

January - April, 2022

Mycotoxin Report



Welcome

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Letter From Our President

The summer is upon us, and as is always the case, moving too quickly. As we enter the “dog days” of summer, we often experience some of the most significant challenges related to livestock and feed.

Agrarian Solutions is actively working to determine the very best ways that we can help you succeed in your business venture. Our Mycotoxin Report, which covers January through April 2022, is just one of those ways we desire to help you succeed. In this report we hope to provide valuable information to help you better manage your animals and provide better service to those who are feeding livestock. We are working diligently to deliver the best solutions for your challenges and ongoing needs.

Please do not hesitate to contact anyone on our team. We are here to help and serve your needs. In fact, it is a pleasure to do just that. Wishing you the best for days and months ahead!



Mark Lantz
President
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.



Letter From Our Vice President of Science & Technology

This is the second of our three mycotoxin reports for 2022. As always you can easily find the key values on the maps and tables to see what has been happening in your area. But I urge some caution! Of the 354 samples tested during this period, 4 states accounted for 63% of the sample submissions and fewer than 20 had any submissions at all. That statistic makes one wonder if their dairy farms are paying for testing or if they're just deluding themselves into believing they don't have any mycotoxin risks whatever. Obviously, if you'd like to know what's going on in your area, your area has to be submitting samples for testing. NY and PA had the highest zearalenone averages (1241 ppb in PA). KS found no Zea. The difference? NY and PA accounted for 136 of the 354 submitted samples; KS, one. VA and MD returned high DON averages. I have to wonder what other states in their regions were experiencing that did not submit any samples at all.

I would like to give you some further information on our source data. Agrarian Solutions has been underwriting the costs of this testing as a service to our customers for more than 25 years. What began as simple single toxin ELISA testing has evolved into state-of-the-art liquid chromatography-tandem mass spectrometry (LC-MS/MS) which gives high accuracy and precision and allows us to offer a panel of 19 mycotoxins and metabolites at about the same cost as doing a 3-toxin ELISA test did seven years ago. The options extend further. In areas that have higher risk of ergot poisonings, we offer a 5 ergot alkaloid panel (separate from the standard run) on request. And we are continually working with the laboratory to expand the numbers of mycotoxins that can be tested. For example, while they cannot be run in the current panel because of their particular chemistries, we may have options in the near future for fusaric acid and Roquefortine C. Why these?

Fusaric acid is best known for its exceptional capacity to act synergistically with several other major *Fusarium* mycotoxins. If it is present, values for DON that we don't normally consider high risk become so. We would use this test when there seem to be ongoing problems in the herd despite our normal product recommendations. Roquefortine C (RoqC), a *Penicillium* mycotoxin, has been suggested as having impact on dairy cows similar to DON. It is typically found along with mycophenolic acid (MPA, which we do test) and is thought to be most prevalent in corn silage. At the moment, however, we do use MPA as a marker: if it is present we can presume RoqC is likely a co-contaminant of the sample. More on that in a moment.

Check out the special graphs at the end. Graph 1 is a comparison of DON and Zearalenone (Zea) results for the Jan-Apr period this year vs. 2021. On first glance the two years look similar but look again. While DON in TMR seems pretty constant, DON in silage rose about 25% this year; Zea is 50% higher in TMR samples and 150% higher in silage

samples. We expressed some concern about last year's corn crop and its potential impact on this year's feeding values. The mycotoxins seem to tell an important story relevant to that concern. In graph 2 you can see that 2022 has seen a decrease in the number of samples with only a single toxin detectable and while TMR improved in terms of frequency of multiple toxins, silage is worse this year with 2, 3, and over 3 toxin results increased over same period last year.

Finally, another worrisome result at this point in the year is seen in graph 3. We're finding significantly higher amounts of MPA this year over last. And in 2021 there was a gradual increase in average values as the weather warmed. That trend would have held except for an unusual spike in February when we saw the highest number of MPA positive samples and the highest individual sample result (12,790 ppb). For perspective, we recently applied some boundaries for determining low, medium, and high risk for this toxin. Tests over 5,000 ppb are considered high risk, and that particular sample was TMR. No companion silage was submitted from that farm; if silage is a primary source, then imagine how active that *Penicillium* was in the bunk!

