

MOULD, YEAST AND MYCOTOXINS

RISK ASSESSMENT TOOL

Moulds and yeasts are found everywhere. Mould and yeast spores are commonly found in home grown crops intended for feeding livestock. Environmental conditions during growing and harvesting may significantly increase the incidence and degree of mould within feed from year to year. Feed contamination will occur when environmental conditions are favourable to mould and yeast spore growth. Consequently, mycotoxins can be produced by certain moulds. These mycotoxins can have a negative impact on animal health and productivity.

Laboratory testing confirms that in any feedstuff, even fresh pasture, there is a high possibility that moulds, yeasts and mycotoxins will be present.

Mouldy feed won't always contain dangerous mould poisons or mycotoxins, but a high prevalence of mould in feed can adversely affect animal health and productivity. Mouldy feeds are less palatable, which can result in lower dry matter intakes and subsequently lower energy and other critical nutrient intakes. The digestibility of the diet may be decreased sufficiently to reduce the energy content by 5% for ruminants. Therefore, it is best to discount the energy values of mouldy feed ingredients by multiplying them by 0.95. This can lead to considerable reductions in milk production, growth rates or weight gains, as well as increase the incidence of metabolic disorders.

A 5 to 10% reduction in production performance and increase in health problems from feeding mouldy feeds can be expected. If mycotoxins are present, their effect can lead to greater losses in production and an even higher incidence of health issues, even if moulds are not clearly evident.

Yeasts tend not to be harmful and are more common in poorly ensiled forages. Their presence indicates aerobic spoilage has occurred and that mould counts are likely to increase. In general, silage should have <500,000 CFU/g to be stable and prevent the feed from deteriorating before feeding out.



Table 1: Feeding risks at various mould spore counts

Mould spore count per gram	Associated risk and feeding recommendations
<500,000	Relatively low risk
500,000 - 1 million	Relatively safe limit
1 – 2 million	Take caution when feeding. Discount energy (x 0.95)
2 – 3 million	Closely monitor livestock health and performance. Discount energy (x 0.95)
3 – 5 million	Increased risk of feeding – Dilute in mixed ration with other feeds and observe livestock. Discount energy (x 0.95)
>5 million	High risk – Do not feed to livestock

Risk is associated with effect of mould contamination and doesn't account for the presence of mycotoxins Source: Adams et al. (1993)

Symptoms of mould and mycotoxin induced problems:

- Reduced feed intake or feed refusal
- Decreased nutrient absorption, altered rumen fermentation & microbial growth.
- Reduced weight gain and performance with increased lethargy and morbidity
- Diarrhea, bloating and hemorrhage
- Suppressed/compromised immune function
- Lack of response to medication or vaccines
- Cellular death - Liver, lung or kidney damage
- Increased incidence of abortions and reproductive issues



Table 2: Classes of moulds, colours and mycotoxins

Mould Type	Colour	Related Mycotoxin Produced	Consequence
Aspergillus	Yellow-green	Aflatoxin Ochratoxin	Hepatotoxic, carcinogenic, immune suppressive Nephrotoxic & gout
Cladosporium	White	None produced	Spores may cause respiratory issues
Claviceps	Sticky honeydew to white	Ergot alkaloids	Neurotoxin – poor weight gain, lowered fertility, staggers, gangrene and even death
Fusarium	White/Pinkish white	DON (vomitoxin)	Dermatotoxic, feed refusal, vomiting
		Fumonisin	Neurological disorders, liver damage
		Zearalenone	Estrogenic, reproductive disorders & abortion
		T2 Toxin	Mouth lesions and loss of appetite
Mucor	White/grey	None produced	Spores may cause respiratory issues
Penicillium	Green to green-blue	Ochratoxin	Nephrotoxic & gout
Rhizopus	Black/white	None produced	

Source: Adapted from Mahanna (2004) and Gashaw (2016).



Mould types and the mycotoxins they can produce:

Each type of mould has their own ideal temperature and moisture level where they grow best, but none grow well at low moisture levels <15%. There are 10 main types of mould that can affect hay production: Alternaria, Aspergillus, Cladosporium, Claviceps, Fusarium, Mucor, Penicillium, and Rhizopus species are the most common. Often the colour of the mould present can give an indication to the type of mould; although this is a guide only.

Mycotoxin concentrations that can negatively impact livestock:

All levels of mycotoxins, even at low concentrations, will have a negative impact on the immune status of the animal. This can allow for secondary infections to occur or result in decreased response to medication and vaccine programs. Mouldy feeds can be a high risk for mycotoxin contamination, but even feeds that appear to have no mould can be contaminated with mycotoxins. Precautionary measures should be taken to prevent issues with animal health and performance. Testing the feed for mycotoxins can be done to determine whether mycotoxins are present and at what concentrations.



Table 3: Mycotoxin contamination levels in cattle

Mycotoxin present	Risk Level of Mycotoxin (ppb)	Calf	Dairy Cow	Beef Cattle
Aflatoxin B1	Low	<5	<5	<50
	Medium	5-20	5-20	50-100
	High	>20	>20	>100
B-Trichothecenes DON (vomitoxin)	Low	<300	<1000	<1000
	Medium	300-1000	1000-2000	1000-2000
	High	>1000	>2000	>2000
A- Trichothecenes T2-Toxin	Low	<100	<100	<200
	Medium	100-800	100-800	200-800
	High	>800	>800	>800
Zearalenone	Low	<100	<100	<200
	Medium	100-250	100-200	200-300
	High	>250	>200	>300
Ergot Alkaloids	Low	<100	<100	<100
	Medium	100-400	100-400	100-400
	High	>400	>400	>400

Source: Adapted from Adam et al. (1993)

Consult your nutrition advisor for further recommendations when dealing with mouldy feeds and the elevated risk of mycotoxin contamination.

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