



# **Travel Report – XXI World’s Poultry Congress, Montréal August 2000**

**A report for the  
Rural Industries Research  
and Development  
Corporation**

**By**

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**April 2001**

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*"Travel report – XXI World's Poultry Congress, Montréal August 2000"*  
*Project no. TA990-78*

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April 2001

# Introduction

During September 2000 I received a A\$1,400 RIRDC conference travel scholarship to partly cover expenditure derived from attending and presenting a scientific poster at The XXI World's Poultry Congress. This event was held in Canada from 20-24 August 2000. Other sponsors/organisations provided financial support to completely cover all my expenditure during this overseas trip. These other organisations were The University of Queensland, The World Poultry Science Association (WPSA), and The Brisbane Tourism and Convention Centre.

<b>Expenditure:</b>	<b>\$</b>
• Air fare Brisbane/Canada (return)	1,900
• Symposium registration	800
• Accommodation, meals and transport	500
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• Total	3,200

## **Reason for travel:**

- To attend and present a poster at the XXI World's Poultry Congress and to visit the International Poultry Exhibition.
- To discuss projects with overseas researchers and industry personnel.
- To discuss experimental results from the current canola/cottonseed meal project with Professor Hank Classen from Saskatchewan University.
- To attend WPSA Secretary meetings
- To represent WPSA Australian Branch at Council meeting in Montreal
- To represent Australia (as part of a working team) to compete in the bid for the WPC 2008.

**Person travelling:** Rider Anderson Perez-Maldonado.

**Organisation:** Queensland Poultry Research and Development Centre  
PO Box 327, Cleveland Qld 4163

**Dates of Travel to Montreal, Canada:** 20/08/00 – 24/08/00.

## **Broad Itinerary**

20/08/00: Brisbane-Sydney.

20/08/00: Sydney-Los Angeles-Chicago-Montreal

22/09/00: Return to Brisbane

# Travel Report Summary

Financial assistance of \$1,400 was received from the RIRDC (Egg and Chicken Meat programs) toward the costs involved for Dr R Perez-Maldonado to travel overseas to attend and to present a scientific poster during a 4-day period at the XXI World's Poultry Congress (WPC) in Montreal, Canada. During the event, a technical meeting was coordinated with Professor Henry Classen and Professional Research Associate Rex Newkirk from Saskatchewan University to discuss and exchange information regarding canola/cottonseed meal research from both Canada and Australia.

This XXI WPC provided Dr R. Perez-Maldonado with up to date information relevant to the development of the RIRDC current research project in canola/cottonseed meals which is being carried out at the Queensland Poultry Research and Development Centre (QPRDC). This overseas trip also provided Dr Perez-Maldonado with opportunities to discuss several new project proposals with his peers.

The main areas of interest were manipulation of fat quality in chicken meat and poultry eggs, animal welfare issues in laying hens and enzyme research in poultry feed. A major activity included a scientific poster presentation on *A Comparison of Raw Soybean Selected for Low Trypsin Inhibitor Activity for Laying Hens* on Tuesday 22. The results of this RIRDC soybean research are highly significant to the economics of poultry production in Australia in which substantial savings can be made when incorporating this meal in layer diets.

As a current WPSA Secretary (Australian Branch) Dr Perez-Maldonado was invited to attend three WPSA meetings. The first called the 2<sup>nd</sup> Meeting of the Branch Secretaries of WPSA was held at 12:00 hours on Tuesday, August 22, 2000 at the Palais des Congrès in Montréal. Then on Wednesday August 23, the Meeting of the Council and General Assembly of the WPSA was attended. The minutes of these meetings will be forwarded on request. An important WPSA meeting was also attended to discuss the 7<sup>th</sup> Asian Pacific Federation Conference to be held on October 2002 at the Gold Coast, Queensland Australia. Part of the agenda during this meeting was to inaugurate the Efficiency in Extensive Small-Scale Poultry Production Working Group in the Asian Pacific Federation. As an Australian WPSA Council representative, Dr Perez-Maldonado participated in the Election of WPSA Officers for the period 2000-2004. As a member of the Australian WPC 2008 bid, Dr Perez-Maldonado participated in the successful Australian bid that obtained the WPC for Brisbane in 2008. Finally I would like to thank RIRDC for the financial support provided.