A last couple of comments for this report: if you're using our testing service, let me mention that we do the data searches based on some 'key' descriptors (TMR, Silage, HMC, Other) which have a selection menu on the submission form. For the data retrieval and comparisons to be valid, it is really important for anyone submitting a sample to do a good job of describing the sample including selecting one of those four descriptors. And if you are a submitter and you have an issue with the submission form, please do let us know. Our desire is that information be as complete as possible but with as little effort as possible on the part of the person collecting and submitting the sample!

If you are not using our service, I have to ask you, why not? The lab is an independent, well credentialed analytical service, the technology is as good as it gets as of now, the reporting is clear and easy to understand, and our periodic summary reports are seen by a very large group of dairy-related people. And you do not have to pay for the service; we even supply postage paid labels for your use. As of this writing I know of a couple of organizations that offer "free" testing, but only for a brief period. Then a fee per sample kicks in. Our customers enjoy our complimentary service all the time. If interested, please get in touch with the office (1-574-825-1224) for details.



John Doerr, Ph.D., PAS, Dipl. ACAN.

Vice President, Science & Technology
Agrarian Solutions®



State	Zearalenone	DON Average	Fumonisin Average	T-2 Toxin Average	No. of Samples
CO	nd	330	150	nd	7
GA	340	615	167	nd	4
ID	nd	230	nd	nd	2
IL	115	1090	371	nd	10
IN	90	800	200	nd	3
IA	90	550	2200	nd	1
KY	nd	200	100	nd	1
MD	153	4755	625	nd	4
MI	122	1386	200	nd	11
MN	124	611	400	nd	37
MO	nd	205	1750	110	2
NY	399	2218	172	75	80
NC	77	540	3100	nd	7
OH	196	1296	338	nd	30
PA	1241	3062	2320	nd	56
SC	nd	260	900	nd	3
SD	nd	100	nd	nd	7
TN	380	2260	1800	nd	1
VA	146	4020	660	nd	22
WV	220	2295	800	nd	2
WI	231	2389	333	235	64

nd = none detected
 ■ = low
 ■ = medium
 ■ = high
 ppb = parts per billion

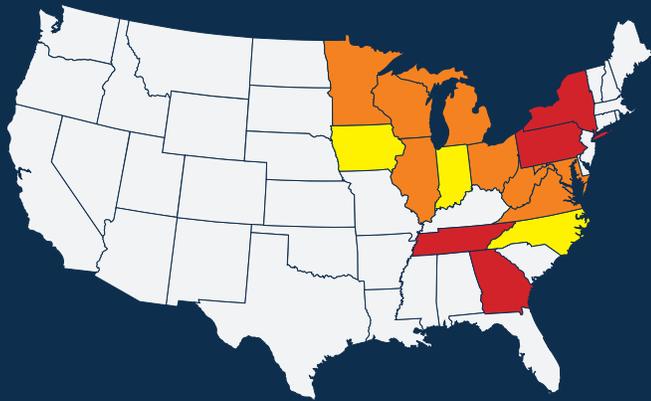
START DATE **January 1, 2022** | END DATE **April 30, 2022**

NO. OF SAMPLES 354

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



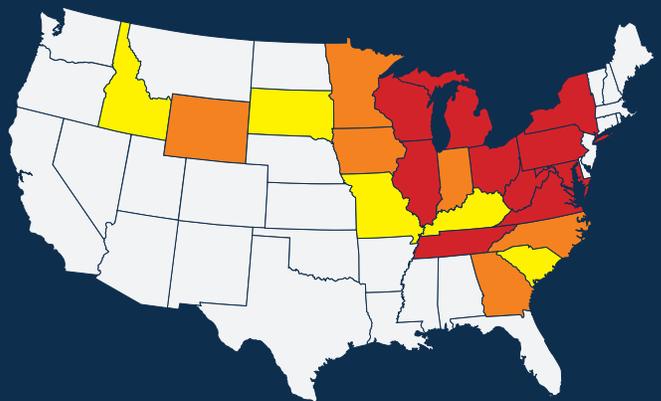
Zearalenone



ppb (parts per billion)

