

Ag-West Bio hosts first annual Animal Health and Nutrition Workshop

March 5th marked the first annual Animal Health and Nutrition workshop held by Ag-West Bio Inc. The program was packed with first-class speakers from many facets of the Animal Health and Nutrition industry.

"Saskatchewan's strengths in agriculture and health make it a leader. For a region with the agricultural wealth and diversity of Saskatchewan, it is no surprise that it is becoming a recognized centre for functional foods, nutraceuticals and natural health products", said Lisette Mascarenhas, VP of Health and Nutrition for Ag-West Bio Inc.

Transforming animal health issues into scientific disciplines and protecting livestock are major strengths for Saskatchewan-based research institutes. The province is as focused in animal health as it is in human health and both will benefit from the overlap and shared characteristics of the sectors. With leaders such as VIDO, the Western College of Veterinary Medicine, the Prairie Swine Centre and the College of Agriculture and Bioresources, improving the health of large animals and companion animals, as well as protecting them from BSE, avian flu and other threats are priorities being met.

Dr. Andrew Potter, Associate Director of Research at VIDO spoke on *Zoonotic Diseases: threats and opportunities*. Zoonotic infectious diseases represent a significant risk to humans, with over 50% of all diseases having a link to animals, a number which increases significantly when one looks only at new and re-emerging infections. The latter includes such recent high profile agents as the Influenza virus, West Nile virus, SARS and prions, all of which have had a significant socioeconomic impact in North America. The importance of zoonoses and potential methods for prevention and control were discussed, focusing on the potential of vaccination of animals as a means of controlling the risk of human disease.

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Health & Nutrition

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"VIDO is working towards control strategies for a variety of diseases transmitted to humans via animals and animal products, including *Escherichia coli* O157:H7,



Dr. Lisette Mascarhenas, VP Health & Nutrition

Salmonella species, *Campylobacter jejuni* and prions (BSE and CWD). The control methods include the development of vaccines such as the recent E. coli O157:H7 vaccine which was co-developed by researchers at VIDO, the University of British Columbia and

Bioniche Life Sciences, as well as non-specific activation of the immune system. The latter area has great potential for a variety of applications in human and animal health."

Mr. Richard Harland, Director of Business Development at Novartis - Animal Health spoke on animal vaccines and immunostimulants. He explained that the animal pharmaceutical global markets are only 2.5 to 3% of the human pharmaceutical global markets. However, in the area of vaccines, animal health markets are approximately 2/3 of the size of the human market. The animal health market offers many unique advantages over the human market in speed of adoption of new technologies. Animal vaccines and

Zoonosis: [zoh-on-uh-sis, zoh-uh-noh-sis] n. pl. zo-on-oses

Zoonosis, also called zoonotic disease, refers to diseases that can be passed from animals, whether wild or domesticated, to humans.

Definition from the Encyclopedia of Medicine

immunostimulants continue to grow in share of the total animal health markets and there are many opportunities for growth.

Saskatchewan's legacy of reinventing the enviable Canadian health care system, sets the foundation for the next major life sciences opportunity. The province is leading the creation of the next generation of products related to nutrition, health and wellness — for both humans and animals.



Safety Steps for Natural Health Products

So you've discovered the potential for a new natural health product - now what?

Health Canada's Natural Health Product Regulations "ensure that all Canadians have ready access to natural health products that are safe, effective and of high quality, while respecting freedom of choice and philosophical and cultural diversity".¹ One element of the regulations requires



information supporting the safety and efficacy of the product. While it is required that this be demonstrated in humans through clinical trials, important information can also be derived from animal or preclinical studies, which can greatly influence the administration of these products in humans.

