Choosing the correct mycotoxin binder dosage: a critical decision

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It would be unthinkable to use a coccidiostat or an antibiotic, or any feed additive at dosages two, three, four or even five times lower than the recommended scientific proven dosage.

Serious doubts regarding the efficiency of such low dosages would arise, unless there is scientific evidence that proved their effectiveness at these lower doses. The dosage is essential to the efficacy of the product.

When it comes to Anti-Mycotoxin Additive (AMA), it seems that this basic dosage premise is disregarded. Often, during the process of selecting an AMA and deciding the dosage, little attention is given to the scientific information that demonstrate products' effectiveness on animal performance and especially on Target Organ Protection (TOP).

Evaluate the target organs

It is important to evaluate the target organ(s) since they reflect the specific damage of the mycotoxin (Table 1).

It is also necessary because some adsorbents base their effectiveness on a positive effect on performance, which is a result of the presence of enzymes, beneficial bacteria, yeast and/or immuno-stimulant in the composition of those products, and not mycotoxin adsorption.

Unfortunately, many times decisions are made based solely on the cost that a product represents in a ton of feed, and the dosage administered is the one recommended in brochures with no scientific basis, or the dosage given is often below the one proven in TOP trials.

In both cases, the lack of time dedicated to critically analyse all the information provided in brochures results in the convergence of marketing, science, and cost, which muddle the scientific facts. This creates an atmosphere where recommended doses are manipulated in order to 'fit' specific needs, usually cost related, apparently benefitting everyone involved, except the animals.

There are several misleading parameters used in order to generate a hypothetical 'commercial dose'; none of which are based on proven scientific information:

- Percentage of humidity in the feed. There is no relation between humidity and levels of mycotoxins.
- Mould count. There is no relation between levels of mould and levels of mycotoxins.
- Mycotoxins in feed: low, medium or high. Levels in ppb or ppm are not given for each range.
- Damage to the animal: no signs, mild, moderate or severe. Prevention is paramount; waiting for symptoms is too late.
- Levels of only one mycotoxin. 90% of the time there is more than one mycotoxin in the feed.
- Cost affordability. Dosage is based on what consumers can afford to pay in each country.
- Lowest dosage. Dose is only given for the purpose of selling an AMA.

Table 1. Target organs that must be evaluated in poultry and swine.

Mycotoxin	Target organ	Damage
Aflatoxin	Liver in poultry and swine	Enlarged, fatty, friable
Ochratoxin	Kidney in poultry and swine	Enlarged, congested. Urate deposits in poultry
T-2/DAS	Mouth, tongue and gizzard in poultry. Mouth, tongue in swine	Necrosis, ulcers, erosions
Zearalenone	Female reproductive organs in swine	Enlarged, vulvovaginitis
Deoxynivalenol	Liver in swine	Size reduction
Fumonisin	Lungs, heart and liver in swine	Enlarged

Bruising due to aflatoxin and fumonisin commercial mycotoxin binder dosage.

Table 2, based on product dosage recommendations found in different brochures, demonstrates how TOP doses are manipulated in order to provide an economically attractive commercial dosage.

This is targeted towards producers who use cost as the main consideration for deciding a mycotoxin binder dosage. When the scientific dosage is high (5-10kg/ton) it is easier to accept a reduced commercial dose.

However, if it is accepted, without any scientific support, that a product with a TOP dosage of 5.0 kg/ton can be effective commercially at 40% of the dose: 2.0kg/ton.

Then, likewise, it would be accepted that a product with a TOP dose of 2.5kg/ton would work at 40% of the dose: 1.0kg/ton.

Subclinical parameters

Some producers believe that using the cheapest dosage of the product will be effective or will at least do something to control the problem, but they are not aware of all the subclinical parameters affected by mycotoxin contamination at the farm and the slaughterhouse level; or they do not have the time to evaluate them.

When the cheapest dose is used, the ben-

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efits of the product are not clearly seen, precisely because the dosage is too low.

Often, the first actions to deal with mycotoxin problems are taken once subclinical symptoms have already become an acute clinical problem, which can happen at any time without notice (mycotoxin levels in feed change on a day to day basis), and then when 40% of the dosage does not work.

Likely, the AMA will be blamed. In some cases the dose is increased to the correct TOP dosage level (if the product has TOP results), but at this point it is too late, damage to the organs and economic losses have already occurred.

This year is the appropriate time to commercially evaluate the effectiveness of an AMA due to the high levels of mycotoxins in grains.

These heightened levels will present the possibility of observing clinical symptoms induced by mycotoxin contaminated diets. Therefore, the difference in effectiveness between a product used at the TOP dosage versus products without TOP results, or used at lower than proven dosage will be evident.

Scientific dosage in vivo with TOP	Commercial dosages as % of the scientific dose				
	50%	40%	30%	20%	10%
10.0kg/ton	5.00	4.00	3.00	2.00	1.00
5.0kg/ton	2.50	2.00	1.50	1.00	0.75
2.5kg/ton	1.25	1.00	0.75	0.50	0.25
2.0kg/ton	1.00	0.80	0.60	0.40	0.20

Table 2. Commercial dosages of mycotoxin binders as percent of the scientific dose.

Cost benefit ratio

If an AMA dose efficacy has been demonstrated in vitro, and more importantly, in vivo, with TOP results against several mycotoxins, it is as valuable as the rest of the critical feed additives.

When used at the TOP dose it will enhance the overall health of the animals, preventing subclinical problems caused by immunosuppression, thus decreasing mortality, while improving performance, carcase quality and yield.

The decision to use a mycotoxin adsorbent at a dose below the scientific TOP dosage should not be made by the supplier, but by the nutritionist and/or the production manager.

The correct TOP dosage must first be used in order to see positive results. Once this occurs, there must be an assessment of the critical points of production before the dosage adjustments are made based on the specific conditions of the particular company.

It is important to be aware that adjusting the dosage implies taking a risk. The risk is that subclinical symptoms can become an acute or clinical problem without notice, causing serious damage and significant economic losses.

The critical question is: which cost is higher, the damage and losses caused by acute mycotoxins problems at a given point in time or the cost of using an AMA at the TOP dosage all the time to protect from clinical and subclinical risks? ■

Fumonisin lung damage prevention using scientific mycotoxin binder dosage.