

## LACTIC ACID BACTERIA CONTRIBUTING TO UPGRADE FODDER QUALITY

**I.A. Naidenko, V.V. Denisenko, M.E. Safonova**

*Institute of Microbiology of Belarus National Academy of Sciences*

*Belarus, 220141, Minsk, Kuprevich str., 2*

*e-mail: naidenko@mbio.bas-net.by*

A solid nutrition stock lays the basis for contemporary animal husbandry. Application of lactic acid bacteria and their metabolites to raise the standards of feed rations as ingredients of pre- and probiotic additives, is an evolutionarily grounded basic microecological technique to uphold health status and realize genetic potential of superproductive farm animals.

Throughout several decades the studies are under way at the Institute of Microbiology of the National Academy of Sciences of Belarus on isolation of lactic acid bacterial strains from various natural sources, investigation of their properties, characterization of produced bioactive agents and elaboration of the derived technologies of manufacturing diverse microbial preparations for various purposes.

Specially selected lactic acid bacteria isolated from various plant sources in Belarus and adapted to local ecological environment are distinguished by intense growth, capacity to compete with other microbial species, active acidogenesis, rapid acidification of substrates down to pH 4.2 or even lower, acid resistance, a broad spectrum of fermented carbohydrates (ability to utilize hexoses, pentoses, oligo- and polysaccharides) and they served as appropriate constituents of liquid biocompositions (Lacsil, Lacsil-M), dry preparation Lacsil-MS designed to improve quality of ensiled vegetable materials.

Lacsil-MS2 concentrate includes homo- and heterofermentative lactic acid bacteria consuming a wide range of carbohydrates: hexoses, pentoses, oligo- and polysaccharides, including major reserve polysaccharides of cereals and legume grasses (starch, polyfructosides). Supply of fastly growing coccoid forms of lactic acid bacteria enables to intensify the process of lactic acid fermentation at the earliest stages and swiftly reduce pH of vegeta-

ble mass. Addition of strains with elevated antagonistic activity ensures the suppression of growth of microorganisms responsible for spoilage of fodder.

Upgrading consortium composition with heterofermentative lactic acid bacteria and propionic acid bacteria prevents spoilage of fodder caused by air access in the course of feeding procedure.

Production by the selected microbial cultures of a set of enzymes (amylase,  $\alpha$ -galactosidase,  $\beta$ -glucanase, pectinase, etc.) capable to hydrolyze hardly digestible oligosaccharides, starch-containing and non-starchy polysaccharides of plant substrates, promotes enhanced bioaccess, better assimilation, increased alimentary and energy value of feed rations.

Evaluation of technology of producing feed additive based on lactic acid bacteria possessing high  $\alpha$ -galactosidase activity acquired top relevance due to the need to eliminate deficit of fodder protein in farm rations by replenishing the share of legumes (alfalfa, lupine, soy, peas, etc.). Introduction of such feed additive incorporating lactic acid bacteria, fermenting recalcitrant oligo- and polysaccharides with  $\alpha(1\rightarrow6)$  glycoside bonds allows to raise digestibility and assimilation of proteins and carbohydrates, to increase the input ratio of legume components into composite fodder formulas, to rule out intestinal disorders (gut meteorism), contributing thereby to farm stock productivity.

It was found that application of preparations comprising selected lactic acid bacteria resulted in economy of fodder expense up to 20% per each kilo of live weight increment, to augment average daily body gains by 9-12%, to increase productivity of lactating cows by 5-10%, and to diminish by 5.0% losses of digestible protein as compared with imported product analogues.