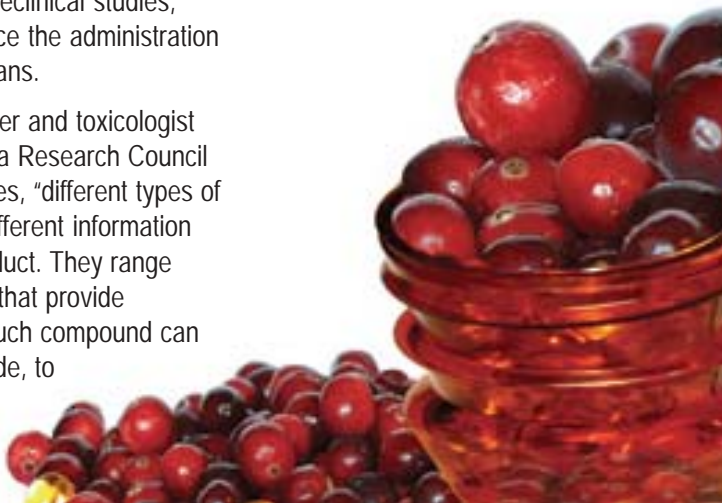
Dr. Vince Rogers, manager and toxicologist with ToxTest at the Alberta Research Council in Vegreville, Alberta states, "different types of animal studies provide different information about the safety of a product. They range from single dose studies that provide information about how much compound can be tolerated in one episode, to repeat dose studies that indicate what happens with exposure over part

or all of a lifespan. Various data are observed and analysed throughout these studies providing information about what effects the product has on multiple organ systems such as heart, liver, kidneys, reproductive systems and skin. These studies are aimed at determining safe dosage levels with natural health products, as well as any potential adverse effects associated with their long-term use."

Literature based safety information is sometimes useful; however, this information should be interpreted with caution:

- ▶ Previous studies may have been conducted on compounds having similar active ingredients but different formulations, which can lead to different biological activities.
- ▶ The raw product tested in the literature may differ from your product because of different harvesting or processing techniques, growing conditions, etc.
- ▶ All studies do not have equal scientific quality.
- ▶ You do not typically have access to the raw data in the study, only the interpretation of the data presented by the author.

(continued on page 4...)



Bio-fuels & bio-products

Research Investment for Farmer Benefit: *WGRF plants investment in varieties for ethanol*



Investment in research to develop world-class wheat and barley varieties is a target of the Western Grains Research Foundation (WGRF). The WGRF is a farmer funded and directed non-profit organization that works to provide affordable, leading-edge technology for the benefit of western Canadian farmers. The Endowment Fund and the Wheat and Barley Check-off Funds provide \$4 - \$5 million of investment into crop research every year.

The WGRF is overseen by an 18-member board made up of farmers and industry representatives from agricultural organizations and commodity groups across the western Canadian provinces.

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(NHP Safety Steps: continued from page 3...)

- ▶ The study design may not provide the information that you need – e.g. the animals may have only been dosed once and your product will be used on a daily basis.
- ▶ The original study may not be reporting adverse effects because limited types of data were observed.

Animal studies can be custom designed for your particular product. It is important to note that when it is time to start testing your product, it is critical to determine certain information in advance. The following checklist is a starting point for information that should be considered before contacting a facility to conduct your studies:

- ▶ The product *must be the same* as the product intended to be used in clinical trials and/or marketed.
- ▶ The product must be tested for concentration, purity, uniformity, and stability before initiating the study.
- ▶ You must have enough product quantity to conduct the study plus method development.
- ▶ Dose formulation: typically if your product is a dry substance, it must be dissolved or suspended in a vehicle for the study. The solubility and stability of this formulation in a given vehicle must be known in advance of study initiation.
- ▶ If a solvent other than water or saline is used to dilute the product, the toxicity of the solvent must not confound the results.
- ▶ What is the desired pH of the dose formulation (this may be limited by physiologic tolerances of the animal).

Even natural health products can cause adverse effects if consumed in sufficient quantities or in combination with other substances. Toxicology studies can determine safe dosage levels and identify any potential adverse effects associated with their use. Proper study design is essential to ensure the information generated from animal studies can be extrapolated to humans and will satisfy regulatory bodies.

1. Health Canada website: http://www.hc-sc.gc.ca/dhp-mps/prodnatur/index_e.html

(WGRF: continued from page 4...)

Some of the objectives set for these breeding agreements target increasing yield, improving disease and insect resistance, development of special adaptation characteristics, improving overall quality and targeting industry demand for areas such as ethanol.

