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Parameters of ensiled maize with biological and chemical additives

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Introduction The amount of maize grown in Poland has increased rapidly. Nowadays it takes about 600,000 ha, 40% of which is used as silage. Changing climate in Poland, with dry summer followed by wet autumn with ground frost causes extensive moulds contamination and high presence of the fusarium toxins in the maize during the harvest. The norms accepted in the EU concerning the acceptable level of deoxynivalenol (DON) and zearalenol (ZON) in feedstuffs for cattle require detailed examination of this problem as it decides on the health quality and production results. The aim of the study was to evaluate the effects of ensiling forage maize with microbiological additive and chemical preservative on the DON and ZON amount. The effects of the secondary fermentation after the silos were open (stability evaluation) were also examined.

Materials and methods The study samples taken from the maize type F70 (Flint type grain from Austria) were ensiled in mid September 2003 after grinding in three ways (5 microsilos each), i.e. 1 - control; 2 - control + 0.25% Kemisile 2000 preservative; 3 - control + 0.2% Lactacel L bacterial enzymatic substance (*Lactobacillus plantarum* 108 cfu/g + enzymes). Whole pieces of maize plant such as leaves, stem and cob were evaluated too. After 12 weeks of ensiling the quality of the silages, microbiological variables and the presence of Fusarium toxins were evaluated. Furthermore, the same analysis was carried out for the silage, which underwent 7-days oxygen exposure. The aflatoxins (AFLA), ochratoxin A (OTA) and ZON were determined by HPLC, DON by Elisa.

Results The results confirmed high moulds contamination of the harvested maize as well as high level of DON (7690 ppb). Ensiling significantly reduced DON and the number of fungal flora. However, the oxygen exposure of the silage increased the level of both mycotoxins and moulds (especially *Aspergillus*, *Penicillium* and *Mucor* genera). The additives Kemisile 2000 had a positive influence on the quality and stability of the silage. The selected parameters have been presented in the Table 1 (mean value from 3 repetitions). The AFLA and OTA were not detected in the raw material.

Table 1 Effect of additive addition on silage hygienic value

Parameters	Ensiling raw material	Silage					
		Control		Kemisile 2000		Lactacel L	
		after opening	after stability	after opening	after stability	after opening	after stability
Moulds (cfu/g)	1.1 x 10 ⁷	1.0 x 10 ²	5.6 x 10 ⁵	1.3 x 10 ³	5.0 x 10 ⁷	2.1 x 10 ²	1.7 x 10 ⁷
Yeast (cfu/g)	1.1 x 10 ⁸	1.1 x 10 ⁴	6.3 x 10 ⁸	1.0 x 10 ³	2.5 x 10 ⁸	6.2 x 10 ⁴	7.9 x 10 ⁸
LAB* (cfu/g)	2.5 x 10 ⁸	2.4 x 10 ⁸	2.1 x 10 ⁸	1.9 x 10 ⁸	1.7 x 10 ⁸	2.6 x 10 ⁸	2.2 x 10 ⁸
Clostridia (cfu/g)	5.4 x 10 ⁶	1.6 x 10 ⁶	9.7 x 10 ⁵	7.6 x 10 ⁵	1.9 x 10 ⁵	1.3 x 10 ⁶	3.5 x 10 ⁵
E. coli (cfu/g)	6.8 x 10 ⁸	1.0 x 10 ⁵	9.3 x 10 ⁴	7.4 x 10 ⁴	5.5 x 10 ⁴	9.3 x 10 ⁴	6.4 x 10 ⁴

* LAB – Lactic acid bacteria

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