# TRAVEL REPORT

## **Primary Purpose:**

The main purpose of this travel was to present a scientific poster paper at the 2000 World's Poultry Congress and to visit Professor Henry Classen at the Department of Animal and Poultry Science at the University of Saskatchewan in Saskatoon. The poster was entitled: *A Comparison of raw Soybean Selected for Low Trypsin Inhibitor Activity for Laying Hens*. This poster was successfully presented on Tuesday 22 from 9:00 to 16:00. However the original idea to visit the Department of Animal Poultry Science in Saskatchewan University after finishing the WPC was modified due to the high airfare cost (A\$1000) between Montreal and Saskatoon. Fortunately Professor Henry Classen, who was part of the WPC technical committee, suggested that I see him during the Congress rather than travelling to Saskatchewan. Therefore a meeting with Professor Classen and his PhD student, Mr Rex Newkirk, was organised for Wednesday 23 at noon.

**Major achievements, benefits to the grantee and his work. Significance to rural industry.** During the Congress I successfully presented a poster paper entitled: *A Comparison of raw Soybean Selected for Low Trypsin Inhibitor Activity for Laying Hens*. The poster was displayed to about 4000 delegates from around the world who were present at the WPC exhibition ground. This research was carried out at the Queensland Poultry Research and Development Centre in Alexandra Hills, Queensland, Australia. RIRDC provided the financial support and CSIRO (through Dr Andrew James) provided the genotype material. The results of this RIRDC research is highly significant for Australian's poultry producers as substantial economical savings can be made when incorporating this meal at up to 11% in layer diets. During my time presenting this poster, there were some questions regarding the availability of soybean Kti material. As far as I know there is Kti genetic material in Australia but this need to be propagated in order to get commercially available material for feeding poultry layers.

The XXI WPC provided significant and relevant poultry industry information for current and future research work in Australia. Of particular interest was my discussion with Professor Classen and Mr Rex Newkirk from Saskatchewan University. This group has been working with canola meal in Canada for several years. The effect of plant processing on the digestibility of lysine in canola meal was discussed and it was indicated that in Canada the amino acid (AA) digestibility mean values were close to 83.4% (range 65.5-85.7) using the acid insoluble ash method. Our results in Australia have a higher AA digestibility value of 85.7% with less variation (range 83-87.4). Our digestibility work compared three different methods; the acid insoluble ash, the chromic oxide and the near infrared spectroscopy analysis (NIRS). The first two methods provided similar results. NIRS however provided a close value result with some AA but generally were out of the range. According to Dr Zhirong Jiang whom is providing services using NIRS for the Asia Pacific Region had indicated me that the accuracy of NIRS depends very much on the data used to calibrate this machine and therefore more data is needed to obtain good results.

When comparing results between Australia and Canada on the differences in AA digestibility it is important to highlight that although both countries use a similar oil extraction method (pre-press solvent extracted), perhaps in Australia less heat is applied during plant processing resulting in less AA damage. The high AA range variation in Canada could be due to

variation between harvesting time, and the amount area dedicated to canola production. The results derived from broiler experiments carried out at QPRDC were also discussed. Dr Henry Classen indicated that our results were good particularly it was interesting that a possible trypsin inhibitor is present in canola meal and that was never reported before. He also indicated that a similar broiler experiments should be repeated using canola and cottonseed meals in least cost diets.

Regarding my attendance at the WPC presentations, the session of particular interest was on the use of enzymes to improve the nutritive value of feed ingredients. The first presentation, by Rostangno and Borges, was about the potential of feed ingredients to show responses to dietary exogenous enzyme supplementation. In this presentation it was indicated that the low digestibility of 55 to 65% of the gross energy value found in feedstuffs such as soybean meal, rice bran, or corn gluten feed among others was due to indigestible carbohydrate content such as raffinose and cellobiose. Saturated fats were also difficult for young chicks to digest because of inefficient production of lipase enzyme and recycling of bile salts. Recent research has also shown a beneficial effect of exogenous enzyme supplementation when added to starter chicks diets. An important finding that can be applied for a better nutrient digestibility and broiler performance was with the use of a mixture of enzymes such as amylase, protease and xylanase in corn and soybean meal diets. In Australian conditions, large amounts of wheat in broiler rations could decrease bird performance due to the presence of non starch polysaccharides (NSP), mainly arabinoxylans (Pentosans) with about 6.6 % NSP. These NSP increase intestinal viscosity in the bird resulting in reduced nutrient digestibility and performance. With the use of pentosanase and B-glucanase to produce a double enzyme effect a reduction of intestinal viscosity and improvement in ME of diets could be obtained.

