Selko® TOXO®-HP-R

Facing the emerging mycotoxin challenges of today

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TOXO®-HP-R

Newly emerging mycotoxins, new mitigation strategies

New mycotoxins are emerging in dairy cattle

Dairy diets are easily contaminated by mycotoxins. They may be present at moderate levels, but feeding mycotoxins over an extended period can lead to chronic toxicity. Traditionally Fusarium mycotoxins such as deoxynivalenol (DON), zearalenone (ZEA) and T-2 toxin are known to cause problems. More recently, new groups of mycotoxins, the so-called silage mycotoxins and other emerging mycotoxins are gaining importance[1,2,3]. Lastly, there are the endophytes-produced ergot alkaloids which grow inside plants and can cause problems in dairy cows.

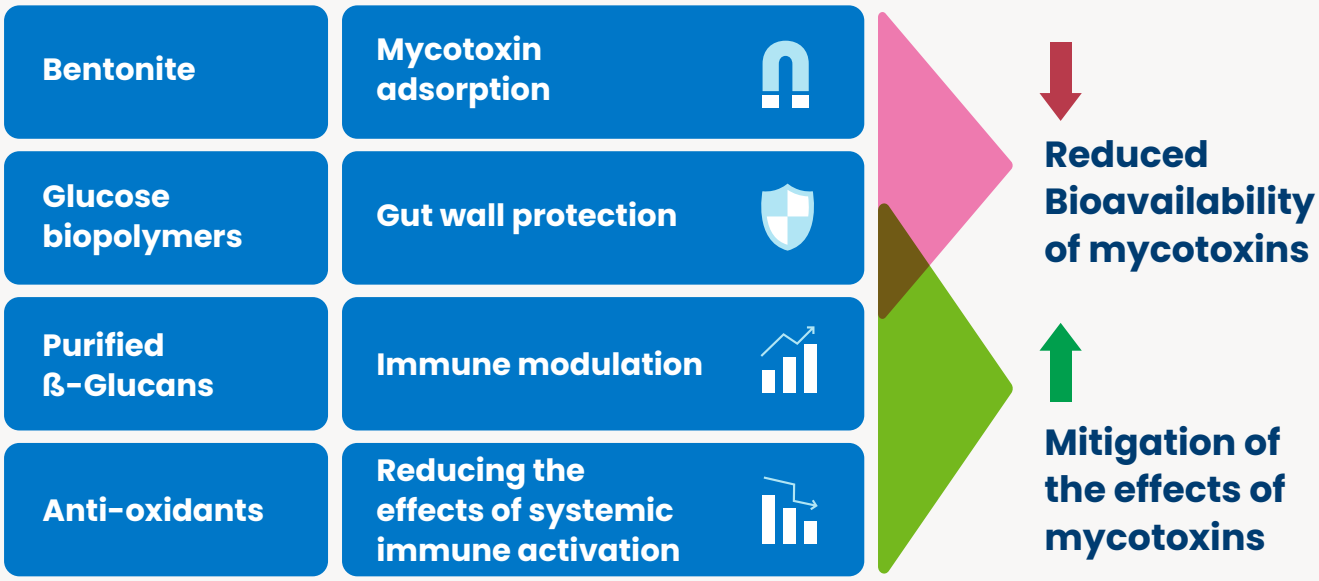
The impact of mycotoxins on rumen health

If a TMR consists of a mixture of concentrates and various forms of roughages, exposure of dairy cattle to multiple mycotoxins is a serious risk. The rumen micro-organisms can degrade or inactivate several mycotoxins but are not always able to deal with a mycotoxin challenge completely. If the rumen micro-flora is also affected by rumen acidosis and/or silage molds with antimicrobial properties, detoxification capacity goes down. Next to that, contamination of silage with typical silage molds favors secondary contamination with bacteria such as Clostridia and Listeria. Chronic exposure to moderate levels of different mycotoxins will therefore cause serious health issues.

Selko Toxo-HP-R has been developed to face the emerging mycotoxin challenges of today

Traditionally, mycotoxin binding products focus only on the binding mechanism of mycotoxins. As our knowledge on the new mycotoxins is increasing, it becomes clear that blocking these binding mechanism alone is not always enough to prevent problems. Mycotoxins are more often causing gut health issues, immune system alterations and oxidative stress. Thus, an effective mitigation product should also deal with these negative effects in addition to preventing the mycotoxins from binding.

