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**Canada's agri-food
sector takes on the
world!**





A drying success

EnWave Corporation's Radiant Energy Vacuum food dehydration technology scores an industry breakthrough

Food manufacturers looking for new technologies that will convert live, active probiotics to a dry format in order to introduce a wider range of probiotic-fortified food products, such as cereal bars, dry cereals and snack foods, will find their answer in Vancouver, British Columbia, Canada.

Hailing from Vancouver, EnWave is an innovative R&D company developing a new industry standard for the dehydration of food, live or active bulk liquids, and sensitive pharmaceuticals. It is working to provide manufacturers with technology that is significantly faster, more cost-effective, and produces a higher quality end product than freeze drying. The current industry standard of freeze drying is an expensive and time-consuming process.

Its current technology dates back to 1996 with the development of the first prototype Radiant Energy Vacuum (REV) machine at the University of British Columbia for dehydrating food and nutraceuticals. Since then, it has produced and sold the first commercial-scale, continuous machine for food dehydration, and developed prototype REV technologies to dehydrate bulk liquids and pharmaceuticals.

The company now has three distinct divisions: nutraREV® for food dehydration, powderREV® for the dehydration of bulk food cultures, probiotics and fine biochemicals such as enzymes, and bioREV® & freezeREV® for live or active pharmaceutical dehydration.

nutraREV

nutraREV technology uses a combination of vacuum pressure and microwave energy to dehydrate fruits, vegetables, low-fat snacks, herbs, meats and seafood at, or below, room temperatures.

"The start up of our first commercially designed nutraREV technology is a significant milestone for EnWave and we will be aggressively marketing this technology as a replacement for freeze drying in the food industry," comments Mr John McNicol, president and co-CEO of EnWave.

In 2008, EnWave built the first continuous nutraREV machine capable of commercial production levels of dried berries. In March 2009, EnWave completed the sale of this technology to partner CAL-SAN Enterprises Ltd, a major blueberry producer in Richmond, British Columbia. Together, the two companies have proven that a marketable, dried berry can be produced in commercial quantities using this state-of-the-art technology.

nutraREV technology is now being marketed by EnWave in North America for the dehydration of products such as berries, sour cherries, herbs, potatoes, tomatoes and onions.

"nutraREV gives the market a major advancement in food dehydration technology, and I truly believe that it will revolutionise the value-added food processing sector," reveals Mr Dave Sandhu, president, CAL-SAN Enterprises, Ltd.

The company also has a co-marketing agreement



with German engineering group Hans Binder Maschinenbau GmbH to sell and service nutraREV technology in Europe. The goal of the agreement is to accelerate revenue growth by each company, and to provide local machine service for their customers in the food sector in Europe and North America.

EnWave's nutraREV and Binder's MIVAP™ technologies both produce attractive dried food products with high nutritional retention, improved flavour and appearance, and significant cost savings in labour, energy and capital per kilogram of production over freeze drying. Although both companies use microwaves as an energy source, EnWave's continuous rotating basket design and Binder's continuous tray system both offer unique proprietary advantages with limited market overlap for dehydrating a wide range of fruit, vegetable, and meat products for the snack, cereal, soup and baking industries. Together, the two technologies will now compete directly for all aspects of the freeze dried food market which comprised over 400 products around the world.

In-laboratory tests have proven that the nutraREV process can have the following benefits over freeze drying:

- high-speed processing in minutes rather than hours or days



A CAL-SAN fresh blueberry beside a nutraREV dried, "puffed" blueberry.

- potential for improved re-hydration characteristics
- manufacturer controls over final moisture content

powderREV

The latest addition to EnWave's platform of REV technologies is powderREV which dehydrates a continuous stream of liquid using microwave energy as a heating source in a low-pressure vacuum environment. This technology is designed for the bulk dehydration of starter cultures, probiotics and fine biochemicals such as enzymes.

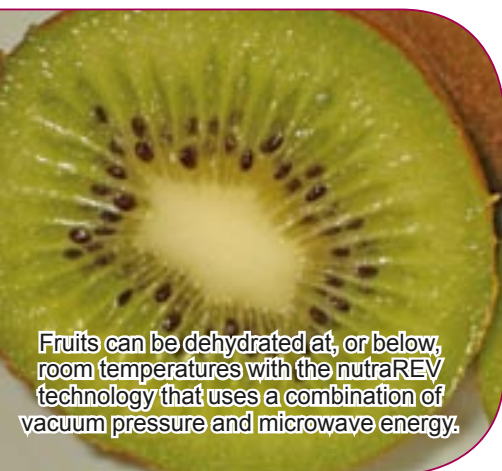
In April 2009, EnWave successfully completed the first phase of a series of tests with partner Danisco A/S, one of the world leaders in food ingredients, enzymes and bio-based solutions. Together, the two companies will create a dehydration method delivering high-speed continuous bulk powder processing capable of handling sensitive biological materials, such as cultures.

