

BIOFUEL BY-PRODUCTS FOR POULTRY DIETS

Hissette M., Destain J., Thewis A., Thonart P. and Beckers Y.

Animal Science and Bio-industry Units, Gembloux Agro-Bio Tech (GxABT)
University of Liège, Belgium
mhissette@ulg.ac.be

The valorization of by-products from biofuel industry will promote the application of the 2010 (2003/30/EC) and 2020 European Directives, stipulating the inclusion of biofuels in transport sector. Replacement of fossil energy for sustainable energy by cereal utilization in bioethanol production increases the competition for starch between monogastric organisms and first generation biofuels. Very wide and interesting opportunities toward Sustainable Development are opened by by-product valorization. Biofuel industry produces enormous quantity of lignocellulose by-products. This biomass constitutes a broad resource for animal feed and the approach pursued in this work is the utilization of fibrolytic rumen enzymes to valorize by-products in the digestive tract of monogastric animals.

A methodology of enzyme production from rumen was first elaborated to demonstrate the potentialities of *in vitro* cellulolysis (40 to 60% of cellulose hydrolysis depending on by-products used). Hydrolysis was done in physico-chemical conditions simulating digestive tract of poultry. Cellulolytic bacteria was then isolated from bovine rumen and cultivated on specific medium to stimulate the biomass and the cellulase production in an *ex vivo* system (which reproduces ruminal anaerobic condition). The cellular biomass reached 10^9 bacteria/mL in 24 hours (in 10L bioreactor) and 2.5 to 15 Units/mL in C/N =30 medium with cellulose as the predominant source of carbohydrates (0.2% of glucose).

Production of fibrolytic enzymes in fermentors by bacteria culture stimulation permitted to obtain the rate of activity needed to make *in vivo* experimentation with monogastric animal (poultry digestibility assay).