

EMERGING MYCOTOXINS IN DAIRY PART 3



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There are many synonyms for mycotoxins; ‘hidden killers’, ‘silent killers’, ‘thieves’ etc. The complexity of dairy feeds and the relatively higher difficulties in precisely analysing mycotoxins in forages strongly support these synonyms.

Knowledge and understanding of their nature and occurrence continues to advance the industry’s growing appreciation for the adverse affects of mycotoxins on animal health and performance. We know now that upwards of 500 mycotoxin types exist so if we are to adequately address the challenge posed by these toxins, efforts should be made to analyse for as many as possible.

Emerging mycotoxins

There are a few laboratories in the world capable of analysing 50 or more mycotoxins. Such analyses, however, are restricted to research and regulatory purposes. To bring such capability to the field and to assist animal producers around the world, Alltech established its 37+ Program.

This Program makes use of state-of-the-art UPLC-MS/MS techniques to analyse more than 37 mycotoxins. Table 1 compares the list of mycotoxins that are included in Alltech’s 37+ Program with those analysed routinely in the animal industry. For ease of understanding, additional mycotoxins tested for in the 37+ Program are considered emerging mycotoxins.

Fusarium mycotoxins

Many studies have shown that when grains/feeds contain DON, other mycotoxins such as 3-acetyl DON and 15-acetyl DON are also present. Recent studies have shown how masked or conjugated DON can increase overall DON toxicity. Masked/bound DON cannot be detected using conventional methods of mycotoxin analysis, including HPLC.

The dairy industry understands all too well the negative effects of T-2 toxin. But few people know that diacetoxyscirpenol (DAS) is more toxic than T-2 toxin.

Trichothecene Fusarium mycotoxins and fumonisins can sup-

press immunity even when present at lower concentrations. Since performance may not be affected at such low levels often their impact on immunity goes unnoticed.

Zearalenone is known to compromise reproductive performance of dairy cows. Table 1 shows three other forms of zearalenone which are not routinely analysed for in the dairy industry, explaining why we often see reproductive issues in dairy cows even when the actual zearalenone level is very low in the TMR.

Penicillium mycotoxins

Some Penicillium moulds can survive at low pH levels which often occur in silages. Such moulds produce mycotoxins such as patulin, mycophenolic acid and roquefortine C. These mycotoxins have been shown to compromise rumen health and immunity. A recent study from The Netherlands has shown increased incidence of metabolic disorders, compromised anti-oxidant status, higher somatic cell counts and poor milk production

when cows are fed TMR containing mouldy silages. This necessitates testing silages and TMR for these emerging mycotoxins – not only aflatoxins and Fusarium mycotoxins.

Other emerging mycotoxins

Apart from Fusarium and Penicillium mycotoxins, many Aspergillus, Alternarium and ergot mycotoxins, which are not routinely analysed, are also included in Alltech’s 37+ Program. The toxicity of ergot toxins in dairy animals is well understood and the ability to analyse many allows for a more precise understanding of the potential toxicity. Gliotoxin is often detected in silages and has been linked to haemorrhagic bowel syndrome (HBS) in cows.

Mycotoxin management

In light of the unexpected toxicity from emerging and unknown mycotoxins, the use of a HACCP-like approach such as Alltech’s MIKO Program to control mycotoxins in feed mills and farms is highly recommended.

Table 1. Comparison of routine mycotoxin analysis vs. Alltech’s 37+ Program.

Mycotoxin group	Routine analysis	37+ program
Aflatoxins	Aflatoxin B ¹	Aflatoxin B ₁ , B ₂ , G ₁ , and G ₂
Ochratoxins	Ochratoxin A	Ochratoxin A and B
Type A trichothecenes/T-2 Group	T-2 toxin	T-2 toxin, DAS, HT-2 toxin, neosolaniol
Type B trichothecenes/DON Group	DON	DON, 3-acetyl DON, 15-acetyl DON, Nivalenol, Fusarenon-X, masked DON
Fumonisin	Fumonisin B ₁	Fumonisin B ₁ , B ₂ , and B ₃
Zearalenone group	Zearalenone	Zearalenone, α-zearalenol, β-zearalenol and zearalanone
Other penicillium and aspergillus mycotoxins	-	Patulin, roquefortine C, penicillic acid, mycophenolic acid, gliotoxin, sterigmatocystin, verruculogen, wortmannin
Ergot mycotoxins	-	2-bromo-alpha-ergocryptine, ergocornine, ergometrine, ergotamine, lysergol, methylegonovine
Alternaria toxins	-	Alternariol
Total number analysed	6	38

Conclusion

The role of lesser known and emerging mycotoxins, along with routinely analysed mycotoxins, should be considered in determining the total toxicity to dairy cows. The non-specific symptoms and subtle nature of the mycotoxin challenge warrants the implementation of mycotoxin control strategies all along the mycotoxin production chain rather than waiting for the devastation to happen. ■

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