



Mastering
Mycotoxins

Jan - April 2021

Mycotoxin Report



Welcome

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Letter From Our Vice President of Operations

For many years Agrarian Solutions® has been a leader in educating and advising our colleagues about the environmental challenges present in livestock feed. We have invested over \$3 million in Mycotoxin testing over the past 15 years. We are pleased to offer you information that can provide even greater insight to guide your decisions and improve the health and performance of your livestock. We have added new features to this report that will enhance your understanding of what is happening across the United States.

Activation Laboratories, a global leader in analytical lab services, is providing independent and state of the art results. The following report is focused primarily on dairy feeds. In the pages ahead, you will find extremely helpful information to assist in discerning the best course of action to optimize your animals' health and performance.



Mark Lantz
Vice President Operations
Agrarian Solutions®



Actlabs
41 Bittern Street,
Ancaster, ON, L9G 4V5

actlabs.com

Actlabs, in Ancaster, Ontario, Canada, is our partner in providing technologically advanced mycotoxin analyses. Actlabs is a global enterprise certified under ISO 9001 and 9002 specifications. They are credentialed under various Canadian agencies and are FDA approved. Analyses are done with high-performance liquid chromatography/tandem mass spectroscopy (LC-MS/MS). And no result is released until a trained technician carefully reviews each chromatogram for various parameters. This method gives excellent sensitivity and accuracy and permits determination of chemically related toxins within the sample. In each sample, 17 mycotoxins are analyzed and reports are optimized for best use by the client, including estimates of the degree of severity of the concentration(s) found.



Welcome to the second Agrarian Solutions Mycotoxin Report of 2021. As always, the major mycotoxin results are given by state in the report; you can double check your own area of operation to get an estimate of what the risks are four months into the year. My only comment right now is that some areas still don't want to participate in our free test service; I don't know if they prefer paying out of pocket or just don't care to know what their exposure is, but it would be nice to have better sampling across all the dairy regions of the US.

In the last report we began to do some retrospective comparisons since our database now allows us to look back. Sampling rates are about the same so far this year as for the same period in 2020. The COVID shutdown took hold about halfway through the period in 2020, but, with loosening of restrictions, we're looking to see improved testing rates over the course of 2021.

This year, TMR's saw more fumonisin than last; corn silage was a bit worse for T-2; and HMC had a large jump in zearalenone. Co-contamination by multiple toxins seems to be a bit higher so far this year with 'zero toxin' or '1 toxin' reports losing and more multiple contaminations rising. But, the major concern this time is the rise in high test values. Silage heads the concerns list with some very high DON and T-2 results. We can't always tell if these are left over from 2019 crop silages or represent the new material, but silage does bear watching closely.

What else is new this time? Every dairy nutritionist and most all producers are very familiar with most of the prominent mycotoxins we usually talk about: aflatoxin, fumonisin, DON, T-2, zearalenone. But what do you know about **mycophenolic acid**? This mycotoxin has been part of our test panel for a few years now; and, while it doesn't come up in the test often, we generally only detected ppb levels below the threshold of real concern. A bit has changed this year with mycophenolic acid.

This is a Penicillium toxin, and its special claim to fame is that its producing mold grows well under very low oxygen tension. That means it is well adapted to survive and thrive in silage. While we like to think silage is anaerobic, we really never achieve that goal. Not surprisingly, then, mycophenolic acid shows up most often in feedstuffs such as corn silage or high moisture corn.

What does it do in dairy cows? I wish I could give a definitive answer to that one, but, frankly, US dairies have not been monitoring this one long enough and the research is not abundant. In Europe where they like to look for everything, and elsewhere around the globe there are frequent reports of dairy forage, silage, etc. with mycophenolic acid. And about ten years ago, several dairy mycotoxicologists began to suspect it may be causing some of the issues we usually attribute to DON. Unfortunately, while it occurs perhaps 25-40% less often than DON, it is almost never alone, and trying to separate out the individual impact of this one toxin is not in the cards right now. Even discounting risk of synergism, my best guess would be to sound a real concern when a report comes back at above 2,500 ppb. And I bring it up because we've just seen a 7,300 ppb mycophenolic acid posted for a silage sample from a Missouri farm during the first quarter. Fewer positive test results in '21 but increasing test values; we need to keep an eye on this one!

