

## Valorization of waste products from poultry industry

H. Stiborova<sup>1</sup>, B. Branska<sup>2</sup>, P. Patakova<sup>2</sup>, M. Jiru<sup>3</sup>, J. Poustka<sup>3</sup>, P. Kastanek<sup>4</sup>, O. Kronusova<sup>4</sup>, K. Demnerova<sup>1</sup>

<sup>1</sup> UCT Prague, Faculty of Food and Biochemical Technology, Department of Biochemistry and Microbiology, Technická 3, 16628 Prague 6, Czech Republic

<sup>2</sup> UCT Prague, Faculty of Food and Biochemical Technology, Department of Biotechnology, Technická 5, 16628 Prague 6, Czech Republic

<sup>3</sup> UCT Prague, Faculty of Food and Biochemical Technology, Department of Food Analysis and Nutrition, Technická 3, 16628 Prague 6, Czech Republic

Keywords: feather waste; amino acids, peptides, microbial hydrolysis, alkaline hydrolysis, chondroitin sulfate, hyaluronic acid

Presenting author email: [hana.stiborova@vscht.cz](mailto:hana.stiborova@vscht.cz)

Millions of tons of raw feather and biomass after chicken mechanical deboning are produced each year by the poultry industry. Despite the fact that feather contains more than 90% of protein keratin and, thus, has the potential to be converted into products of industrial and natural value, traditionally is simply disposed of in incineration plants. Biomass from mechanical deboning is low value product often used in pet food production. The aim of this study was to i) transform the raw feather waste using three different approaches (whole cell microbial digestion, enzymatic and chemical cleavage) and to test the usage of the hydrolysates as peptone substitutes in culture medium and ii) to extract the bioactive compounds such as are chondroitin sulfate (CS), hyaluronic acid (HA) and peptides from biomass after chicken mechanical deboning.

Keratin-degrading bacteria isolated from poultry waste by enrichment method. Among all isolates, *Pseudomonas* sp. P5 achieved the highest feather hydrolysis of up to 90 % in 5 days. Over 300 mg/L of free amino acids and 6.2 g/L of peptides smaller than 3,000 Da were released from 90 g/L of wet raw feather by microbial hydrolysis. Hydrolysates obtained by keratinase semi-purified keratinase contained 1191 mg/L of amino acids and 3.3 g/L of peptides. The highest amount of peptides (17.2 g/L) was achieved by mild alkali condition and this hydrolysate also proved the best properties as cultivation medium [1].

Biomass after mechanical deboning was subject to proteolytic cleavage with papain and pepsin. The better liberation of glycosaminoglycans was achieved by papain digestion. The hydrolysis was optimized using the software Design Expert and three independent variables were chosen (amount of added enzyme, volume of added buffer and duration of the hydrolysis). The procedure was verified with 5 kg of waste material and bioactive compounds as chondroitin sulfate, hyaluronic acid and peptides were determined in the final product. These approaches show that waste products from poultry industry could be transform into the valuable products.

**Acknowledgement:** This project was funded by the Technology Agency of the Czech Republic project BIORAF TE01020080.

[1] H. Stiborova, B. Branska, T. Vesela, P. Lovecka, M. Stranska, J. Hajslova, M. Jiru, P. Patakova, K. Demnerova, Transformation of raw feather waste into digestible peptides and amino acids, Journal of Chemical Technology and Biotechnology, (2016).