nd <100 100-300 301+

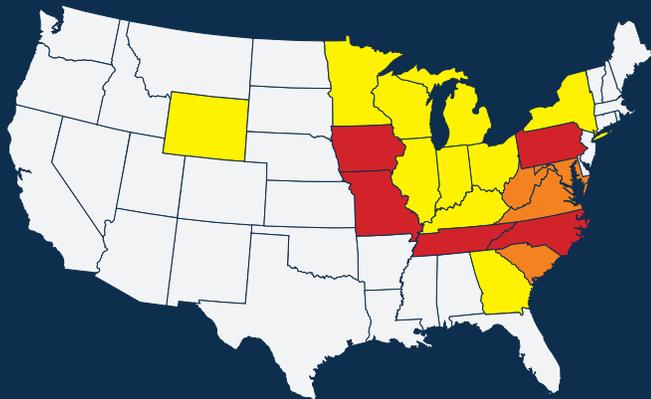
DON Average



ppb (parts per billion)

nd <300 300-1000 1001+

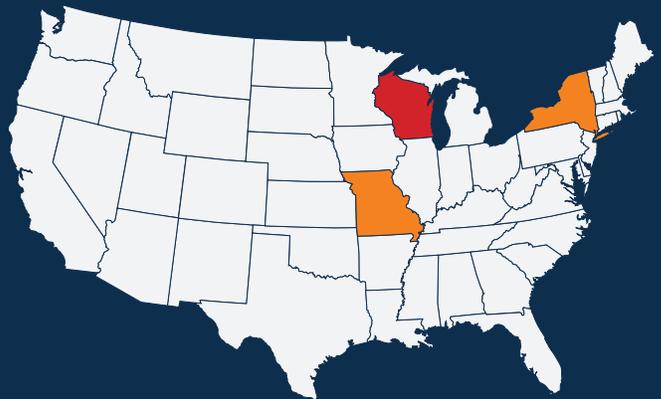
Fumonisin Average



ppb (parts per billion)

nd <600 600-1500 1501+

T-2 Toxin Average

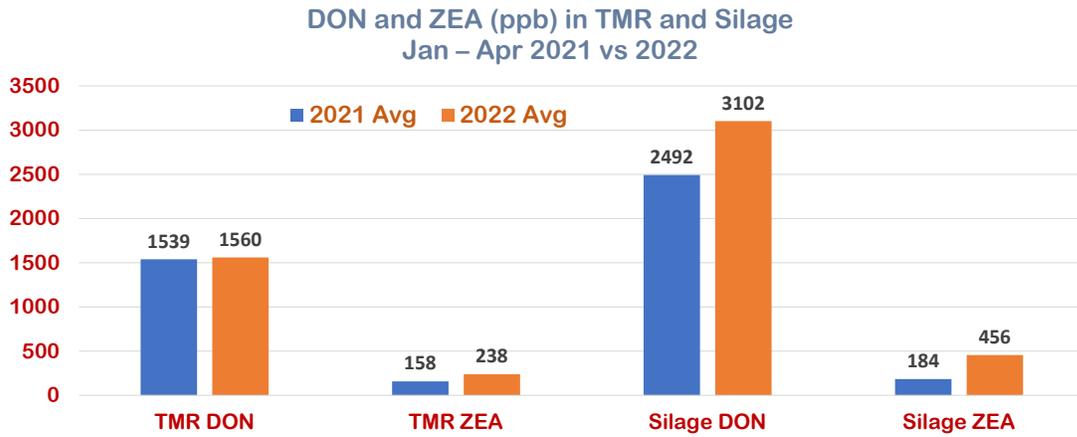


ppb (parts per billion)

