

# Silage mycotoxin project highlights health issues

**Most moulds found on silage aren't harmful and the rumination process has a certain ability to detoxify many. However, work being carried out by Bovmycotox project, funded by BBSRC and led by the University of Bristol, is revealing how mycotoxin-producing moulds are responsible for causing chronic health problems and impacting on productivity in UK herds.**

## What are they?

Mycotoxins are toxic chemical substances produced by some moulds. There are many mycotoxins, but the main ones important to the UK livestock industry are Deoxynivalenol (DON) and Zearalenone (ZON), which are produced by fusarium fungi that favour wet and mild conditions.

## Mycotoxins in forages

In 2014 the HY-SIL project sought to investigate the extent of silage mycotoxins and the relationship between silage composition and mycotoxin rate by analysing feed samples from farms across South West England. The samples, including TMR, maize-silage, wholecrop silage and grass silage, were tested for 13 different mycotoxins.

Of the 51 grass silage samples analysed, no mycotoxins were found. However, 90% of the maize samples contained mycotoxins, as did 71% of TMR and 67% of wholecrop samples. Of the maize samples, 42% fell into the high-risk category, with levels over 500 parts per billion (ppb). One sample of maize had levels of DON and ZON at 7,111ppb and 3,901ppb respectively.

Because the main mycotoxins found were those produced by fusarium the study concluded that mycotoxins in silage predominantly originate whilst crops are growing, rather than whilst the silage is being stored.

## A ruminant health challenge

Despite the ability of the rumination process to detoxify a range of foods, the potential for mycotoxicosis is increased in young cattle, where the rumen is underdeveloped, and in high yielding cows receiving a high starch diet which can lower rumen pH.

Diagnosing mycotoxicosis is also problematic as symptoms can be associated with other problems such as rumen acidosis. Symptoms include depressed feed intake,

reduced yield, diarrhoea, ketosis, gastroenteritis, intestinal hemorrhages and indicators of a suppressed immune system, such as poor fertility, mastitis and lameness.

To effectively diagnose mycotoxicosis a sample of the specific feed should be analysed. The main strategy for dealing with feeds containing mycotoxins currently is to add a binding agent, e.g. bentonite or diatomaceous earth. The binders absorb mycotoxins, forming stable complexes that are passed in excrement. However, there is also a lack of information about the possible side effects of binders.

Bovmycotox is seeking to address a number of questions:

- 1 What are the mycotoxin effects on ruminal gastro-intestinal wall cells?
- 2 What are the effects of diet and binders on the ruminal metabolism of mycotoxins?
- 3 What are the effects of metabolites produced in the rumen when mycotoxin is present on ruminal gastro-intestinal wall cells?
- 4 What effect does mycotoxin toxicity of maize silage have on the metabolite profile of dairy calves (through analysing samples of urine, plasma, saliva)?

The answers to these will contribute to developing a practical diagnostic test for mycotoxicosis.

## Healthy silage – a diverse issue

A number of partners from the project spoke at a recent workshop:

Prof Michael Lee (Bristol University and Rothamsted Research) explained the early finding that low levels of mycotoxins do not kill cells but do induce changes in the metabolites produced by them and the possibility of detecting these altered metabolites in biological fluids such as urine or saliva.

Prof Mike Wilkinson (University of Nottingham) outlined the wider issues of healthy silage, covering the need for careful making, storage and feeding practice to prevent aerobic bacteria, yeasts and moulds. He also highlighted the often overlooked aspect of health and safety during silage making.

Liz Mee (Micron Bio-Systems) gave a global overview of mycotoxins, pointing out that, whilst it is not realistic to check every feed sample, we do, however, understand the



*The long growing season for maize may make it more susceptible to mycotoxin moulds.*

environmental conditions linked to certain moulds which can help to target analysis and in-feed solutions.

Dr Jaime-Leigh Douglas (ABVista) discussed the risk of mycotoxins to dairy cows, including stresses on rumen microbes, emphasizing the need for effective measures of detoxification to safeguard production.

Questions raised included whether it is worth harvesting maize earlier to avoid mycotoxins, though doing so would reduce starch content. Chop-length was also queried as shorter fibres may be linked to increased rumen acidity, yet aid silage compaction. The potential impact of climate change on growing conditions and therefore moulds was also highlighted.

For further information on the project visit [www.bovmycotox.co.uk](http://www.bovmycotox.co.uk).