> WHO TO CONTACT FOR QUESTIONS ON RUMINANTS:

Name: Matthias LINS DI (MSc)
Position: Ruminant Specialist
Education: 1995 – 2002: University of Natural Resources and Applied Life Sciences, Vienna
Since March 2004: Ruminant Specialist
Address: BIOMIN GmbH, Industriestrasse 21, 3130 Herzogenburg, Austria
Tel: +43 2782 803 0
Fax: +43 2782 803 30
e-mail: matthias.lins@biomin.net

> LITERATURE


> IMPRESSUM

Newsletter is published by the export department of BIOMIN GmbH
Editors: Dian Schatzmayr, Niawoon Sharma, Michaela Mohr, Christian Lückstädt, Verena Starkl
Industriestrasse 21, 3130 Herzogenburg, Austria
Tel: +43 2782 803 0, Fax: +43 2782 803 40; e-Mail: office@biomin.net, www.biomin.net, Frequency: 12x per year
Publisher: Erich Erber

Mycofix® Plus product line

Mycotoxins cut Dairy Profitability
by Matthias Lins

Mycotoxins are a widely accepted issue in monogastric nutrition. On a scientific basis the general agreement in ruminant nutrition over years was that due to the detoxification ability of the rumen microbes ruminants are not susceptible to mycotoxins at all. On the other hand extensive field studies showed significant production losses and increased incidence of health disorders in early lactating dairy cows when mycotoxin contaminated rations were fed.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us.

> EDITORIAL

In the past our newsletters focused on the effects of mycotoxins in pigs and poultry. Ruminants are less susceptible to the effects of mycotoxins. However, we are finding more and more evidence of adverse effects for mycotoxins in dairy cows and Mycofix® Plus is already being used in several countries to overcome mycotoxin problems in dairy cows successfully, particularly in the USA. The most recent news on adverse effects of mycotoxins in dairy cows were received from Canada and the UK. In Canada last year’s harvest was highly contaminated with deoxynivalenol and zearalenone and some dairy herds reported a drop in milk production of up to 50%! Furthermore they observed a higher incidence of diarrhoea, decreased feed intake and longer calving intervals. Fresh cows seemed to be most affected. The return on investment from using Mycofix® Plus in dairy cows under those circumstances proved to be very high and helped to regain health status and performance levels in affected herds. A case in UK was reported with not only lower milk production, but also fertility problems and ovarian cysts in response to feed contaminated with increased levels of deoxynivalenol and zearalenone.

As a result of the increased interest in the use of Mycofix® Plus in dairy cows, we invited our ruminant specialist Matthias Lins to share his knowledge on dairy cows with us and tell us why despite being less susceptible to mycotoxins than e.g. pigs, the dairy cow should be protected from mycotoxin contamination in the feed.

Verena Starkl
Mainly ZON impairs fertility and causes economical losses

**Research and field data contradictory**

In research trials often mycotoxin consumption had no effects. On the other hand mycotoxin contamination even at a low level showed dramatic effects in large field studies (up to 20,000 cows per field study). In contrast to scientific experiments where mainly purified mycotoxins are used, cows in field studies consume naturally contaminated feeds in which due to co-occurrence of different mycotoxins toxicity of the single mycotoxin is enhanced (synergistic effects). To minimize the high costs of a scientific trial, exposure periods are often reduced. Unfortunately exposure of cows to mycotoxins for only 10 or 20 days is too short to express negative effects. In field studies dairy herds consumed contaminated rations for several weeks or even months before the investigation started. Mainly early lactating, high producing dairy cows showed negative effects in the field whereas low producing, mid to late lactation cows being used in research trials did not show any symptoms of mycotoxicosis.

*Table 1* illustrates the main causes of varying results in research and field data.