Let me end with another pitch for the test service. We use one of the best regulated, independent labs available for state-of-the-art analysis. And we've prided ourselves on our 17-toxin panel, especially when producers don't have to spend a dime to get those tests done. But, we are constantly looking to make it even better. The lab tells us that by end of this month or early in June the toxin count will go to 18 with the addition of alternariol to the test panel. Presuming this to be true, I'll have some more to say about that toxin and dairy cows in the next report. And, you can also add to that a toxin called patulin. It's being worked on now, and by end of summer it should be bringing our tally to 19 for the test. I'm guessing that maybe 1% of you will ever get back a report with a positive alternariol, and probably less than that for patulin, but they are there for good reasons, and farms that do encounter those toxins need to be aware of them and what they mean. Keep that in mind for the next Mycotoxin Report.

Enjoy this issue of the Agrarian Solutions Mycotoxin Report, and, as always, feedback from you is most welcome.



John Doerr, Ph.D., PAS, Dipl. ACAN.
Vice President, Science & Technology
Agrarian Solutions®

State	Zearalenone	DON Average	FUM Average	T2 Average	No. of Samples
AL	50	1700	300	nd	2
AR	nd	160	3400	nd	1
CO	nd	nd	nd	nd	6
GA	40	700	500	nd	2
ID	nd	1230	200	nd	2
IL	214	1471	650	475	7
IN	125	1405	440	nd	16
IA	368	1032	133	80	11
MD	120	2249	467	nd	9
MI	140	763	133	80	11
MN	57	553	243	90	37
MO	nd	186	1783	nd	6
NY	90	2475	425	893	8
NC	207	1181	2900	100	14
OH	240	4757	460	178	65
PA	526	2742	947	233	81
SC	50	720	nd	nd	1
SD	30	368	nd	nd	6
TN	240	342	980	nd	5
TX	60	1400	250	120	2
VA	265	2285	2038	190	40
WA	90	849	nd	60	9
WV	1010	6605	700	nd	2
WI	124	1162	207	204	60

nd = none detected
 ■ = low
 ■ = medium
 ■ = high

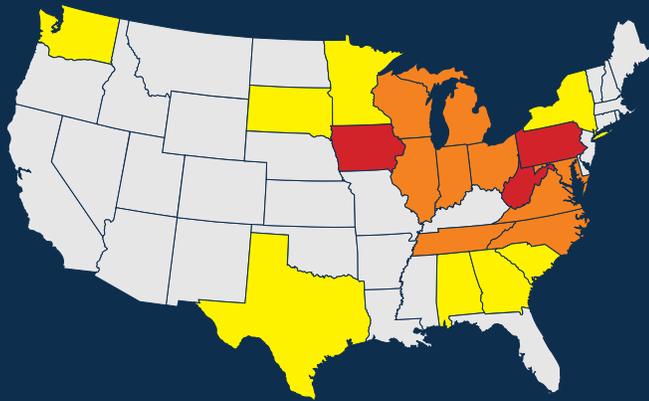
START DATE **January 1, 2021** | END DATE **April 30, 2021**

NO. OF SAMPLES 403

1 DON = DON + 3-Acetyl-DON + 15-Acetyl-DON; FUM = fumonisin B1 + fumonisin B2; T-2 = T-2 toxin + HT-2 Toxin



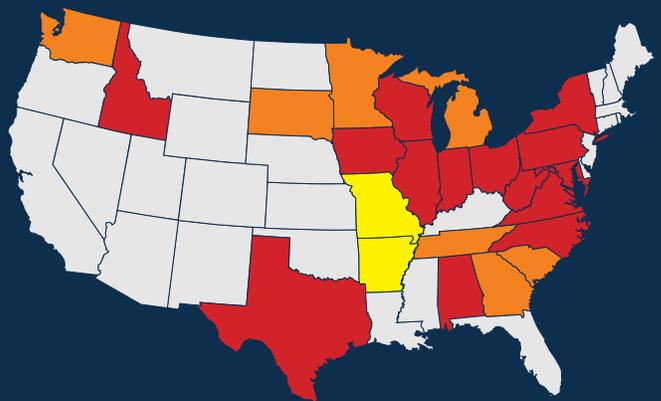
Zearalenone



ppb (parts per billion)

nd <100 100-300 301+

DON Average



ppb (parts per billion)

nd <300 300-1000 1001+

FUM Average



ppb (parts per billion)

