IOWA STATE UNIVERSITY
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The good old long (mostly dry) summertime brings threats to livestock

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This year has brought a varied weather pattern that is cause for concern as the summer deepens. Last year's dry weather in a substantial portion of the state raised issues of nitrate accumulation, aflatoxins and algae in ponds. These threats to livestock could develop again. In addition, dry weather tends to favor weeds and some of these are toxic. The three "drought toxins" are reviewed briefly.

Aflatoxin. This mycotoxin, produced by *Aspergillus flavus*, from prolonged hot dry weather and insect damage is often predicted by crop specialists, so keeping in touch with their reports is beneficial. Aflatoxins produced in the field can be screened by inspection of the cracked grain under a short wave UV light. If positive blue-green to yellow fluorescence is detected, collect multiple samples from a field or bin for aflatoxin testing. Expected effects in livestock may only be reduced growth or feed efficiency, or liver damage with stunted and icteric animals and immunosuppression. Aflatoxins are excreted in urine or milk of contaminated animals for several days after consumption stops. Aflatoxin is concentrated 3-4 fold in distiller's grains. Suspect grain, liver (fresh and in formalin), kidney and urine are good diagnostic samples. Aflatoxins can be blocked from absorption using calcium aluminosilicate (Novasil®) or Mycosorb®. For details, go to (www.vdpam.iastate.edu) and click on the "What's New" bar and then the **aflatoxin** links. Guidelines for use of contaminated grains in different livestock are given at the website. Generally, younger monogastric animals and young poultry are more susceptible than are ruminants, with sheep being more resistant than cattle.

Other common mycotoxins (Vomitoxin or DON, Zearalenone and Ergot alkaloids) are more likely in cool moist conditions. However, Fumonisins (which cause liver damage and pulmonary edema in pigs and leucoencephalomalacia in horses) are potentially more a problem with dry summers followed by a cool wet September.

Blue Green Algae. The blue green algae are not a common toxicant in Iowa, but in times of drought and hot weather, pond levels may drop and the algae concentrate and begin to die rising to the surface where winds can blow the accumulated algae close to shore. Toxic blue green algae can produce two recognized clinical syndromes. One is the infamous "fast death factor" associated with Anatoxin-a, a depolarizing neurotoxin causing paralysis and death in a matter of minutes. Another (Anatoxin-a[s]) is a cholinesterase inhibitor. There are no lesions and detection is only by identifying the toxin or the algae (*Anabaena flos-aquae*) in a pond, and possibly decreased cholinesterase in brain or blood. A second toxin, Microcystin, (produced mainly by *Microcystis aeruginosa*) causes severe GI signs with bloody diarrhea that may be followed in 24 hours by acute massive liver damage, edematous gall bladder and sometimes hemorrhages and

photosensitization. Dying and dead algae may also be a source of botulinum toxins.

Diagnosis locally is by identification of the algae compatible with these toxins. At least a quart of fresh pond water containing algae should be collected and kept refrigerated. Another pint should be mixed 1:1 with 10% buffered formalin to preserve algae for microscopic identification. Additional chemical detection is available at one referral laboratory in the USA for a cost of approximately $250. Most diagnoses are made with a combination of clinical observation, appropriate lesions and identification or the appropriate algae.

Nitrates. Nitrate accumulation in crops and certain weeds occurs in response to drought stress. leading to increased nitrates primarily in the stalks or stems of plants. Lower stems have the greatest concentration, followed by upper stems and then leaves. Grain and legume hay does not accumulate significant nitrate. Some weeds – e.g. pigweed, lambs quarters, Kochia and Johnsongrass are nitrate accumulators. Cut drought damaged corn at least 12'' high and ensile to reduce nitrate threat. Ensiling reduces nitrate concentration by about 50% provided there is adequate starch for fermentation. A field test for nitrate (the diphenylamine test) can detect dangerous concentrations of nitrate in plant stalks. Check with your county extension services, or if needed, the ISU VDL can help in formulating materials for the test. For a definitive test at ISU VDL or other labs, collect stalks or green chop and keep cold until it reaches the lab. Cattle with generally tolerate 2000 ppm (0.2%) nitrate on a dry weight basis without any effects. Some guidelines suggest caution with pregnant cattle at > 0.2% and limited feeding of forages above 0.5%. Concentrations above 1% (10,000 ppm) are considered acutely hazardous to ruminants. Ocular fluid from a suspect nitrate death is a good diagnostic sample from the animal. Methylene blue is the classical treatment, but FDA regulations do not allow its use and pharmaceutical sources are not readily available. Dosage is 5 – 15 mg/kg BW in a 1% solution.