

MYCOAD A-Z[®] & MYCO-AD^{DF}



CATTLE TECHNICAL MANUAL



SPECIAL NUTRIENTS, INC.
The mycotoxins specialist

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Introduction

Importance of aflatoxin in dairy herds.

There is a general understanding that ruminants are less susceptible to mycotoxins detrimental effects due to the metabolizing action of rumen microflora. However, metabolites produced in the rumen can be equally or even more toxic than the original toxins. There is even evidence of toxic metabolites derived from originally innocuous compounds. Ruminants are not efficiently protected against aflatoxin toxicity due to the limited ruminal degradation of aflatoxin B1 (AFB1) and because its main metabolite: aflatoxicol, has a very similar toxicity to the original molecule.

Ruminant rations normally include concentrate and forages, which increases the risk of mycotoxin contamination over animals that do not eat forages. Feed contaminated with mycotoxins, not only reduces the performance and health status of the animals, it also generates a serious risk of milk contamination. AFB1 is absorbed rapidly and intensively and it is transformed in the liver into aflatoxin M1 (AFM1), which is also rapidly eliminated through milk and urine. It has been

established that AFM1 appears in milk 12 hours after the ingestion of AFB1 by the cow. Maximum concentration occurs at 24 hours, and it is cleared 4 days after the animal stops consuming the mycotoxin.

The relationship between the mycotoxin contained in the diet being transferred to the milk fluctuates between 1 and 3%, with the average being 1.7%. This transfer of mycotoxins from the diet to the milk may vary widely between animals, from one day to another, and between milking times, due to the ingestion rate, digestion rate, health status, milk production rate and cow sensitivity to mycotoxins. A transfer relationship of up to 6.2% has been measured in top performance dairy cows at peak lactating times. In 2003 at least 99 countries had some kind of legislation addressing the control of mycotoxins in feed and food; and 66 had specific legislation concerning AFM1 in milk. In the USA, the FDA limits aflatoxin content in dairy feed to 20 ppb and AFM1 content in milk to 0.5 ppb. There are two standards to regulate AFM1 content in milk: 0.5 ppb in USA and many countries in Latin America and 0.05 ppb (50 ppt) in the European



Union. Based on an average transfer relationship from dietary AFB1 to milk AFM1, to comply with legislation, in particular with European legislation, it is necessary to maintain an extremely low aflatoxin dietary concentration in dairy cattle rations or to prevent mycotoxins absorption and damage to the animal with the use of a mycotoxin binder with proven efficacy.

Importance of zearalenone in dairy herds.

Zearalenone is a mycotoxin produced by fungi from the *Fusarium* genus that is responsible for the presence of abortions in dairy cattle consuming contaminated raw materials and feed rations. The higher abortion rate directly decreases productivity and profitability of dairy

operations, resulting in significant economic losses. Abortions in a dairy farm can be caused by infectious and non-infectious factors. Toxic abortions are included in the non-infectious origin and zearalenone is apparently the main cause. This justifies the inclusion of mycotoxin binders in the diets to reduce the incidence of toxic abortions in dairy farms, such as Mycoad AZ, a purified binder highly specific for zearalenone. Raw materials used in feedstuffs for dairy cattle are very susceptible to contamination by mycotoxin-producing fungi. Zearalenone is a mycotoxin that affects reproduction parameters in dairy cattle: increasing days open, infertility, follicular cysts and abortions, which result in lower profitability for producers.



Figure 1. Non-infectious abortion caused by the ingestion of feed contaminated with zearalenone in a dairy cow.



IN VIVO RESULTS

Mycoad DF and other mycotoxin binders effect on elimination of AFM1 in milk

Facilities: A commercial farm located in Parma, Italy (Experiment 1) and an experimental farm located at the Faculty of Agronomy at Piacenza University, Italy (Experiment 2).

Type of animals:

Experiment 1. 800 commercial dairy cows in Parma.

Experiment 2. 24 commercial dairy cows in Piacenza.

Mycoad-DF inclusion rate:

Experiment 1. Mycoad DF= 50 g/cow/day

Experiment 2. Mycoad DF= 60 g/cow/day

Product A = (dose recommended by manufacturer)

Product B = (dose recommended by manufacturer)

Concentration of mycotoxins in the feed: 10 ppb

Reference:

Cavassini, P. and D. Zaviezo.

Efficacy of Mycoad DF in the reduction of aflatoxin M1 content in milk. Special Nutrients' bulletin, 2006.

Results

Experiment 1.

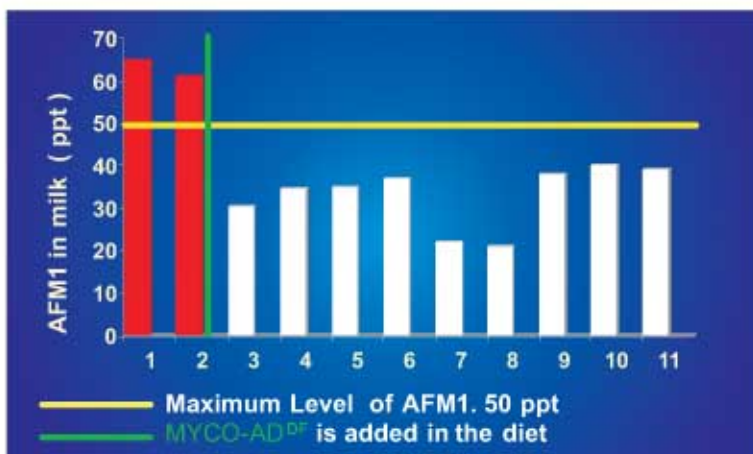


Figure 2. Presence of aflatoxin M1 in milk after adding Mycoad DF in the ration at a dose of 50 g/cow/day.