According to Lanette Kuchenski, Executive Director of WGRF, "Ethanol represents a significant opportunity for western Canadian wheat and barley farmers. We are supporting this industry through the development of varieties that meet the needs of the ethanol plants, and work well for farmers in their fields".

Farmers, in return for their investment, get about \$4 for each \$1 invested in the form of improved wheat and barley varieties, as well as a range of new technologies to improve production and support Canada's competitiveness in the world grain market.

One variety filling a large amount of the demand for grain ethanol is AC Andrew. This variety, supported by WGRF, falls into the soft white spring wheat category. AC Andrew is a semi-dwarf with very high yields and excellent straw strength resistance to shattering. It was one of many varieties developed through Dr. Sadash Sadasivaiah's soft white spring breeding program at the

Agriculture & Agri-Food Canada research station in Lethbridge, AB.

Soft white wheat varieties were initially developed as a low protein, low gluten-strength crop for use in cookie and pastry flour, as malt for specialty beers, and as a soup thickener. Lower protein content generally creates higher yields and increases the starch concentration in the kernels. The two most sought after traits for ethanol production are high starch content and a low protein profile, so it's easy to see why AC Andrew is such a great fit.

Other varieties are undergoing research and development to meet the needs of the ethanol industry. Soft white spring wheat breeders continue to strive for improvements in this wheat class, for example, increased resistance to diseases like bunt and fusarium head blight, along with other improvements that will continue to expand this market.



Terra Grain Fuels: ethanol powered by wheat

By examining the development of the U.S. ethanol market, Gary Drummond and partner Tim LaFrance, along with their operating team at Terra Grains Fuels, decided to apply the principles learned south of the border to a major Canadian project. "The decision to choose a Saskatchewan location was easy given the huge capacity to produce the needed feedstock: wheat," says Tim LaFrance, President and CEO of Terra Grain Fuels.

Terra Grain Fuels (TGF) is currently constructing an ethanol plant near Belle Plaine, Saskatchewan that is designed to produce approximately 150 million litres of ethanol and 163,800 tonnes of dried distillers grains annually. At a cost of approximately \$140 million, the Terra Grain Fuels plant will be the largest wheat based ethanol production facility in North America, employing 150 people during construction and more than 40 during operations.

"It was an important aspect of our business plan to solicit local Saskatchewan firms for equity and financing. Fair terms and conditions were provided to us and we wanted to work with the people and businesses of Saskatchewan," notes Mr. LaFrance.

Using TGF's combined experience in the energy market, risk assessments showed it was feasible to proceed with the project independently and have producers deal directly with Terra Grains. "We have over 350 producers working directly with us and so far the support and enthusiasm has been very positive. We're happy to cooperate with the producers in the area and provide them with certainty they will

receive a fair price for their product and the ability to take advantage of programs such as cash advances and Producer Direct Agreements," says Mr. LaFrance.

The economic benefits and positive spin-off from construction of the plant are promising for the Belle Plaine region and all of Saskatchewan. The utilization of technology and new research will provide continual improvements. Increased efficiencies, from breeding programs that improve upon existing high starch varieties of wheat such as AC

Andrew, to new processes for obtaining ethanol more economically are in the pipeline.

"Our team has farming roots and we understand the importance of managing costs and mitigating potential risks to ensure a profit can be earned. Focus groups, current and historical crop

reports and experience have shown that growing ethanol-specific varieties consistently yields up to 35% more than traditional varieties, even without irrigation. Using a conservative estimate of 61 bushels per acre at \$3.60 a bushel to calculate returns for an ethanol friendly variety, 10% more gross dollars per acre are earned, leaving producers with more money in their pockets," says Mr. LaFrance.

A pillar of Terra Grain Fuels' business model is ensuring farmers receive fair and equitable returns for their labor and products.



Saskatoon: a science city

A powerful research cluster centered in Saskatoon is driving aggressive growth. Home to world-class research institutes, some of the most advanced thinking in the world around nutrition, health and wellness is occurring in Saskatchewan. The province is home to:

Vaccine and Infectious Disease Organization

A world leader in the development of vaccines and immunotherapeutic technologies for animals and, increasingly, humans.



