

Hygienic value and mycotoxins level of grass silage in bales for horses

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Introduction Mycotoxins are secondary metabolites of moulds which have adverse effects on humans, animals, and crops and result in illnesses and economic losses. The toxins may occur in storage under conditions favourable for the growth of the toxin-producing fungus or fungi. The highest forage concentration of toxins was found in horizontal storage methods such as bunker silos and feed piles, which were left open to oxygen. In any fermentation storage system, temperature and the presence of moisture is sufficient for toxin production. In a plastic covered storage system, oxygen penetration is slowed but not eliminated. The longer silage is stored, the greater the opportunity for significant fungus growth and toxin contamination. Although the effects of mycotoxins on horses are not well documented in scientific literature, in many situations mycotoxin problems appear to be significant e.g. colic, neurological disorders, paralysis and brain lesions. The aim of this study was to determine the level of mycotoxins in grass silage prepared in bales for horses.

Materials and methods Grasses were conserved in two ways as a hay and silage. Grasses were ensiled in bales, which were opened after six and sixteen weeks. Samples for each treatment from six bales were taken for chemical and microbiological analysis of the basic nutrients, the total amount of fungi, yeast, LAB bacteria, mycotoxins – AFLA, OTA, DON, ZON.

Results Spores of *Aspergillus niger* that belongs to the allergens of respiratory system (*Cladosporium*, *Alternarium*) were dominated in hay. ZON (Zearalenol) was also detected in hay. Hay silage after 4 months of fermentation contained lower level of moulds than hay. Simultaneously, the level of lactic acid bacteria increased. Mycotoxins AFLA, OTA, ZON, DON were not detected.

Table 1 Hygienic value of used feeds

Material	Grass	Hay	Hay-silage 6 weeks	Hay-silage 16 weeks
Total fungi CFU/1gram	2.6 x 10 ⁶	2.4 x 10 ⁶	8.1 x 10 ⁴	5.7 x 10 ⁵
Total moulds CFU/1gram	3.2 x 10 ⁵	7.1 x 10 ⁵	2.9 x 10 ³	9.3 x 10 ³
Total yeast CFU/1gram	2.3 x 10 ⁶	1.7 x 10 ⁶	7.8 x 10 ⁴	5.6 x 10 ⁵
The dominant moulds	Cladosporium Aureobasidium Alternaria Mucorales Fusarium	Cladosporium Aureobasidium Alternaria Mucorales Fusarium Dematiaceae Endomyces	Acremonium Aureobasidium Mucor Humicola Penicillium	Fusarium Penicillium Endomyces
The total amount (30 ⁰ C) CFU/1gram	5.0 x 10 ⁷	6.6 x 10 ⁷	8.4 x 10 ⁶	2.0 x 10 ⁷
The total amount of lactic fermentation CFU/1gram	9.4 x 10 ³	1.8 x 10 ³	4.8 x 10 ⁴	2.2 x 10 ⁷
AFLA (B1, B2, G1, G2) ppb	NS	NS	NS	NS
OTA ppb	NS	NS	0,1	NS
ZON ppb	< 5	< 10,1	< 5	< 5
DON ppb	< 222	< 222	< 222	< 222

Conclusions Hay-silage had better hygienic value than hay and seems to be safer feed for horses.