Based on the success of these early results, EnWave and Danisco are now undertaking the second phase of testing to evaluate the commercial viability of EnWave's powderREV dehydration technology on a wider scope. EnWave and Danisco expect this second phase to be completed in the second quarter of 2010.

If testing proves successful, commercial-scale dehydration of probiotics and enzymes using powderREV could serve to dramatically reduce manufacturing and distribution costs while improving retention and shelf-life of live material in the end product.

"Danisco has always been proactive in searching for innovative technologies to improve the drying process of cultures. The initial results from the tests with EnWave's technology are encouraging. We are looking forward to expanding the testing on a larger scale prototype to better evaluate potential product and economic advantages," says Mr Egon Bech Hansen, cultures division vice president of R&D, Danisco.

- significant reduction in energy usage, start-up costs and machinery footprint
- improved retention of flavour and colour
- reduced potential for large batch losses with continuous processing
- potential for creation of new product attributes such as "puffing"



Fruits can be dehydrated at, or below, room temperatures with the nutraREV technology that uses a combination of vacuum pressure and microwave energy.



bioREV and freezeREV

EnWave's proprietary REV technology combines microwave energy with vacuum pressure to produce high-speed dehydration of live or active pharmaceuticals in sterile vials. This process is particularly suitable for creating room temperature-stable pharmaceuticals containing live organisms, such as viruses, bacteria and antibodies, where an emphasis must be placed on maintaining the maximum possible survival rates of these organisms until they are delivered to a patient.

Production of dried vaccines storable at room temperatures for long periods of time would be considered a major industry breakthrough. Dried vaccines with long shelf-life could be shipped worldwide, stored without the need for expensive, constant refrigeration, and stockpiled to protect against pandemic diseases and bioterrorism. The current standard for dehydrating many liquid pharmaceuticals is freeze drying (lyophilization).

This process is expensive, time consuming and often results in significant loss of live organism activity during dehydration.

EnWave has developed two versions of REV for use in drying live or active pharmaceuticals:

- * bioREV – a dehydration method for materials which require a gentler drying process without extreme temperature changes or freezing.

- * freezeREV – a dehydration method for frozen material where low moisture levels in the final product are imperative for long product shelf-life.

Both methods dry material in minutes compared to days required for conventional freeze drying, and both technologies are designed to offer the potential for significant reductions in processing costs through labour, raw material, energy and time savings. bioREV and freezeREV technology is currently available as a single-vial prototype to collaboration partners. **FBA**

EnWave granted new patent for REV dehydration technology

The Canadian Patent Office has granted the University of British Columbia (UBC) a technology and process patent for the use of radiant energy vacuum (REV) dehydration technology in the production of dried biological materials. The patent covers vacuum microwave dehydration of a wide range of materials in either solid, liquid or frozen state including enzymes, drugs, vitamins, antimicrobial agents and preservatives, and is intended to protect intellectual property developed at the UBC laboratory of Dr Tim Durance, EnWave's chairman and co-CEO. UBC has licensed this patent exclusively to EnWave under its ongoing collaboration agreement with the company.

"This is a general, broad-based patent which serves to substantially bolster EnWave's growing patent portfolio over the use of vacuum microwave dehydration technology globally," says Dr Tim Durance. "As a technology company, we put significant and continuous effort into protecting our intellectual property. A strong patent portfolio provides EnWave with a competitive advantage, and places the company in a stronger position when negotiating with global food, ingredient and pharmaceutical producers looking to replace freeze drying with our faster and cheaper technology."

EnWave holds an expanding intellectual property portfolio designed to protect the technology and knowledge base of the company. In addition to the company's own patent filings on other REV dehydration processes and equipment, EnWave holds an exclusive world-wide license from the university for a number of food and biopharmaceutical dehydration patents. The company expects the new patent to pave the way for expedited protection over the coming year in the United States, the European Union, China, Hong Kong, Australia and India where it was simultaneously filed in July 2005.