University of Saskatchewan:

Comprised of a number of colleges that focus on the life sciences, including the Western College of Veterinary Medicine, the College of Medicine, the College of Biotechnology and the College of Agriculture and Bioresources.

Canadian Light Source: Canada's only synchrotron is opening up research possibilities with a strong emphasis on industrial applications. New beamlines are currently under construction.



Saskatchewan Research Council:

300 staff operate and oversee the Fermentation Pilot Plant, provide genetic services and applied research to the biotechnology sector, and provide DNA testing for traditional and specialty livestock.

National Research Council's Plant Biotechnology Institute: This institute focuses its research on crops for enhanced human health, cell technologies, lipid biotechnology, molecular and development genetics, Plant Natural Products¹ and protein research.



POS Pilot Plant:

A contract research, toll processing, and analytical services organization that specializes in extraction, fractionation, purification and modification of bio-based materials.

1. <http://pbi-ibp.nrc-cnrc.gc.ca/en/research/naturalproduct.htm>

Agricultural Biotechnology

A plant with potential

Agrisoma Biosciences Inc. (Agrisoma) provides innovative products and technology solutions for sustainable agriculture and improved human and animal health. Agrisoma is applying its proprietary technology in the development of value enhanced crops with higher yield, quality and commercial value, as well as the efficient production of industrial and therapeutic proteins in plant-based production systems.

Agrisoma's technology, referred to as the 'ACE System' is a proprietary gene delivery and expression platform capable



Tom Mamic, President & CEO,
Agrisoma Biosciences Inc.

of simultaneously introducing multiple genes into uniquely modified regions of engineered plant chromosomes in an efficient and predictable way. Genes exhibit stable and predictable expression from generation to generation, enabling the creation of value enhanced crops and plants optimized for the production of industrial and therapeutic proteins.

Agrisoma's technology overcomes the limitations of conventional gene transfer technologies in crops, such as reduced expression levels due to random integration of genes, and limited capacity to transfer large amounts of DNA - features that enable crops to express multiple traits or large complex genes. "The ACE System's large carrying capacity and ability to express multiple genes without gene silencing enables the creation of novel products based on the expression of multiple gene combinations", explains Tom Mamic, President and CEO of Agrisoma.

Agrisoma operates laboratories at the Saskatoon-based Industry Partnership Facility of the National Research Council Plant Biotechnology Institute (NRC-PBI), through a collaborative agreement that provides space and support within the PBI incubator facility.

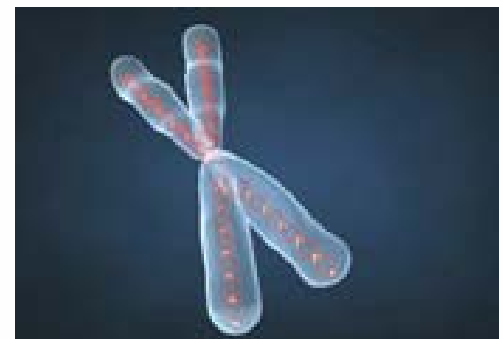
Partnerships such as this can help to expedite the commercialization of products when organizations are working towards similar goals. Research areas of NRC-PBI include metabolic modification of oilseeds to increase oil content for specialty oils, and canola seed genomics. In 2006, Agrisoma initiated an alliance with NRC-PBI to develop Brassica plants producing value-added oils for industrial applications in the bioproducts area.

"Working in the value enhanced crop market, Agrisoma can create value for partners through attaining high, consistent expression levels from multiple genes more rapidly and efficiently than other conventional technology providers in the marketplace," says Mr. Mamic.

Agrisoma has also identified a unique opportunity to exploit the high-level expression achieved with ACE technology in plant-based systems as a means to compete in the market of protein production.

Although the expression from proteins in plants has been demonstrated, the development of systems with commercially viable levels of expression has been limited.

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This collaboration entails enhancing the characteristics of Brassica plants by combining NRC's oil biosynthesis genes with the multiple gene stacking capabilities of the ACE System.