Selko Toxo Hp-R is a mixture of bentonite, glucose biopolymers, purified ß-glucans and antioxidants. **Selko Toxo HP-R** deals with all the potential negative effects of mycotoxins of dairy cattle, including those of mycotoxins that have recently emerged.



Trials caried out with Selko Toxo-HP-R

A trial was carried out at the CERZOO research and experimental center of the University of Piacenza, Italy[4]. The impact of Selko Toxo-HP-R on cows exposed to 3 different Fusarium mycotoxins was tested.

Material and methods

A total of 31 lactating Holstein cows were included in the study. The experimental periods included 7 days of adaptation, followed by 54 days of mycotoxin exposure. During exposure, the cows received one of three diets:

- Negative control group: TMR with low levels of DON, ZEA and FUM, at 284.5, 43.2 and 129.6 µg/kg dry matter, respectively
- Positive control group: TMR high levels of DON, ZEA and FUM at 1021.0, 196.8 and 238.4 µg/kg dry matter, respectively
- Selko Toxo-HP-R group: TMR also with high levels of DON, ZEA and FB at 1009.6, 248.5 and 241.7 µg/kg, respectively, and supplemented with 100 g/cow/day of Selko Toxo-HP-R.

Results

Contamination of the feed with mycotoxins resulted in a reduction of dry matter intake (see Figure 1) and a reduction of the rumination time compared to the negative controls (see figure 2). Treatment with **Selko Toxo-HP-R** resulted in an increase of dry matter intake and rumination time.

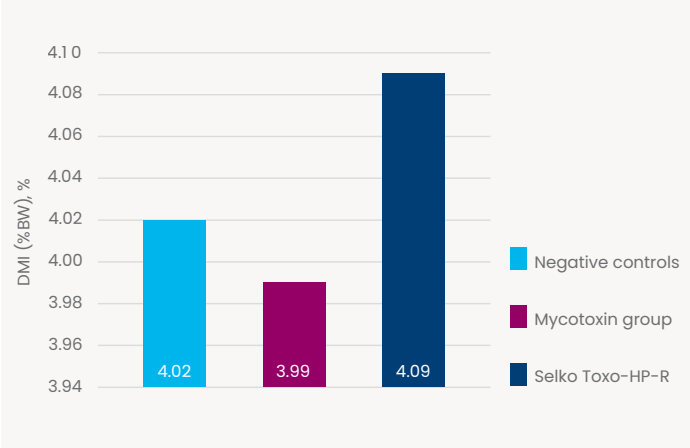


Figure 1: Dry matter intake (DMI), expressed as percentage relative to the initial bodyweight, in negative controls on a diet with low levels of mycotoxins, positive controls on a diet with high levels of mycotoxins or cows on a diet with high levels of mycotoxins in combination with treatment with Selko Toxo-HP-R.

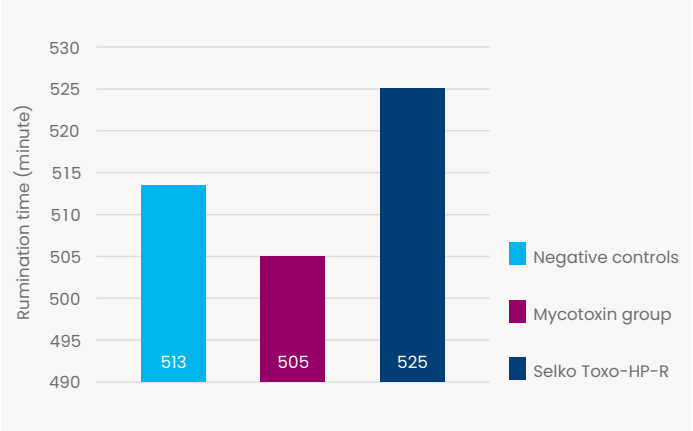


Figure 2: Rumination time in minutes per day, in negative controls on a diet with low levels of mycotoxins, positive controls on a diet with high levels of mycotoxins or cows on a diet with high levels of mycotoxins in combination with treatment with Selko Toxo-HP-R.

The production of energy corrected milk (ECM) was reduced in the animals on a diet with high levels of mycotoxins compared to the negative controls. The animals on **Selko Toxo-HP-R** produced more milk compared to both the negative and positive control groups (see Figure 3).

