MYCOAD AZ

Just Science®

IMPACT OF MYCOTOXINS IN DAIRY

There is a general understanding that ruminants are less susceptible to mycotoxins' detrimental effects due to the metabolizing action of the rumen microflora. However, metabolites produced in the rumen can be equally or even more toxic than the original toxin. In addition, ruminant rations include forages, increasing the risk of mycotoxicosis due to its high level of contamination, especially in silages. Besides aflatoxin, zearalenone (ZEA) and deoxynivalenol (DON) are the mycotoxins with the greatest impact in commercial dairy operations.

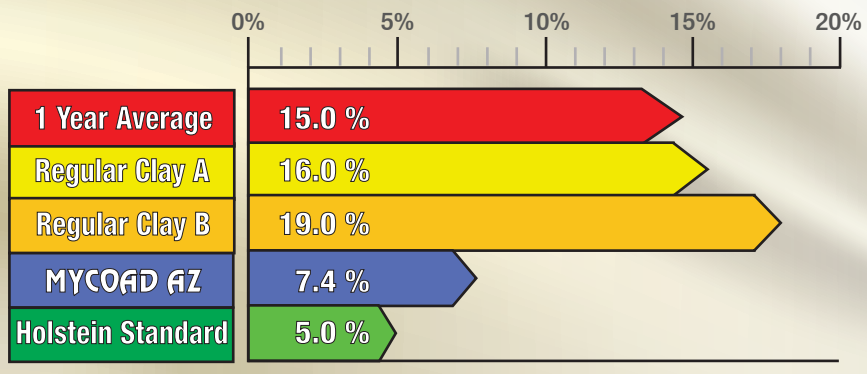
ZEARALENONE

ZEA is a mycotoxin produced by several species of *Fusarium,* found in silage, corn and other grains. It is degraded by ruminal microorganisms to *alpha*-zearalenol; considered about four times more estrogenic than the parent toxin. ZEA does not affect milk production and quality; however, it produces serious negative reproductive effects such as ovarian cysts, decreased embryo survival, edema and hypertrophy of the genitalia and mammary glands in pre-pubertal females. ZEA also decreases the amounts of luteinizing hormone and progesterone, affecting the morphology of the uterine tissues with vaginitis, vaginal secretions, infertility and abortions. In males, ZEA decreases fertility due to reduced testosterone production.

The most critical financial losses are derived from an increased number of abortions and a decreased conception rate (lack or false heats that increase the number of inseminations). ZEA is the main cause of non-infectious abortions, representing 25 to 50% of all abortions. This justifies the inclusion of an effective anti-mycotoxin additive (AMA) in dairy rations such as **MYCOAD AZ**, a purified binder highly specific for the prevention of the damages produced by Fusariotoxins.

MYCOAD AZ AND OTHER BINDERS ON ABORTIONS DUE TO ZEA

This trial was performed in a commercial dairy farm in Guanajuato, Mexico with a history of abortion (15% per month in the last year). A total of 468 Holstein cows divided into three groups of 156 cows each were used in the test. All groups were fed for 30 days with a naturally contaminated diet containing 200 to 300 ppb of ZEA. Group 1 received the contaminated diet with the addition of Clay A at 300 g/cow/day; Group 2 was fed the contaminated diet with the addition of Clay B at 500 g/ cow/ day; and Group 3 was fed the contaminated diet with the addition of 20 g/ cow/ day of **MYCOAD AZ.**



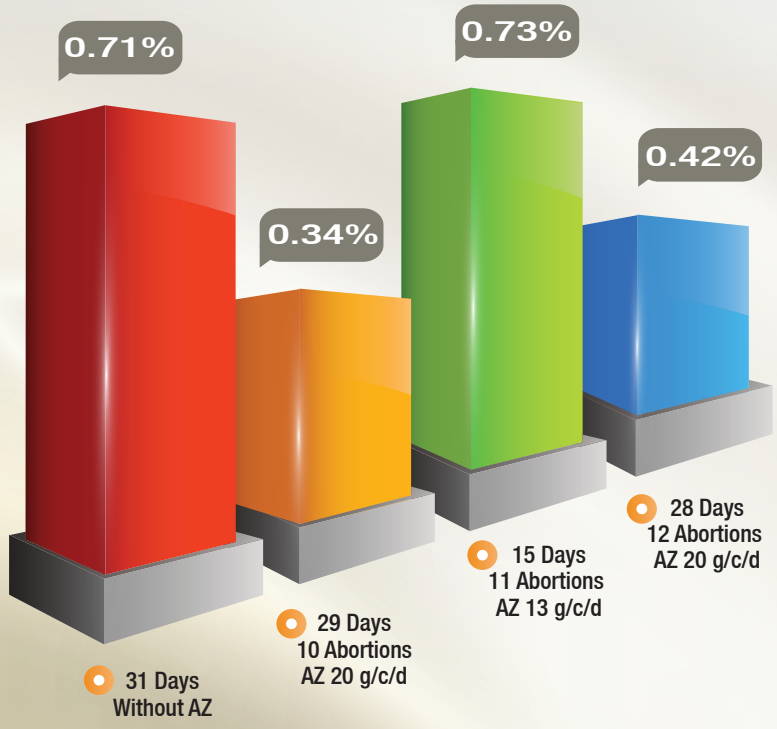
Effect of different mycotoxin binders on the abortion rate during a 30-day period.