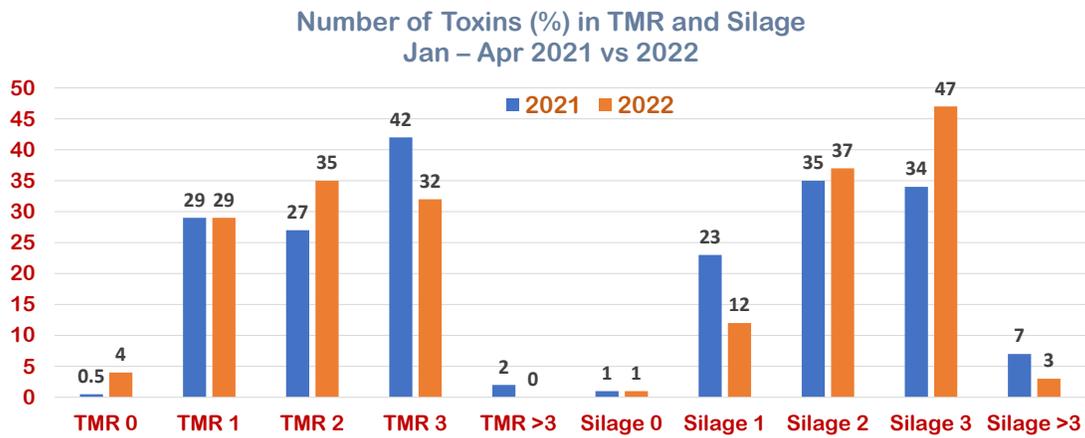
nd <75 75-150 151+



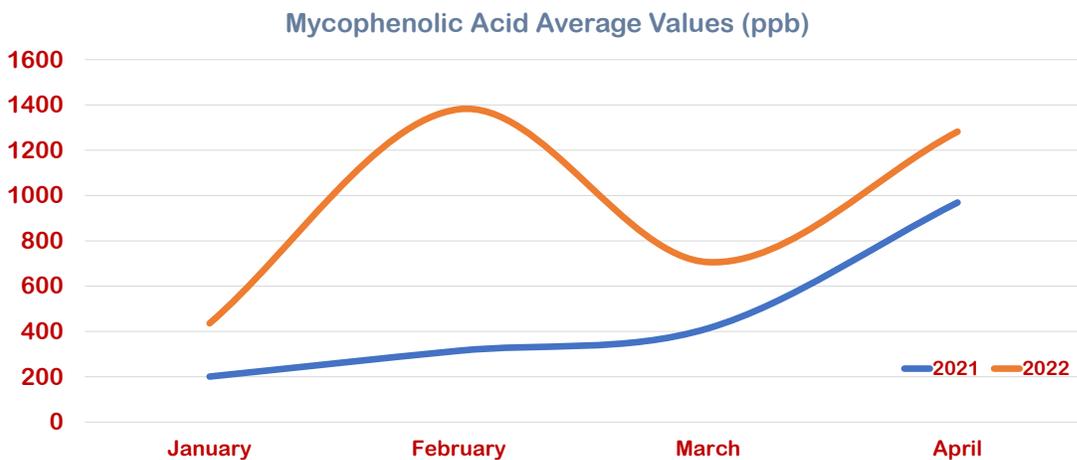
Graph 1



Graph 2



Graph 3





Planning for the 2022 Crop Year

Summary

Early indications point to a high-quality 2022 corn crop; however, a great number of factors may significantly reduce the nutritive value and increase the mycotoxin levels before harvest. Evaluating feed nutritive value and mycotoxin levels going into storage enables development of plans to account for variations in either nutritive content or mycotoxins present.

The June 6, 2022 USDA Weekly Crop Progress Report indicated that corn planting and emergence were both slightly ahead of the 5-year average. Considering the corn planting status of early May, the June 6 report is a testament to the capabilities of corn farmers to “Git ‘er done” when the time is right. Perhaps more important was the crop condition rating of 73% good-to-excellent, placing the 2022 crop near the high end of the 12-year average for the initial corn crop rating of the season.