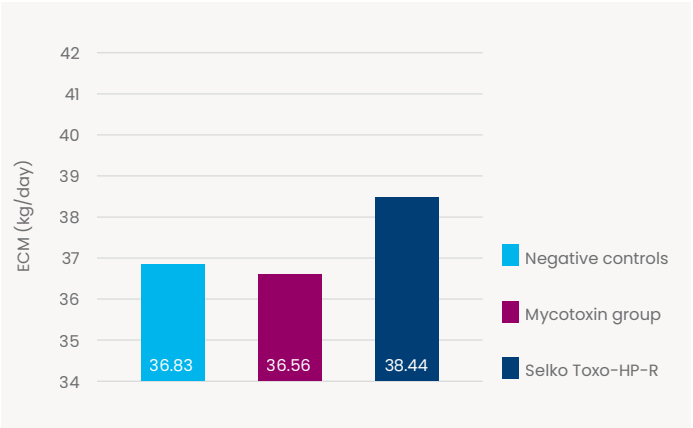


Figure 3: Production of Energy Corrected Milk of negative control cows on a diet with low levels of mycotoxins (CTR), positive control cows on a diet with high levels of mycotoxins or cows on a diet with high levels of mycotoxins in combination with treatment with Selko Toxo-HP-R.

Conclusions of the trial

Selko Toxo-HP-R mitigated the effects of a challenge with high levels of deoxynivalenol (DON), zearalenone (ZEA) and fumonisins (FUM). Treatment with **Selko Toxo-HP-R** resulted in an increase of dry matter intake and an increase in rumination time, suggestive of a better rumen function. **Selko Toxo-HP-R** also mitigated the negative effects of the mycotoxin challenges on milk production. Treatment with **Selko Toxo-HP-R** increased the production of ECM by 1.88 litre/day.

"Many mycotoxins that originate for example from Penicillium species, have strong antimicrobial activity. Continuous dietary exposure to these mycotoxins provokes a significant shift in the rumen microbiota. This shift is comparable with the shift we see in dairy cows suffering from rumen acidosis and leads to comparable symptoms."

Professor Fink-Gremmels,
Department of Veterinary Pharmacology,
Pharmacotherapy and Clinical Toxicology at
Utrecht Veterinary University.

EXPERT OPINION

"Bentonites can effectively bind aflatoxins, ergot toxins and bacterial endotoxins in the intestine, but the only have moderate binding to T-2 toxin, ZEA and OTA and very little binding to DON. Fumonisins can be bound at acidic pH but most will get released at alkaline pH. Thus, next to a mycotoxin binding strategy, there is a need for ingredients capable of improving immunity, anti-oxidant status and gut health of dairy cows."

Dr. Swamy Haladi,
Global Programme Manager at Selko.

SCIENCE BASED LOGIC

Conclusion

Due to global warming and other factors, new mycotoxins are emerging every day. As a result, the problems caused by mycotoxins are also shifting. The impact of mycotoxins on rumen function and health of dairy cows is growing. This requires a different approach with a mycotoxin mitigation product that does more than just binding mycotoxins. Selko Toxo-HP-R is the product for farmers that want to improve the performance of their dairy herd every day.

References

1) Whitlow, L. and W. Hagler (2005). Mycotoxins in Dairy Cattle: Occurrence, Toxicity, Prevention and Treatment Proc. Southwest Nutr. Conf. 124–138.

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3) Kemboi, D.C, Antonissen, G, Ochieng, P.E, Croubels, C, Okoth, S, Kangethe, E.K, Faas, J, Lindahl, J.F, and J. K. Gathumbi (2020). A Review of the Impact of Mycotoxins on Dairy Cattle Health: Challenges for Food Safety and Dairy Production in Sub-Saharan Africa. Toxins 2020, 12, 222.

4) Gallo, A, Catellani, A, Marotta, M, Mosconi, M, Mulazzi, A, van Kuijk, S, and Y. Han (2022). A mycotoxin-mitigating feed additive reduces the chronic adverse effects of moderate levels of Fusarium mycotoxins in dairy cows. World Mycotoxin Forum, May 16-18, Parma, Italy.

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Selko is the Feed Additives brand of Nutreco. In an era defined by global trends that include increased regulation, pressure to reduce antibiotics, climate change, raw material shortage, and scarcity of land use, the demand is rising rapidly for sustainable and safe feed-to-food production. Selko products and services help to achieve this.

Selko specializes in research-proven feed additives that help reduce harmful microorganisms and mycotoxins at various stages in the feed-to-food chain, leading to improved quality at the feed mill and farm level.

We offer a wide range of solutions related to health and mineral optimization. All aiming to support animal health and help reach your animals' full production potential. This way, we help you get the best results for you, your animals and your customers.

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