The second interesting presentation on enzyme application was delivered by Dr Mingan Choct from Australia. He reviewed the effect of enzymes on poultry diets containing high levels of grain legumes, oilseeds and other non-conventional ingredients such as sunflower, canola, cottonseed, copra and palm kernel meals. This topic is of particular interest in Australia because there is a substantial trend for using vegetable protein meals around the world. This massive vegetable protein meal usage in poultry diets can elevate levels of anti-nutritive factors and indigestible carbohydrates, which may lead to poor nutrient digestion and absorption. During the presentation, it was suggested that the activity of enzymes currently used does not affect the complex structure of the carbohydrates present in the above meals. It was also suggested that more studies are needed on the chemical structure and physiological activity for these non-conventional ingredients.

Of particular interest were the issues related to animal welfare particularly the use of cages for layer birds. Interesting topics such as "***Modifying The Cage To Accommodate Behaviour***" (by Dr Appleby), ***The Pros And Cons Of Cages*** (by Dr Duncan) provided real knowledge in this worldwide current topic. Various welfare points of view were deeply discussed and I believe there was substantial agreement to continue with the use of cages for egg production. But modifications of the current commercial system of cages and adjustments to bird population per cage need to be achieved before practical solutions can be applied to industry.

Obviously there were a large number of sessions, posters, and exhibitors to look at during the week at Montreal that were of great interest. Unfortunately during this event I had other

obligations and responsibilities regarding my role as a WPSA secretary of an Australian Branch and team representative for promoting Australia (Brisbane, Queensland) to obtain the XXII WPC in 2008. Fortunately the WPC organisation provided a compact disk which includes all the abstracts and proceedings that were presented during this magnificent event. If anyone would like to obtain any information regarding any subject presented during the XXI WPC please feel free to contact me and I will endeavour to provide all the necessary information

**Recommendations to RIRDC and Industry arising from the report**

I would like to thank RIRDC (Chicken meat and Egg Industries) for kindly providing me with financial assistance to make my trip to Montreal in Canada a reality.

I will recommend the incorporation of ideas acquired and developed at the seminars and poster sessions during this event into future Australian research projects, particularly in the area of nutrition, enzyme application, and animal welfare.

It is recommended that the major benefits from the scientific work presented during this XXI WPC, which can be applied to Australian conditions, should be delivered to Australian poultry producers. That could be done through national poultry magazines and regional or local news dedicated to poultry.

## **RIRDC special request**

*RIRDC requested that during my travel I should investigate:*

*1: Differences between Australian and Canadian canola varieties.*

*2: Attempt to identify reasons for the difference in quality of meal derived from Australian and Canadian varieties.*

*3: How breeding for oil characteristics may have contributed to these differences.*

*4: Information should also be sought on likely future directions for canola breeding in Canada.*

While in Montreal and during the Congress I consulted Professor Henry Classen, Mr Rex Newkirk both from Saskatchewan University and other scientist that were presenting papers on canola. The majority suggested me to search the Internet to obtain most of the information requested.

On my arrival in Australia I carried out a canola search using the website, [www.canola-council.org](http://www.canola-council.org). I believe this website, is a good source of canola information. I have therefore pasted several paragraphs from different sites to provide a summary of the canola meal information requested. This summary includes information on the origin of canola, where it is grown, oil extraction methods and an oil industry overview. This is followed by research and market development summaries.

Lastly, there is a summary of the conference entitled: "What's on the Horizon in Canada, Australia and Europe?" by *Howard Morris, General Manager Advanta*

### **The Origin of Canola**

Canola is a genetic variation of rapeseed developed by Canadian plant breeders specifically for its nutritional qualities, particularly its low level of saturated fat. In 1956 the nutritional aspects of rapeseed oil were questioned, especially concerning the high eicosenoic and erucic fatty acid contents.

In the early 1960's, Canadian plant breeders isolated rapeseed plants with low eicosenoic and erucic acid contents. Health and Welfare Department recommended conversion to the production of low erucic acid varieties of rapeseed. Industry responded with a voluntary agreement to limit erucic acid content to five percent in food products, effective December 1, 1973. At this time, animal nutritionist also expresses concerns with the sharp tasting, anti-nutritive glucosinolates, which were affecting the meal quality of rapeseed. The meal, the portion left after canola seed is crushed to remove the oil, is fed to livestock.

In 1974, Dr. Baldur Stefansson, a University of Manitoba plant breeder, developed the first 'double low' variety which reduced both erucic and glucosinolate levels. This Brassica napus variety, Tower, was the first variety to meet the specific quality requirements used to identify a greatly improved crop known as Canola.