Certainly, starting the game fast is important; however, corn production is more of a marathon than a sprint and environmental conditions between now and pollination, silage chopping and grain harvest will be the major determinants of crop quality and mycotoxin risk. In addition, local factors, including soil conditions and getting (or not getting) timely rains and escaping hail will influence feed quality on a farm-by-farm basis.

Nutritionists and producers are increasingly sampling forages and grains going into storage to better enable them to know the inventory quality, as well as inventory quantity. Starch degradability will increase as corn silage and high-moisture ferments and remains in the bunker or silo; yet the base starch percentage is essentially set when crop comes from the field to the storage structure. Under proper oxygen-limiting fermentation and storage conditions, most mycotoxin levels will not change for fermented feeds between harvest and feed-out. The mycophenolic acid (MPA) and roquefortine C (RoqC) are exceptions and may significantly increase during proper fermentation and storage.

Sampling feeds while entering storage may be a challenge, especially with the increased usage of custom choppers and harvesters. However, knowing the inventory nutritive value entering storage will enable development of a pro-active plan to compensate for nutritive values different than normally encountered. Similarly, knowing the feed hygiene or mycotoxin levels will allow the development of a proper feeding program to protect livestock against these harmful agents. Please consider the complimentary Agrarian Solutions mycotoxin testing program for evaluating current feeds or for evaluating 2022 feeds, whether going into storage or at feed-out.

The 2022 corn crop is looking good at this point; however, the game isn't over until final whistle! Please consider teaming with Agrarian Solutions for assessing your feeds today and in the future.



Larry Roth, Ph.D., PAS

Assoc. Vice President, Science & Technology
Agrarian Solutions®





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
Mycophenolic Acid	< 1500 ppb	1,500-5,000 ppb	> 5,000 ppb

Revised 01/2022

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

Mycophenolic Acid (MPA)

Increased health events (immune suppression)

Lowered rumen efficiency

Loose manure

Lowered reproductive efficiency

Enteritis



Meet Our Agrarian Solutions® Team



MARK LANTZ



ROB HAMAKER



JOHN DOERR, PH.D.,
PAS, DPL. ACAP



CHAD CHRISTENSEN



DAN HOYING



NIC BRADLEY



SCOTT ZEHR



KURT MARQUARDT



KELBI VEENSTRA



LARRY ROTH, PH.D.,
PAS

We exist to help others succeed.



Agrarian[®]
SOLUTIONS



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.

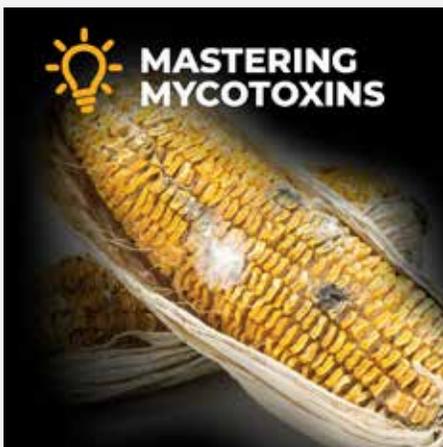
Professional Product Support System

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



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.



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.



We believe everything is built on solid relationships. We work to help others succeed. We care about you, we are genuinely curious about you, and we want to find the best way(s) to help you in what you are doing. Let's win the day together!



— OVER —
980
MYCOTOXIN
Tests Reported
— IN 2021

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



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



Ca3 BioFresh®

Dairy producer's choice for times of stress

- **Key Ingredients** | A combination of three calcium sources for quick and steady calcium availability, as well as vitamin D3 for calcium metabolism.
- **Focus** | Aids cows in meeting the tremendous calcium demands at freshening. Features safe and readily available calcium sources.
- **Feeding Rate** | Administer one bolus with the applicator as per the instructions when calving. If required, administer a second bolus approx. 12 hours after birth.



Notes

GLOBAL SOLUTIONS FOCUSED ON
Livestock Health & Performance



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