nd <600 600-1500 1501+

T2 Average

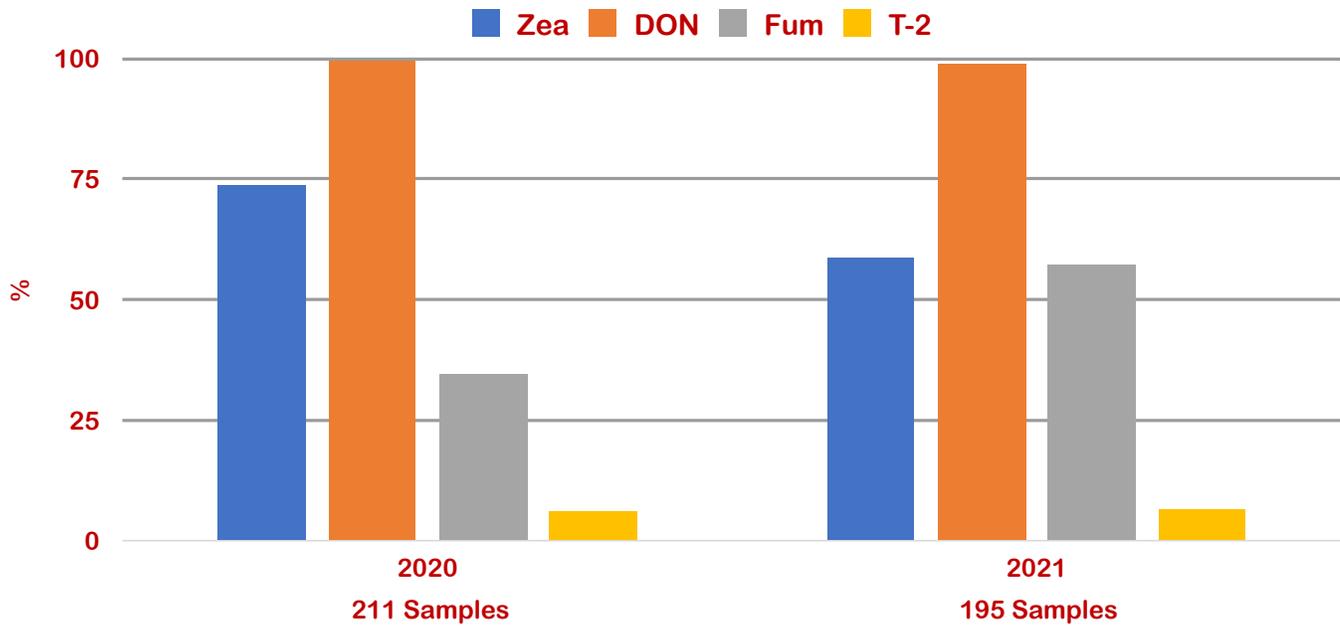


ppb (parts per billion)

