

High value proteins from waste

Elaine Watson

The business case for bioethanol could be substantially strengthened were manufacturers able to isolate high value proteins from products of this process and sell them to the food industry, according to Danish biotech firm Upfront Chromatography.

Upfront, which is behind the world's largest industrial protein chromatography installation at the Avebe potato starch plant in Gasselternijveen (see story below) is now in talks with several bioethanol producers about using its 'expanded bed' adsorption technology for this purpose, said business development manager Morten Olander.

"Our technology enables companies to mine their process streams for valuable functional proteins that were previously unobtainable using classical chromatography or membrane technologies."

He added: "Considerable amounts of highly valuable functional proteins are regularly lost in the side-streams of industrial processes, and yet these proteins represent



a potentially valuable source of untapped revenue."

Upfront's technology, based on expanded bed rather than traditional packed bed adsorption techniques, enables companies to process industrial

quantities of waste/slurry with lots of large particulates, fast, and could be applied to anything from potato juice to peas, corn, wheat, whey and canola, claimed Olander.

The Upfront approach, which

involves the use of patented chromatography columns and adsorbent materials, enables the capture of target molecules directly from crude feed stocks, obviating the need for lengthy and costly three-step clarification, concentration and purification processes.

It was particularly well-suited to dairy process streams, he said. "We have enabled [Australian dairy co-operative] Dairy Farmers to isolate and extract high quality lactoferrin, lactoperoxidase and immunoglobulin from its whey stream.

"It is processing more than 200,000 litres of whey per day."

The technology has also been deployed by Danish ingredients giant Christian Hansen in order to isolate chymosin – an enzyme used in cheese production – from its fermentation broth.

Chromatography refers to a set of techniques used to separate different compounds.

'Column chromatography' uses a column filled with adsorbent through which a composite liquid mixture such as potato juice passes, explained Olander.

... as production starts at first potato protein extraction plant

Production has started at the first plant to produce highly functional, clean-label potato proteins for the food and pharmaceutical industries.

The plant, situated next to Avebe's potato starch factory in Gasselternijveen in The Netherlands, is run by Solanic, a subsidiary of Avebe set up earlier this year.

The plant uses patent-protected mild separation technology instead of the traditional heat coagulation method to extract proteins from the starch factory's waste stream, said Solanic director of commerce Frank Goovaerts. "We currently have the capacity to produce 1,000t a year, but will increase that to 4,000t next year. We could do 10,000t from



Frank Goovaerts: potato protein has superior emulsifying properties

this site." If Solanic were to set up plants at all of Avebe's potato starch factories, it could produce 40,000t annually, said Goovaerts.

The energy savings from finding a better use for

Avebe's waste products were considerable, he said. "Avebe alone consumes 0.6% of Holland's entire energy bill, and 30% of that is just to treat its waste stream. Ultimately, if we process all of its potato juice slurry, we could reduce the Dutch energy bill by 0.2%!"

The Gasselternijveen plant will produce proteins from November to March, with new capacity coming on-stream in August, said Goovaerts.

There were big opportunities to replace egg and dairy-based ingredients in yoghurts, spreads, meringues, sausages, paté, ice cream and sports drinks, said Goovaerts. "In an aerated dessert, you can use 1% potato protein instead of 2.5-4% milk proteins and get the same effect

plus a cost saving.

"You can also replace whey or caseinate in a yoghurt with potato protein and improve its viscosity and smoothness, or use it to make an egg-free meringue or non-dairy Frankfurters or patés, which currently use caseinate for structural reasons such as water binding and texture. In paté, potato protein has far superior emulsifying properties and offers significantly enhanced flavour release."

The essential amino acids composition in potato protein was superior to other sources of vegetable protein such as peas, rice, soy and wheat, and comparable to that of animal-based proteins such as caseinate, claimed Goovaerts.