Experiment 2.

Treatment	Wk 1 AFM ₁ ppt	Wk 2 AFM ₁ ppt	Wk 3 AFM ₁ ppt	Wk 4 AFM ₁ ppt	Reduction %
Control	31	23	18	25	-
Product A	23	19	16	24	15.5
Product B	13	15	5	14	51.5
MYCOAD^{DF}	7	8	6	9	69.1

Table 1. Effect of different binders in the reduction of AFM1 in milk in 4 groups of cows (6 cows each) after treatment with different mycotoxin binders.

Conclusions

Experiment 1.

Mycoad DF at a dose of 50 g/cow/day is capable of significantly reducing the presence of AFM1 in milk to levels under the maximum allowance (50 ppt) of the European Union legislation.

Esperiment 2.

10 ppb AFB1 contamination did not result in elevated levels of AFM1 in milk. However, it is evident that Mycoad DF was the binder that mostly reduced AFM1 level in milk. It is important to mention that cows that consumed product B during week 3 had consumed Mycoad DF in the previous week.



Mycoad AZ effect on abortions caused by zearalenone

Facilities: Commercial farm in Coahuila, Mexico.

Type of animals: 800 Commercial dairy cows (Holsteins).

Mycoad AZ inclusion rate: Used for 4 consecutive periods of time in all animals at different concentrations: 31 days with no product, 29 days with 20 g/cow/day, 15 days with 13 g/cow/day and 28 days with 20 g/cow/day.

Concentration of natural mycotoxins.

Natural zearalenone content ranged from 100 to 900 ppb in raw materials, and 100 to 400 ppb in feed rations as determined by laboratory tests (ELISA).

Reference: Jaramillo, H., A. Villareal, and D. Zaviezo, Effect of Mycoad AZ in the prevention of abortions in dairy cattle. 8th Pan-American Dairy Congress. Miami Beach, Florida, USA, 2004.

Results

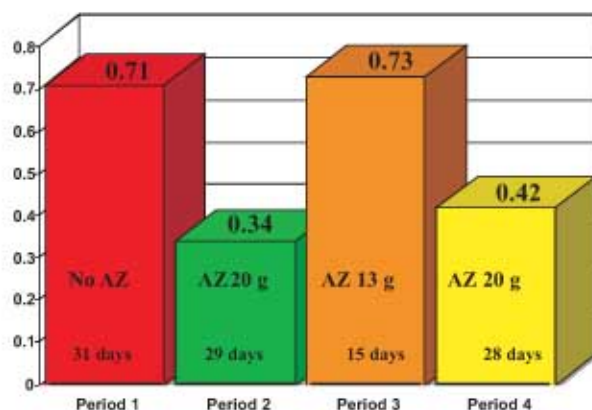


Figure 3. Effect of Mycoad AZ on the incidence of non-infectious daily abortion rate by period of administration in dairy cattle.

P1= Control (No Mycoad AZ in the ration.)

P2= Mycoad AZ (20 g/cow/day) administered immediately after P1

P3= Mycoad AZ (13 g/cow/day) administered immediately after P2

P4= Mycoad AZ (20 g/cow/day) administered immediately after P3



Conclusions

- Continuous administration of Mycoad AZ at a dosage of 20g/cow/day significantly reduced non-infectious daily abortion rate during the testing period.
- Daily administration of Mycoad AZ in feed rations of dairy cattle helps to control abortions produced by zearalenone contamination.
- Mycoad AZ maintained the expected productivity rate of pregnant cattle by controlling the estrogenic adverse effects of zearalenone.



Mycoad AZ and other mycotoxin binders effect on abortions caused by zearalenone.

Facilities: Commercial farm located in Guanajuato, Mexico.

Type of animals: 468 Commercial dairy cows (Holsteins).

Inclusion rate.

Mycoad AZ[®] = 20 g/cow/day

Commercial product A= 300 g/cow/day

Commercial product B= 500 g/cow/day

Concentration of natural mycotoxins.

All raw ingredients showed concentrations of 200 to 300 ppb of zearalenone (ELISA test).

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

Results

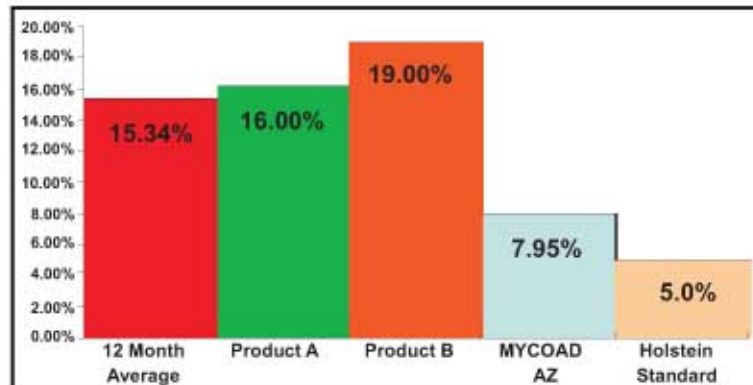


Figure 4. Monthly abortion rate during the 30-day experimental period compared to the average 12-month breed standard and the average abortion rate for a year in that farm.



Conclusions

1. Zearalenone concentrations above 200 ppb are capable of increasing toxic abortion rates when compared to Holstein's breed standards.
2. Commercial products A and B did not show any effect in controlling the abortion rates in the cows used in this trial.
3. Mycoad AZ reduced the 12-month average abortion rate in 7.39% , getting a final performance close to the breed standard.





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