Concentrations of ZEA above 200 ppb were capable of increasing toxic abortion rates when compared to Holstein's breed standard. Commercial clay products A and B did not show any effect in controlling the abortion rates. **MYCOAD AZ** reduced the 12-month average abortion rate to 7.4 %, getting the final performance close to Holstein's breed standard.

Reference: R. Rivera, R. Borbolla, E. Soto, D. Sarfati and D. Zaviezo. Effect of different mycotoxin binders in the incidence of abortion in dairy cattle. Proceeding of 8th Pan-American Dairy Federation Congress. 2004. Miami, USA.

EFFECT OF MYCOAD AZ ON ABORTIONS DUE TO ZEARALENONE

A trial was performed in a commercial dairy farm in Coahuila, Mexico with 800 Holstein cows fed for four consecutive periods with a naturally contaminated total mixed ration with an average of 274.8 ppb of ZEA. The first period of 31 days included no anti-mycotoxins additive. During the second period of 29 days, cows consumed 20 g/ cow/ day of **MYCOAD AZ**; in the third period of 15 days they consumed 13 g of **MYCOAD AZ** / cow/ day; and in the fourth period of 28 days the consumption of **MYCOAD AZ** was 20 g/ cow/ day.



Effect of MYCOAD AZ on the incidence of abortion (average/day) by period.

Continuous administration of **MYCOAD AZ** at a dosage of 20 g/cow/day significantly reduced the non-infectious daily abortion rate during the testing period. Daily administration of **MYCOAD AZ** in dairy rations demonstrated its ability to reduce abortions produced by ZEA contamination. **MYCOAD AZ** maintained the expected productivity rate of pregnant cows by controlling the adverse estrogenic effects of ZEA.

Reference: H. Jaramillo, A. Villarreal and D. Zaviezo. Effect of **MYCOAD AZ** on the prevention of abortions in dairy cattle. Proceeding of 8th Pan-American Dairy Federation Congress. 2004. Miami, USA.

COST OF ABORTIONS

Close to 50% of all abortions in dairy cattle are caused by mycotoxins and the cost of one abortion is around US$ 1,500 to 2,000; which represents a major economical impact for milk producers. Several factors must be considered in calculating the total cost of an abortion:

- Milk production loss (days left to finish lactation).
- Cost of feed consumed until abortion and before new pregnancy.
- Cost of cow's treatment.
- Cost of re-insemination and semen lost.
- Cost of lost replacement calves.

BENEFITS OF USING MYCOAD AZ AT LOW LEVELS OF ZEARALENONE CONTAMINATION

Trial performed in a commercial dairy farm in Torreon, Mexico with 1400 Holstein cows. The analyses of the total mixed ration presented concentrations from 81 to 87 ppb of ZEA, 3 to 4 ppb of aflatoxin B1, and 2 to 29 ppb of T-2 toxin. **MYCOAD AZ** was included in the diet at 20 g/ cow/ day for 90 days. Reproductive parameters were compared with the same period from the previous year.

Evaluation for 90 days June-July-August	Abortion %	Fertility %	Pregnancy Rate %	Postpartum Problems %	Udder Problems %
No Binder	9.22	23.4	14.0	50.9	13.23
MYCOAD AZ	8.35	23.86	17.3	37.7	3.63
Difference	-0.87	+0.46	+3.3	-13.2	-9.60

Permanent low levels of ZEA and other mycotoxins can negatively affect reproductive performance and the health status of high producing cows. The addition of **MYCOAD AZ** at 20 g/cow/day is a practical and economical tool to prevent the detrimental effects of low levels of mycotoxin in dairy cattle.

Reference: R. Rivera, A. Villarreal, E. Olguín and D. Sarfati. Effect of a purified anti-mycotoxin additive on health and reproductive parameters of dairy cows receiving low levels of mycotoxins. Proceeding of 14th Pan-American Dairy Federation Congress. 2010. Belo Horizonte, Brasil.