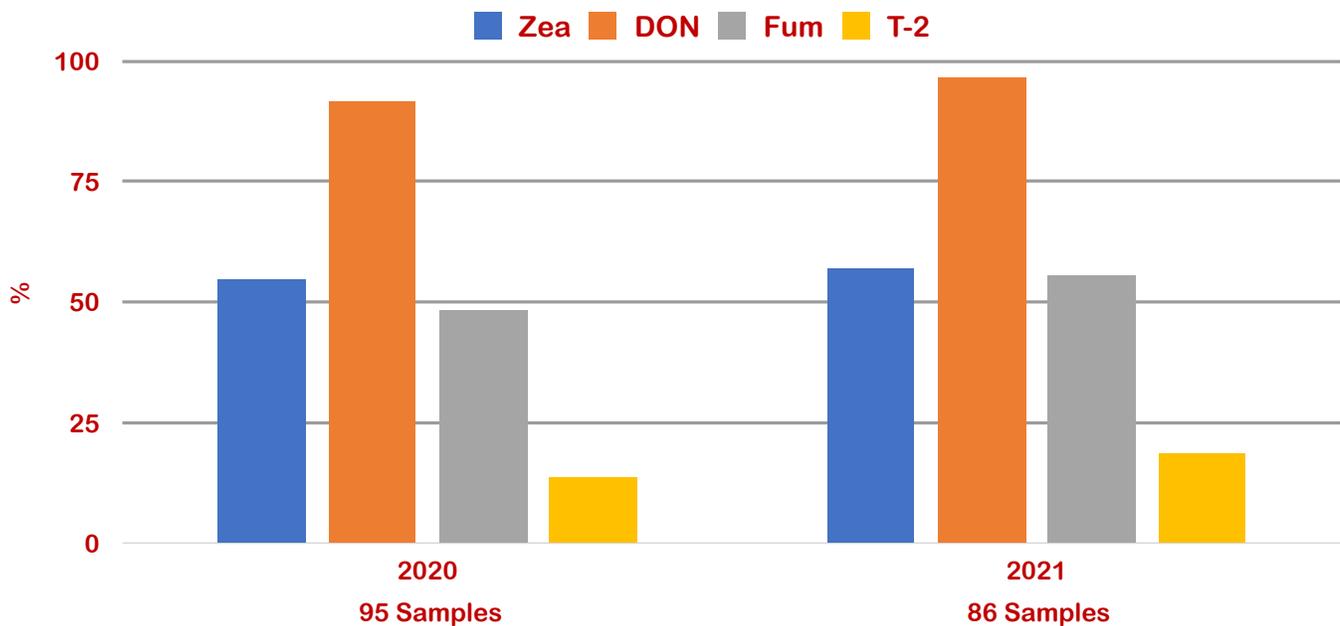
nd <75 75-150 151+



Major Mycotoxins: TMR – 2020 vs. 2021

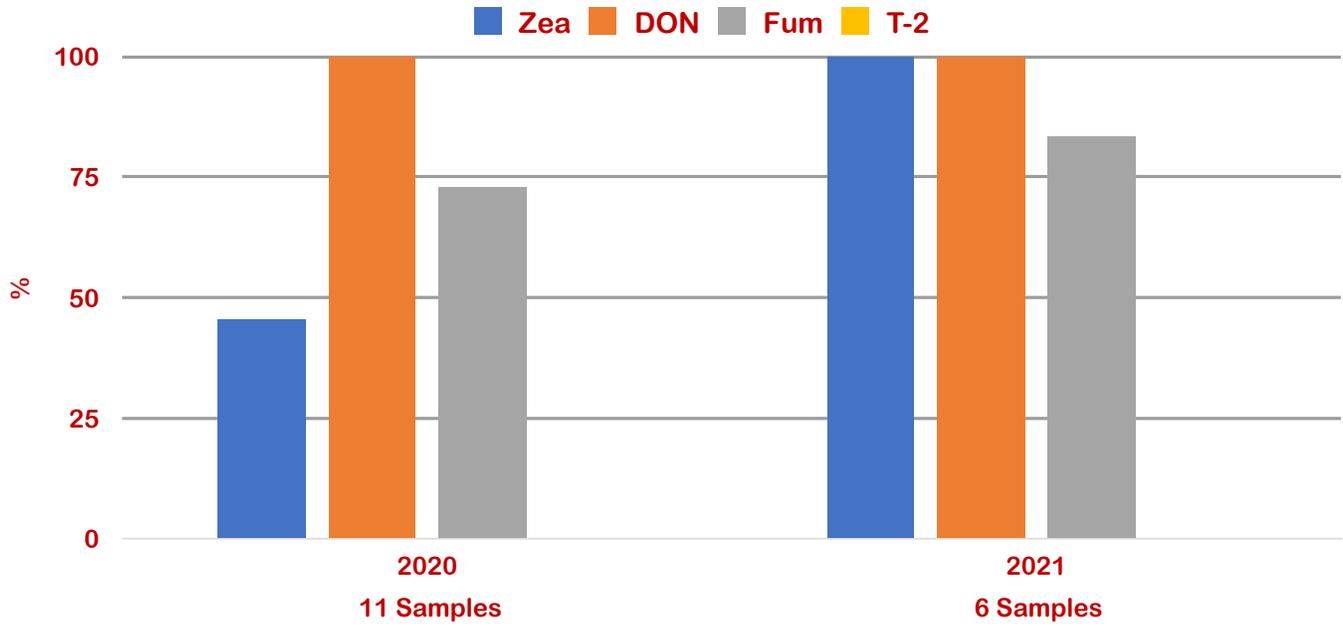


Major Mycotoxins: Corn Silage – 2020 vs. 2021

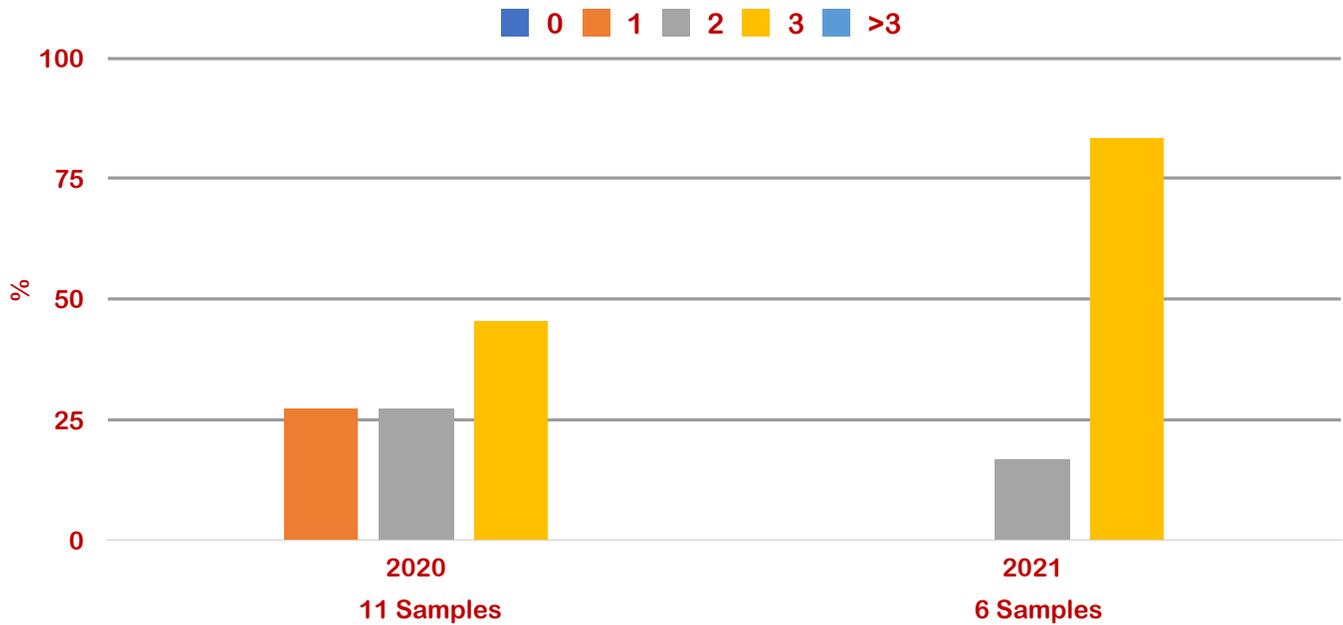




Major Mycotoxins: HMC – 2020 vs. 2021

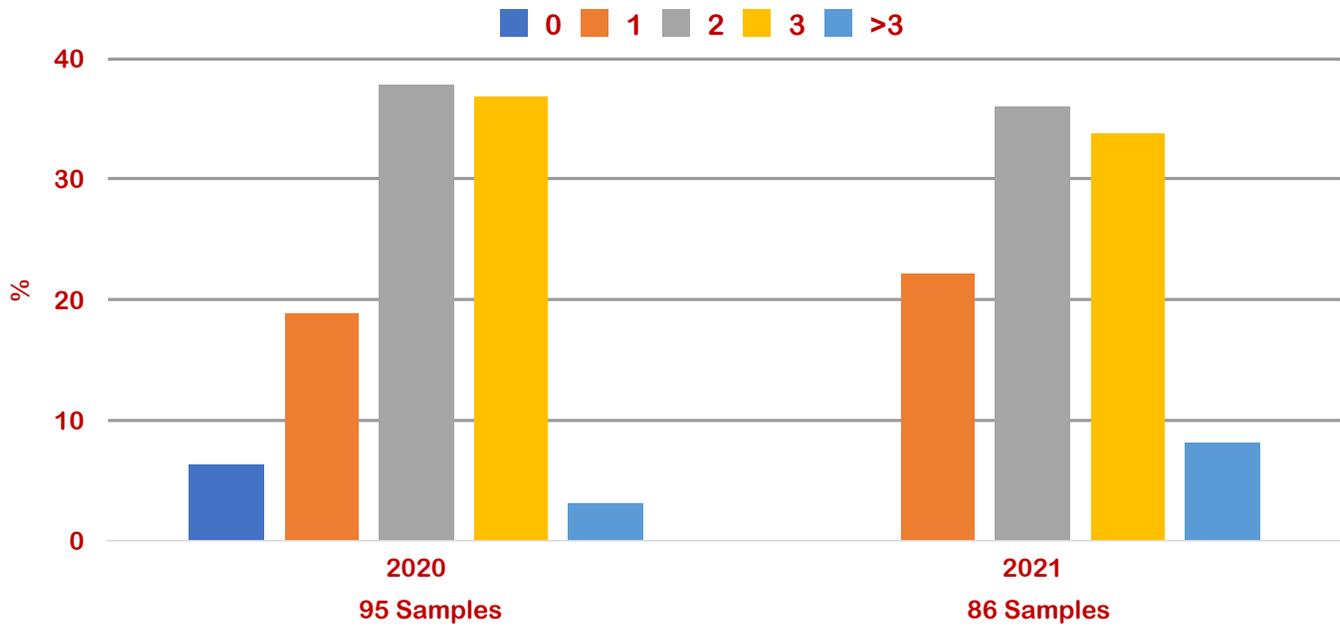


Multiple Mycotoxins: HMC – 2020 vs. 2021

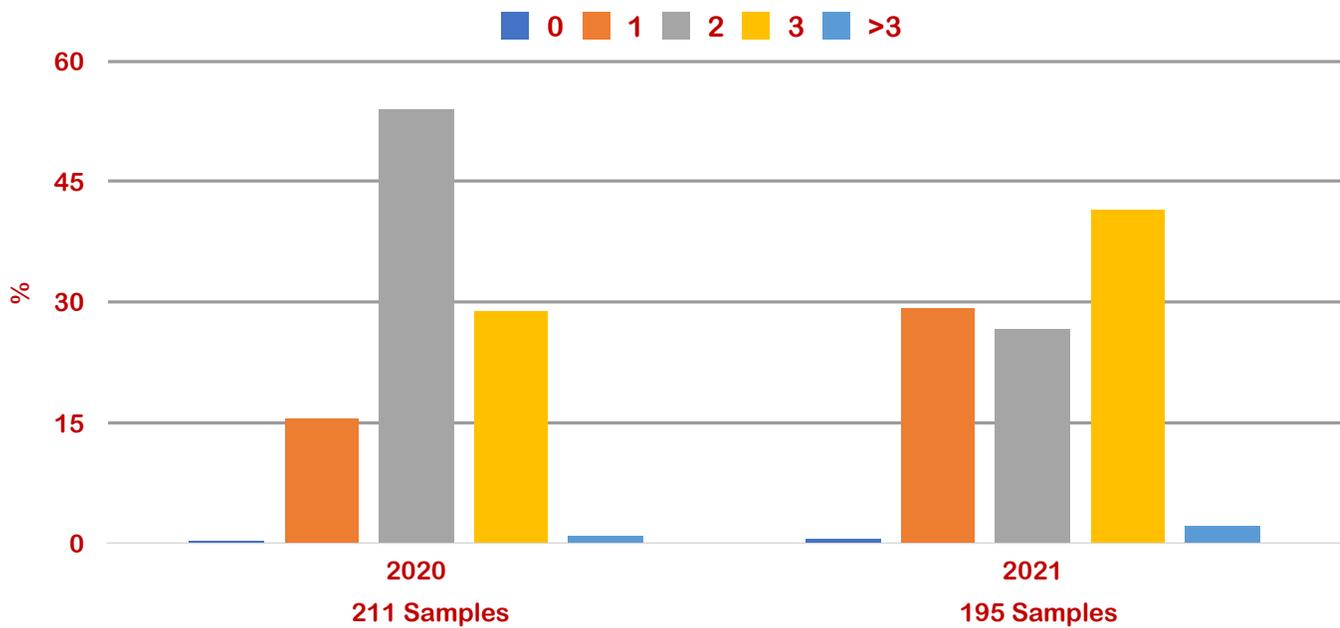




Multiple Mycotoxins: Corn Silage – 2020 vs. 2021



Multiple Mycotoxin: TMR – 2020 vs. 2021





High Test Comparison – 2020 vs. 2021

All Mycotoxin Values in PPB

