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DAIRY PIPELINE

Mycotoxins. Reducing poisons in your feeding systems. If you were asked what level of poison you are currently feeding your cows, you'd probably take offense—and rightly so. However, in some instances, poisons may be being delivered to your animals without your knowledge. The culprits for this hidden danger are **Mycotoxins.** Mycotoxins are difficult to treat because they are constituted by a wide variety of organisms (mostly fungi and molds) and their resulting poisons, each having a different mode of action on the host organism. Even the species of the animal itself makes a difference in the danger of Mycotoxins. **Horses** and **swine** are most susceptible to the ravages of mycotoxins. However, poultry and ruminants are not immune to their effects. At present, the only known ways to combat mycotoxins are by complete removal of the infected feed source or by feeding binding agents mixed in the animals feed. It is proposed that horses and swine are least likely to be successfully treated by binding agents because their rate of feed passage does not allow the agent to "catch up" with the offending toxins. Dr. Peter Spring of the SHL Institute in Bern recently spoke on the subject of mycotoxins at a meeting of feed industry personnel in Wytheville. According to Dr. Spring, the most commonly known mycotoxins are Alfatoxins which are carcinogenic and affect liver function and Fusarium, a wide ranging family of organisms that decrease milk and reproductive efficiencies. One of these poisons, Fumonisin (B1) is a linear chemical that damages the cell membrane. The "leaking" tissues cause edema that causes increased pressure on areas like the brain. Deoxynivalenol (DON) affects the animal by inhibiting protein synthesis, which leads to increased free amino acids in the blood. This in turn affects the kidneys and also appetite by decreasing serotonin levels in brain tissues. We usually think of mycotoxins being carried by grains and indeed when we have high yielding corn grain years (like this past corn year), it seems that mycotoxin pressures increase. Of tested feeds, whole grains (like whole wheat with the bran still in place) have infection rates higher than any other feed source. This means that most of the feed grains that we grow on the farm are sources of mycotoxins. It would be incorrect to think that the threat is diminished if you do not grow or feed grain. Zearolenone (ZEA) affects pastures and can affect cows and lambs dramatically at levels as low as 3 parts per million. In fact at that level, live lambing will be reduced by 15-50%! Levels of 500 parts per *billion* as tested by Dr. Lon Whitlow of NC State exhibited the ability to reduce pregnancy rates in dairy heifers by 30%. Heifers with ZEA poisoning will exhibit estrogenic effects, like swollen udders prior to breeding and estrus expression during pregnancy. ZEA is usually found only in sparse areas in the pasture. The only true way to measure ZEA pressures are to collect urine samples from the animals that are harvesting the pasture. ZEA is found mostly on the unused undergrowth that overwinters in the pasture. Corn crops can be adversely affected by ZEA and DON. As in the pasture, these mycotoxins exist mostly in residues from past crops. In Europe, plowing residues under dropped mycotoxin pressures from an average of 6.1 to 1.8 ppm. While this might not be an option according to your tillage protocols, it has been shown that assisting the breakdown of the residue (such as bush-hogging or shredding the corn stubble) has much the same affect on mycotoxin levels. European studies also show that certain varieties of corn are more likely to grow mycotoxins. While studies are inconclusive, Dr. Spring does feel that varieties that stay green longer seem to have higher mycotoxin levels. In conclusion, some strategies for reducing mycotoxin pressures in your herd are to manage crop and pasture residues and manage the storage of your crops and control (or prohibit) additional moisture (rain). Also you can dilute infected grain with clean grain sources, divert the feeds to less susceptible species or add proprionic acid to the feed during harvest.

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Handling dairy manure is not what it used to be. The new dairy facility at Virginia Tech has a unique waste handling system that is in the process of being evaluated by Dr. Katharine Knowlton and her students. It uses solids separation to reduce the

amount of nutrients being pumped to surrounding pastures and cropland. The solids are composted (under aerobic conditions) which reduces the odor potential and makes it easier to transport to off site areas. Also the liquid is aerated in a series of three tanks also reducing offensiveness. The material is then either recycled as flush water for the free stall barn or irrigated. One of the big questions that Dr. Knowlton is pursuing is how much nitrogen and phosphorus goes with the solids in the compost as compared to staying with the liquid. This can impact our nutrient management plan. A recent meeting on Dairy Manure Management (NRAES publication - 176) contained a presentation by Cornell researchers (Scott F. Inglis, Curt A. Gooch, and Karl J. Czymmek). The researchers monitored four farms that had solids separation equipment in place. They found that there were differences in nutrient removal from farm to farm and even from day to day depending on the conditions. An interesting observation was that no more than 25% of the nitrogen or phosphorus was partitioned into the solids portion. As we get further into our own evaluation of the Virginia Tech system we will be able to compare our results to theirs with implications for the Virginia dairy industry as we look for ways to better distribute manure nutrients to prevent environmental problems.

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Daughter pregnancy rates can change genetic merit for fertility. PTA's for Daughter pregnancy rates (DPR) measure genetic differences between bulls in fertility of their daughters. DPR predicts genetic improvement (or deterioration) in pregnancy rate for future daughters of a bull compared to a bull that is expected to produce no change (PTA DPR = 0). Better pregnancy rates reduce semen usage and can be an important part of efforts to reduce days open. Producers wanting more fertile cows should select the bulls with higher DPR ratings. Change will be slow, as genetic differences between bulls range from lows of -3 or -4 % to highs of similar magnitude. Some of the critics of DPR say that genetics don't control fertility enough to justify selection. I will plead guilty to ignoring fertility in the past for just that reason, though not having genetic evaluations for fertility made the decision for me. Heritability of DPR is low – only about 4% - so producers should not expect dramatic improvement in fertility from selection. However, genetic control of fertility is real. Pregnancy rates in Holsteins declined by about 9% over the past 40 years, and 5 to 6 of those percentage points were due to genetic change. During those years, fertility was not part of selection programs. We selected to improve production and type. The decline in fertility was a correlated response. If fertility can be hurt by correlated response to selection, it can certainly be improved by selective use of higher fertility bulls. DPR needs to be included with all the other traits of economic importance in dairy cattle breeding, however, rather than being singled out as "the" trait in a breeding program. The reason is that one of the more effective ways to improve fertility is to select for lower milk yield, which would likely cause more pain than gain. The Net Merit index includes DPR with 7% of the total emphasis on all traits. That compares with 55% emphasis for milk, fat, and protein. Selection on Net Merit will improve fertility by 1% across an entire population of cows over a ten year period. The magnitude of change isn't impressive, but the real point is that fertility improves at the same time that production, productive life, somatic cell score, functional type traits and calving ease are substantially improved. That's a much better situation than the old approach where improved milk and type came at the cost of less fertile cows.

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**** Upcoming Activities****

Hokie Cow Classic Golf Tournament, Virginia Tech, *Blacksburg Country Club*	May 31
Waste Management System Demonstration and Dairy Tour, *Virginia Tech Dairy Center*	July 15
State 4-H/FFA Dairy Youth Field Day *Harrisonburg*	August 5

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