**Factors influencing the susceptibility of dairy cows to mycotoxins can be summarized as:**

- Contamination level in the feed
- Duration of mycotoxin intake
- Level of cow comfort
- Level of concentrate intake
- Level of feed intake and passage rate
- Housing conditions even a low mycotoxin contamination might already cause health disorders (e.g. mastitis). Consumption of contaminated diets for only a few days might be without any effects. Feeding mycotoxin contaminated concentrates or corn silage for weeks or even months undoubtedly will lead to reduced herd health and production losses. The ability of rumen microbes to detoxify mycotoxins is enhanced when rumin pH is around 6.7. If it drops below 5.8 (rumen acidiﬁcation) rumen microbes are killed and thus ruminal mycotoxin detoxiﬁcation is reduced. Rumen acidiﬁcation is induced by feeding high amounts of concentrates. The level of feed intake can also affect ruminal mycotoxin detoxiﬁcation. Cows producing more than 40kg of milk per day or 10,000kg a year have to consume a lot of feed on a daily basis. To enable a high feed intake the feed has to pass the digestive tract quickly. So the rumen of a high producing cow has only little time to detoxify mycotoxins because the feed does not stay in the rumen as long as it does in a low producing cow with lower feed consumption.

**Consequences of feeding mycotoxins to dairy cows**

Like in monogastric nutrition in dairy the most important mycotoxins are DON (and other trichothecenes), ZON and aflatoxins. DON and ZON are widespread in feeds grown under moderate climate conditions. Aflatoxins decrease milk production and induce metabolic disorders in the first weeks after calving. A field study showed that production rose by 30% after the removal of aflatoxin contaminated corn silage (120ppb). Even though the physiological “mode of action” of ZON in ruminants is absolutely comparable with the one in pigs, the visible effects are different. As a result of mimicking estrogen in the organism ZON causes irregularities in heat expression. Heats occur in abnormal intervals or are even skipped. Conception rates drop to an unacceptable level (<30%) as a consequence of a high breeding index (number of servings until the cow gets pregnant) and incidence of ovarian cysts in cows and heifers increase. At a very high contamination level abortions might appear more frequently. Feminization in bulls is often associated with ZON contaminated feed.

A field study which was coordinated by the University of North Carolina in the USA investigated the effect of a natural DON contamination on dairy productivity. Withlow and co-workers summarized that beginning at a contamination of 100ppb DON up to 800ppb in the total ration, milk production declined by almost 2kg/cow/day. In addition to the production losses a higher incidence of metabolic disorders like ketosis and fatty liver syndrome as well as mastitis, metritis, retained placenta, diarrhoea and displaced abomasums (digestive disorder) was observed.

**Experiences using Mycofix® Plus in dairy cows**

Biomin started evaluating Mycofix® Plus in dairy cattle already in 1998 on a scientific basis. A trial was run by a research station in Austria (Wieselburg) in cooperation with the University of Veterinary Medicine Vienna. The contamination in the ration was 620, 705, 744ppb DON and 47, 33, 34ppb ZON in the control, toxin and Mycofix® Plus group. The conclusion of the long term trial (6 months) with 27 Simmental cows (dual purpose breed) was:

- Mycotoxin decrease rumen microbe population
- Mycofix® Plus increases milk production even in low producing dairy cows
- Mycofix® Plus lowers Somatic Cell Count by 60 %

The above promising results led to another dairy trial 2003 in the United States with 120 Holstein cows. The contamination in the TMR (total mixed ration) was 400 and 600ppb DON and 78 and 70ppb ZON in the control and the Mycofix® Plus group. Inactivating the mycotoxin load in the TMR drastically reduced milk production by more than 2kg/cow/day, feed intake by 0.4kg and feed efficiency from 1.39 to 1.47kg milk per kg feed. Increasing feed efficiency improves dairy profitability and reduces manure production which gets extremely important on large dairy operations.

The economical evaluation of the trial showed that the Return on Investment (ROI) of Mycofix® Plus was 5.1. For every cent the farmer invested he got 5 cent back. In addition to results from trials in the past we did and planned in the near future we receive feed back from the area managers working with Mycofix® Plus in the dairy industry. Mycofix® Plus has been confirmed to reduce mycotoxin related fertility problems, such as ovarian cysts and poor conception rates. Furthermore there is positive feedback on Mycofix® Plus eliminating aflatoxin contamination in the milk and compensating negative effects of mycotoxins in feed intake, milk yield and metabolic disorders.

**Conclusion**

Mycotoxins can be present in dairy concentrates and silages. Especially dairy cows producing 40kg of milk a day are very susceptible to mycotoxins due to their limited ruminal detoxification. Trials with Mycofix® Plus in dairy cows showed promising results which are confirmed from the field (farmers, veterinarians, nutritionists). Mycofix® Plus unlocks the cows' potential and increases profitability in dairy production.