Year	Item	Zea	DON	Fum	T-2
2020	TMR	174	4,570	2,800	440
	Corn Silage	353	6,740	4,700	380
	HMC	1,816	2,107	1,875	0
2021	TMR	158	9,430	1,700	380
	Corn Silage	194	30,970	4,400	1,510
	HMC	4,708	29,020	3,700	0

2021 **Highlight** = Items of Concern

Mycophenolic Acid (MPA) – 2020 vs. 2021

Values in PPB

Year	Metric	MPA	Source	Concern?
2020	High	2,660	Silage, TN	
	Low	30	TMR, VA	
	No. Samples	76		
2021	High	7,320	Silage, MO	✓
	Low	40	TMR, PA	
	No. Samples	51		



APPROXIMATE RANGE FOR RISK

MYCOTOXINS	LOW	MEDIUM	HIGH
DON (vomitoxin)	< 300 ppb	300-1,000 ppb	> 1,000 ppb
Zearalenone	< 100 ppb	100-300 ppb	> 300 ppb
Aflatoxin	< 10 ppb	10-30 ppb	> 30 ppb
T-2 toxin	< 75 ppb	75-150 ppb	> 150 ppb
Fumonisin	< 600 ppb	600-1,500 ppb	> 1,500 ppb

Revised 01/2019

Qualifiers

- Multiple mycotoxins will compound potential effects.
- Toxic effect may be increased by body condition, health challenges, or stress.
- Mycotoxins are not uniformly distributed in feedstuffs.
- Small samples yield high test errors and underestimate mycotoxin contamination rate.
- Low-level test results may still be cause for pro-active response.