DEOXYNIVALENOL (DON)

Deoxynivalenol (DON) or vomitoxin is also produced by *Fusarium* molds and can be present in very high concentrations in silage,grains and concentrates. DON can be converted in the rumen into a less toxic compound; however, animals with pre-existing rumen acidosis do not degrade this mycotoxin completely. DON has been associated with decreased feed consumption, diminished milk production and milk fat content. In addition, a significant increase in somatic cell count and a reduction in reproductive efficiency have been observed. Sometimes there is an increase in inflammatory reactions with greater incidence and severity of mastitis and laminitis.

EFFECT OF MYCOAD AZ ON DAIRY COWS FED DON + ZEA CONTAMINATED RATIONS

Trials were performed by Dr. Ivan Girard in three different commercial dairy farms in Quebec, Canada. Fifty cows were selected in each location during the winter season of 2012 due to the presence of high levels of mycotoxins in the total mixed rations. All cows were fed a yeast cell wall based product as a mycotoxin binder and during this period the herds experienced poor fertility and high somatic cell count. Once DON was found in the serum, producers decided to try **MYCOAD AZ** at 20 g/cow/day for two consecutive months. Within the herds there were cows of different lactations periods; hence, data on somatic cell count was separated by number of lactations since older cows tend to have higher counts.

Trial 1

Parameters	Previous ration with yeast cell wall	**MYCOAD AZ** 20 g/cow/day For 60 days
Total ration DON, ppb	720	882
Total ration ZEA, ppb	80	413
3rd lactation SCC/ml	367,100	175,800
First service conception %	31	50
Second service conception %	45	42
Total conception rate %	76	92

Trial 2

Parameters	Previous ration with yeast cell wall	**MYCOAD AZ** 20 g/cow/day For 60 days
Total ration DON, ppb	566	787
Total ration ZEA, ppb	474	240
3rd lactation SCC/ml	417,500	267,000
First service conception %	25	61
Second service conception %	45	38
Total conception rate %	70	99

Trial 3

Parameters	Previous ration with yeast cell wall	**MYCOAD AZ** 20 g/cow/day For 60 days
Total ration DON, ppb	410	520
Total ration ZEA, ppb	80	60
3rd lactation SCC/ml	932,400	633,900
First service conception %	47	40
Second service conception %	27	52
Total conception rate %	74	92

*SCC = somatic cell count

The addition of 20 g of **MYCOAD AZ** per cow per day in all three trials dramatically decreased the somatic cell count (40%) in the milk produced by cows in their third lactation; indicating that **MYCOAD AZ** was effective in preventing the deleterious effects of DON. Cows treated with 20 g of **MYCOAD AZ** per day also improved their conception rate in 29% (average of 3 trials), confirming the efficacy of **MYCOAD AZ** in preventing the estrogenic effects of ZEA.

CONCLUSION

The use of MYCOAD AZ at a dietary dosage of 20 grams per cow per day has been proven to be an effective and economical additive to prevent and control mycotoxins in dairy cattle, improving the health status of the herd and the productive and reproductive performance of the cows.

MYCOAD AZ

Does your anti-mycotoxin additive meet the basic TOP and FACTS?

Target Organ Protection			
Mycotoxin	**Organ**	**MYCOAD**	**MYCOAD AZ**
Aflatoxin	**Liver**	**YES**	**NO**
Ochratoxin	**Kidney**	**YES**	**NO**
T-2 Toxin	**Oral lesion**	**YES**	**YES**
Fumonisin	**Heart / Lung / Liver**	**YES**	**YES***
Zearalenone	**Reproductive**	**N/A**	**YES**
DON	**Liver**	**N/A**	**YES**

Facts	MYCOAD	MYCOAD AZ
In vivo dosage with **TOP** results	**2.5 kg / MT**	**1 kg / MT**
Recommended **commercial dosage**	**2.5 kg / MT**	**1 kg / MT**
The **clay** is **always obtained** from the **same mine**	**YES**	**YES**
Approved in **Texas**, **USA**, against Aflatoxin	**YES**	**N/A**
Approved in the **European Union** against Aflatoxin. Regulation #1831 / 2003 (1m 588)	**YES**	**N/A**
ENDOTOXIN adsorption	**N/A**	**YES**
Efficacy approved by **LAMIC** and other institutions against the following number of mycotoxins	**4**	**4**
Efficacy approved by **LAMIC** and other institutions in different types of animals	**6**	**5**
Nutrient absorption	**NO**	**NO**
In vitro efficacy test every:	**100 MT**	**18 MT**

* Test performed with 4 Kg / MT with 30,000 ppb of fumonisin
N/A= not applicable

MYCOAD = Cobind, Toxfree Standard
MYCOAD AZ = Cobind AZ, Toxfree

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