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Agrisoma believes its ACE technology can provide the mechanism to attain high volume expression. Manufacturing costs, as well as flexibility for developing cell lines expressing recombinant proteins are primary considerations in the industry, making Agrisoma's technology a commercially attractive protein production package.

The adoption of genetically modified crops provides substantial agronomic, economic, environmental, health and social benefits to farmers and increasingly, to society at large. The commercialization of crop varieties which are produced using innovative technologies like Agrisoma's will provide employment and training to technical personnel in the area of value-added agriculture. Canada - and Saskatoon in particular - has taken a leadership position in the commercialization of modified crops. Deployment of Agrisoma's technology will help enhance this role.

Collaboration between emerging biotech companies and established industry leaders, such as the one between Agrisoma and NRC-

PBI, will support the development of long-term, high value commercialization programs and provide a vehicle for further investment dollars in Canadian R&D.





In the News

In the News...People

- Ernie Barber has agreed to serve for up to one year as acting provost and vice-president academic, and has decided not to return to his current position of Dean of the College of Agriculture and Bioresources. He will take over from Michael Atkinson on July 1, 2007. [More](#)

- Four University of Saskatchewan research teams have been nominated for the Innovation Place–Industry Liaison Office Award of Innovation:

Plant sciences professor Lawrence Gusta, together with colleagues Albert Robertson and Guohai Wu, discovered Rob-5, a novel gene that confers tolerance to environmental stress, increases plant vigor and seed yield, and shortens the time needed for plants to mature.

Martin Reaney and colleague Dushmanthi Jayasinghe in the department of applied microbiology and food science have developed a novel chemical process that could improve profitability in the biodiesel industry.

Biology professor Vipen Sawhney has developed a photoperiod-sensitive male-sterile tomato line. The novelty of this system is that under certain photoperiod, the plants of this line become fertile, which makes it attractive for use in hybrid seed production. [More](#)

In the News...Finance

- Saskatchewan will receive \$44.4 million from the federal government's ecoTrust program, which supports provincial and territorial projects to help reduce greenhouse gas emissions and air pollutants. [More](#)
- A nascent Tisdale ethanol producer is the first company to put in its application for federal capital funding for biofuels. Officials with EnSask Biofuels Ltd. of Tisdale will seek \$20 million in funding from the ecoAgriculture Biofuels Capital (ecoABC) initiative. [More](#)
- The U of S Industry Liaison Office and Saskatchewan Agriculture and Food invite aspiring alumni and student entrepreneurs to submit their bio-product ideas to the BioVenture Challenge business plan competition. A potential \$50,000 boost and a new business plan will help a new business get off the ground. [More](#)

In the News...Companies

- Arborfield, SK is home to a new bioproducts company. Can Pro Ingredients has acquired the business assets and operations of Arborfield Dehy Ltd. along with licensed proprietary canola processing technology from MCN BioProducts Inc. [More](#)
- People in Birch Hills and area who have been plugging away for eight years to snag the first-ever facility to make ethanol from straw now have reason to believe the Saskatchewan location is the favoured site for such a facility. [More](#)
- Bioriginal is expanding both its European and North American offices in response to global demand for its products. [More](#)
- Performance Plants Inc., a leading Canadian agricultural biotechnology company, has announced that a U.S. patent has been issued to one of its gene-based technologies for improving drought tolerance in plants. [More](#)

(In the News...Companies, continued..)

- Philom Bios Inc. recently received regulatory approval in western Canada for TagTeam® soybean granular inoculant. TagTeam soybean granular represents the second new product registration for soybean and Philom Bios' fifth new product registration for the 2007 crop year. [More](#)
- Insulin produced by genetically modified plants - with a human gene added - could be on the market in three years, a Canadian company has claimed. SemBioSys said it has made scientific breakthroughs and found a short cut through current drug regulations. [More](#)
- GreenField Ethanol, Canada's leading ethanol producer, announced that its third plant, and the only ethanol plant in Quebec, is now in full operation in Varennes, Quebec. [More](#)
- Earthcycle Packaging has joined forces with Four Seasons Produce Inc., one of the largest independent produce wholesalers in the United States, to supply them with their signature compostable produce trays for Four Seasons' entire organic packaging program. [More](#)
- Cargill's inulin product, Oliggo-Fiber™, has been approved for use as a dietary fiber in Canada. This means Health Canada does not object to the classification of the product as dietary fiber for labeling purposes in Canada. [More](#)
- North America's biggest biofuel refinery will be built in central Alberta near the town of Innisfail, and could be producing fuels in the third quarter of 2008, the plant's developers stated. The \$400 million complex will be able to produce 378 million litres each of ethanol, canola oil and biodiesel. [More](#)