Representative Symptoms

DON (vomitoxin)

Reduced feed intake / feed refusal

Reduced milk production; reduced milk fat

Poor reproductive performances

Elevated SCC

Impaired immune function

Loose, inconsistent manure

Zearalenone

Hyper-estrogenism

Poor reproductive performance

- Short cycle heats
- Cystic cows; follicular cysts
- Twinning cows; multiple ovulations
- Vaginitis
- Enlarged mammary glands in virgin heifers

Aflatoxin

Liver damage; altered protein synthesis

Decreased appetite/off feed

Lower milk protein

Impaired immune function

Increased disease rates

Highly interactive

Rough hair coat

T-2 toxin

Reduced feed intake

Intestinal hemorrhages

Frequent defecation

Bloody diarrhea

Absence of estrous

Impaired immune function

Increased disease rates

Fumonisin

Reduced feed intake

Reduced milk production

GI tract ulceration

Impaired immune function



Meet Our Agrarian Solutions Team



MARK LANTZ
Vice President Operations



ROB HAMAKER
Vice President, Sales & Marketing



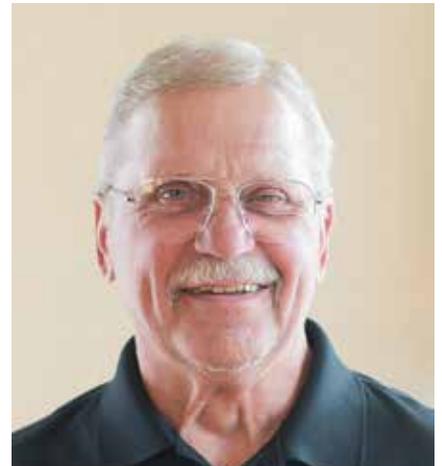
JOHN DOERR, PH.D., PAS, DPL. ACAP
Vice President, Science & Technology



CHAD CHRISTENSEN
Regional Sales Manager Midwest Plains Region



DAN HOYING
Regional Sales Manager Midwest Region



GREG MUCHMORE
Regional Sales Manager Eastern Region



NIC BRADLEY
Director of Operations



SCOTT ZEHR
Business Development Manager



RUTH CARLSON
Office Manager



The Agrarian Advantage Are You Making the Right Choice?

Unique Technology

The Agrarian proprietary technology works within the intestinal cell wall to improve immune function, reduce the burden of pathogens, and combat feed-borne toxins that effect the performance and health of the animal.

State-Of-The-Art Testing Program

Agrarian Solutions is committed to offering mycotoxin testing at no charge as a service. Mycotoxins can wreak havoc on the dairy. We believe mycotoxin testing should be implemented on every dairy. Ask your local Agrarian Solutions representative how to take advantage of this special offer.

Professional Product Support System

Agrarian Solutions has a team ready to serve you. Our Agrarian Representatives are equipped to help provide outstanding product support. Whatever questions you may have we are here to help. Passion, Integrity, and Industry Expertise are all a part of what you will get from your local Agrarian Representative.

Customer's Economic Advantages

If your dairy is experiencing any environmental challenges it can have a huge impact on the overall herd health as well as the farms bottom line. Having sick cows, reproduction problems, and even death will ultimately place a big strain on the farm's bottom line. Our products will help prevent many of these common issues from happening, helping drive the dairies profits.

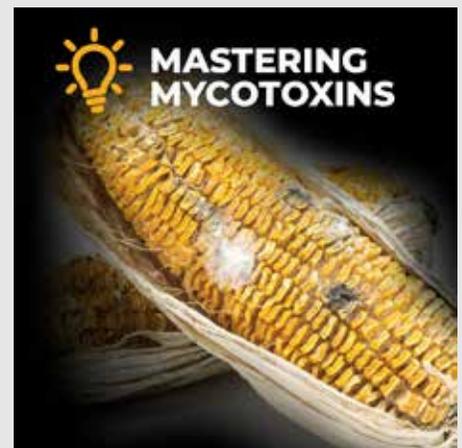
What Makes Agrarian Solutions Different



The Agrarian proprietary technology works within the intestinal cell wall to improve immune function, reduce the burden of pathogens, and combat feed-borne toxins that effect the performance and health of the animal.



Agrarian's cutting edge technology coupled with our responsive customer service, set us apart in our quest to provide global solutions for improving the health and performance of your animals.



Mycotoxins and other challenging pathogens can severely impact animal productivity, increase incidence of disease due to immunosuppression, damage vital organs, and interfere with reproductive capacity.



— OVER —
1,100
MYCOTOXIN
Tests Reported
— IN 2020

Agrarian Solutions has invested over **\$3 million** in **Mycotoxin Testing** since 2006.

Ask your Agrarian Solutions or Select Sires representative
about our **Free Mycotoxin Testing**.



