

# The effect of lactic acid bacteria additive on gamma zeins content in high moisture corn silages

Marija Duvnjak<sup>1</sup>, Ana Butorac<sup>2</sup>, Kristina Perica<sup>3</sup>, Mario Cindrić<sup>3</sup>, Višnja Bačun-Družina<sup>2</sup>, Darko Grbeša<sup>1</sup>

<sup>1</sup>Department of Animal Nutrition, University of Zagreb Faculty of Agriculture, Svetošimunska cesta 25, 10000 Zagreb, Croatia

<sup>2</sup>University of Zagreb Faculty of Food Technology and Biotechnology Pierottijeva 6, 10000 Zagreb, Croatia

<sup>3</sup>Ruđer Bošković Institute, Planinska 1, 10 000 Zagreb, Croatia  
mduvnjak@agr.hr

Silage production is a conservation method used for high moisture crop preservation. It is based on natural fermentation that is under control of epiphytic microflora, optimally-mostly by lactic acid bacteria. Lactic acid bacteria additives (inoculants) in ensilaging are used for promotion of optimal fermentation processes, thus improving dominant nutrients preservation. Additionally, corn fermentation results in degradation of zeins, corn endosperm proteins, and therefore making corn starch more digestible. However, the impact of inoculation on the gamma zeins content still remains ambiguous. In the corn endosperm gamma zeins are comprised from three distinctive proteins: 16kDa gamma zein, 27kDa gamma zein and 50kDa gamma zein, with 50kDa gamma zein being expressed in undetectable quantities on molecular level. The purpose of the present study was to investigate the additive effect of lactic acid bacteria on the gamma zeins content during high moisture corn fermentation process. In commercial production ensilaging is conducted on yearly basis e.g. between two corn harvests. Therefore, the differences in gamma zein content were monitored in three samples of high moisture corn, on the first day of fermentation and after one year (the 364<sup>th</sup> day), in total nine samples. Silages were ensiled in the same production conditions (67,61% – 72,42% DM) in laboratory scale bag silos with and without Bio-Sil LAB inoculant in a concentration  $3 \times 10^5$  CFU/g of fresh material. The differences between gamma zeins content in silages ensiled with and without inoculant were detected using 2-D gel electrophoresis followed by densitometry quantification and MALDI-TOF/TOF protein identification. The results showed that the 16kDa gamma zein was less abundant in inoculated high moisture corn silages, but there was no difference in 27kDa gamma zein content between inoculated and noninoculated silages. The content of all gamma zeins declined from the first day of fermentation to the final fermentation stage. Fermentation of high moisture corn leads to gamma zeins degradation. However, the differential analysis of particular gamma zeins, done for the first time in this scientific work, showed that the inoculation has influence on 16kDa gamma zein degradation but the same was not detected in the case of 27kDa gamma zein.

Acknowledgment: This work was supported by Bc INSTITUTE, Zagreb d.o.o.