challenge to which we and our partners are bringing new resources.

Steve Reynolds, PhD, who directs the High Plains Intermountain Center for Agricultural Health and Safety at Colorado State University, which will lead the initiative, said “By 2007, building on the results of this effort, we will be in a good position to seek the involvement of all the stakeholders affected by tractor injuries and fatalities – farm and safety groups, equipment manufacturers and dealers, government agencies, and legislators, educators and outreach specialists, and most importantly, farmers, ranchers, and their families. Together, we can make a difference.”

Under the initiative, the centers will:
- Study the costs of injuries from farm tractor overturns and highway collisions and identify who bears those costs.
- Assess the impact of changes in ROPS standards, regulations, and technology and their effect on future ROPS availability.
- Examine the acceptability of, and procedures for, financial incentives to retrofit tractors with ROPS.
- Create a database of potential partners to help guide the planned national campaign and launch an intranet to facilitate communication about tractor safety among the centers.

The most ambitious of the projects, involving eight of the 10 centers, will test procedures for, financial incentives to retrofit tractors with ROPS.

Joining forces to reduce tractor injuries