Superior Protection for Your Genetic Investment

CONVERT CALF CARE PRODUCTS



CONVERT™ Powder

For optimal calf health and performance

- **Key Ingredients** | Blend of naturally occurring direct-fed microorganisms, L-form *Lactobacillus*, microbial sugars, enzymes and specialized proteins
- **Focus** | Healthy Calves
- **Feeding Rate** | Up to four scoops at birth and then one dose per day for 20 days added to milk or milk replacer



CONVERT™ Gel or Bolus

Protect your herd's future; don't let your calf have a bad day

- **Key Ingredients** | The same important ingredients as Convert powder in an extremely concentrated form
- **Focus** | Newborns and individual calves faced with environmental challenges
- **Feeding Rate** | Five to 15 cc of gel or one bolus (can be used instead of Convert™ Powder at birth and then use Powder for 20 days)

DIRECT FED MICROBIALS



Select BioCycle™

Healthy cows 24/7

- **Key Ingredients** | Two strains of L-form *Lactobacillus*, two sources of yeast, four digestive enzymes, microbial sugars and specialized proteins
- **Focus** | Excellent direct-fed microbial, aides in modulating immune function, digestion, and combats environmental challenges
- **Feeding Rate** | 1/2 ounce per head per day to animals not exposed to mycotoxins



Select DTX™

Broad-spectrum, multiple benefits

- **Key Ingredients** | Specific L-form *Lactobacillus*
- **Focus** | Proven to be effective in neutralizing the damaging effects of mycotoxins. Fed to lactating cows, dry cows, and heifers
- **Feeding Rate** | 1/2 ounce per head per day. When mycotoxin levels are extreme, use DTX in addition to a single dose of BioCycle Plus™ to the milking herd



Select BioCycle Plus™

The Gold Standard to healthy herds

- **Key Ingredients** | The best of both BioCycle™ and DTX™
- **Focus** | Lactating dairy cows exposed to mycotoxins. When mycotoxin levels are extreme, the addition of DTX™ is recommended
- **Feeding Rate** | 1/2 ounce per head per day



Select BioCycle Plus™ Ultimate

Enhance protein utilization

- **Key Ingredients** | Ultimate contains BioCycle Plus as its base ingredient and Ultimate contains increased levels of enzyme potency and microbial sugar
- **Focus** | Enhance high energy and high protein rations
- **Feeding Rate** | One-half ounce per head per day for lactating dairy cows



CONCENTRATES



Select BioCycle™ Concentrate

Stronger heats and overall animal health

- **Key Ingredients** | Two types of L-form *Lactobacillus*, two sources of yeast, four digestive enzymes, microbial sugars and specialized proteins
- **Focus** | Recommended when performance improvements are needed in reproduction, and overall herd health
- **Feeding Rate** | Mix into dairy feeds at a rate of five grams (5g) per head per day



Select BioCycle™ Plus Concentrate

A complete approach to feed and herd performance challenges

- **Key Ingredients** | The best of both BioCycle and DTX
- **Focus** | Lactating dairy cows exposed to mold produced challenges
- **Feeding Rate** | Mix BioCycle Plus Concentrate into dairy feeds at a rate of 10 grams per head per day



Select DTX™ Concentrate

Combats environmental and feed related challenges

- **Key Ingredients** | One specific L-form *Lactobacillus*
- **Focus** | Designed specifically for feed challenges caused by molds and their metabolites
- **Feeding Rate** | 9 grams (0.02 lbs.) per head per day

FRESH COW SOLUTIONS



BioFresh® Bolus

Dairy producer's choice for times of stress

- **Key Ingredients** | 8x dose of BioCycle with added vitamins and minerals
- **Focus** | Assists Somatic Cell Count (SCC) by modulating the immune functions of cows affected with environmental mastitis challenges. The direct-fed microbial action gets fresh cows on feed faster, reducing potential metabolic disorders and Displaced Abomasums (DA's)
- **Feeding Rate** | One bolus per day for three days at freshening



BioFresh® Plus Soluble

Give fresh cows a fresh start

- **Key Ingredients** | Equivalent active ingredients of one BioFresh Bolus, 12g of niacin, and 54g of calcium propionate. This concentrated powder mixes easily in water or propylene glycol for energy
- **Focus** | Fresh cow metabolic disorders
- **Feeding Rate** | Three ounces per day for up to three consecutive days post freshening

PROVEN PERFORMANCE

Thousands of dairy and beef producers have seen the results from this family of direct-fed microbial products and report:

- Stronger heats
- Lower somatic cell counts
- Higher fat tests
- Better feed utilization
- Less metabolic problems
- Healthier Calves
- Improved reproductive performance
- Fresh cows off to a better start



Notes

GLOBAL SOLUTIONS FOCUSED ON
Livestock Health & Performance



801-7 West Wayne St. Middlebury, IN 46540 • (574) 825-1224
office@agrsol.com • agrariansolutions.com