In the News...Updates

- Saskatchewan researchers and entrepreneurs will now be better able to take new technologies and research into the marketplace, thanks to the establishment of SpringBoard West Innovations Inc. at Innovation Place Regina. [More](#)
- Organic Friends E-Zine from the Organic Agriculture Centre of Canada Organic Friends' E-Zine is a monthly E-mail publication which highlights the most recent up-dates on the Organic Agriculture Centre of Canada website. [More](#)
- Two organic farmers seeking damages from Monsanto and Bayer CropScience have lost their latest bid for a class-action lawsuit. They are accusing the two companies of allegedly contaminating their organically grown canola and fields with genetically modified canola. [More](#)
- fDi (Foreign Direct Investment) magazine, a Financial Times publication, has selected Saskatoon as a top 10 North American "City of the Future" and the #1 "Best Economic Potential" for 2007/08 in the small cities category. [More](#)
- Finding partners and learning about Canada's biotechnology industry now easier than ever before. The free, internet-based Canadian Life Sciences Database has gone online thanks to BIOTECCanada. [More](#)



Ag-West Bio Events

Check the events page on the Ag-West Bio website for a comprehensive guide to events happening in Saskatchewan, Canada and around the globe: www.agwest.sk.ca/events

Intellectual Property Management Workshop — May 14, 2007

This one day workshop will feature Dan Polonenko, patent agent with Fasken Martineau. Dr. Polonenko has over 20 years of experience in the Canadian biotech industry, nine at the corporate executive level. Key intellectual property questions will be examined by Dr. Polonenko in this insightful and informative workshop, ideal for senior, executive, financial and venture capital managers. For details contact Jazmin Bolaños at 306-668-2659.

New Ag-West Bio membership benefit

Ag-West Bio is excited to provide your organization with increased media coverage to boost your profile throughout North America. In collaboration with Saskatchewan Industry and Resources, a Publicity Network has been established to highlight Saskatchewan in the many trade publications, newspapers and magazines available today. The group we are working with will forward opportunities to us, and we will solicit our members to participate. However, I encourage you to contact me at your convenience to ensure I am apprised of your endeavors to maximize the possibility of taking advantage of this opportunity. Please feel free to contact me by phone at 306-668-2656, or by email: darcy.pawlik@agwest.sk.ca to discuss how we can help you benefit from this service. I look forward to hearing from you!

Darcy Pawlik, M.Sc. Communications Director for Ag-West Bio Inc.

Join Ag-West Bio!

Support the bio-economy, and discover the benefits of membership.

[Click here](#) to learn more!

Calgary hosts ABIC 2007

The International AgBiotech Conference will be held in Calgary this year, September 23 - 26, 2007. ABIC offers participants the opportunity to exchange ideas and hear from a distinguished line-up of internationally-acclaimed speakers from the global biotechnology industry.

www.abic.ca

Welcome to AWB's newest members:

PricewaterhouseCoopers LLP
Red Coat Bio-Processors
Banda Marketing Group
Agriculture and Agri-Food Canada - Saskatoon Research Centre
Morris Johnson, Lifespan Pharma Inc.
Quantum Genetics
Linnaeus Plant Sciences Inc.
ToxTest - Alberta Research Council Inc.
Northern Vigor Berries
Foreign Affairs and International Trade Canada

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Readers wishing to have their comments considered for inclusion are encouraged to submit **less than 500 words** via e-mail to: darcy.pawlik@agwest.sk.ca Include your name and contact information. We reserve the right to edit for length.