Each canola plant produces yellow flowers which, in turn, produce pods, similar in shape to pea pods about 1/5th the size. Within the pods are tiny round seeds that are crushed to obtain canola oil. Each seed contains approximately 40 per cent oil. The remainder of the seed is processed into canola meal which is used as a high protein livestock feed.

## **Where is Canola Grown**

Canola is grown primarily in regions of Western Canada, with some acreage being planted in Ontario and the Pacific northwest, north central and southeast United States. Canola is also grown in other countries including Europe and Australia.

Rapeseed is not a word that can be used in the place of canola. There are strict quality standards governing canola and products which do not meet government standards cannot use this trademark term.

## **Canola Oil Extraction**

The first stage in processing canola is to roll or flake the seed. This ruptures cells and makes the oil easier to extract. Next the flaked or rolled seeds are cooked and subjected to a mild pressing process which removes some of the oil and compresses the seeds into large chunks called "cake fragments". The cake fragments undergo further processing to remove most of the remaining oil. The oil extracted during each step is combined. The oil is then subjected to processing according to the end product requirements. Different treatments are used to process salad oils, margarines, and shortenings.

## **Oilseed Industry Overview**

Oilseed crops are a significant contributor to the income of farmers and the Canadian net trade balance. The largest oilseed crop by far, representing two-thirds of the total oilseed production, is canola. Currently, Canada's annual exports of canola seed, oil and meal are valued at over two billion dollars.

Canola is the seed derived from the plant species *Brassica napus* and *Brassica campestris/rapa*. The oil component is less than 2% erucic acid, and the meal component is less than 30 umoles per gram glucosinolates. High erucic acid rapeseed acreage, although still present in Canada, is now confined to production under contract for specific industrial uses.

Canola is not a Canadian trademark. In Canada, it is recognised as being distinct from rapeseed in our seed, feed and food regulations. During the June-July 1999 meeting of the Codex Alimentarius Commission in Rome, the commission adopted a new set of standards for vegetable oils. Within those standards is now a recognition that canola is a common name for low erucic acid rapeseed.

It is only oil of canola quality that is generally recognised as safe in the U.S. and it is only meal of canola quality that can be fully substituted for other protein sources in livestock and feed rations. Canola oil products now find themselves on grocery market shelves in the U.S., Mexico, Australia, Singapore, Hong Kong, Japan, Korea and many other countries. Canola meal exports from Canada are routinely destined to the U.S., Japan, Korea, Indonesia, Taiwan, Thailand, Norway and others.

Canola is grown throughout Canada, but primarily on the prairies. Canola grows best in the cooler central and northern areas of Manitoba, Saskatchewan and Alberta.

The *Brassica napus* varieties are produced in areas with longer growing seasons, while *Brassica campestris/rapa* varieties are grown in short season areas. *Brassica campestris/rapa* varieties have lower yields and somewhat lower oil and protein. Therefore,

the emphasis by plant breeders in recent years has been to develop earlier maturing *napus* varieties and higher oil, protein and seed yielding *rapa* varieties.

Canola seed, oil and meal are sold on the open market. Canola seed prices are discovered through the Winnipeg commodity exchange; it is not handled by the Canadian wheat board; it is not given any initial or floor prices, and does not access any concessional credit programs or freight subsidies. Canola oil and meal prices are usually established relative to soy oil and soy meal prices trading on the Chicago board of trade.

The markets for any oilseed are determined by the uses of the two main components, the oil and the protein meal. Canola oil is widely used to produce salad and cooking oils. Its strength here is largely due to its stability at room temperature, its bland flavour, light colour and delicate aroma.

Lowering serum cholesterol levels by including highly unsaturated oils in our diet is what the ideal oil is all about in many countries. That search led to recognition of canola oil's nutritional properties. It is high in monounsaturates, moderate in polyunsaturates and low in saturates. The nutritional strength of canola is illustrated by its comparative fatty acid profile and, in particular, the lowest level of saturated fat of any vegetable oil. Therefore, many of the margarines, cookies, sauces, cereals, salad dressings, etc. you consume are canola oil based, or have canola oil as one of the ingredients.

The other identity of canola relates to the protein meal left when the oil is extracted from the seed. The meal is used in livestock, poultry and swine feeds. Based on nutrient content alone, canola meal is worth, on a unit weight basis, 65% to 70% of the value of 44% protein soybean meal for feeding poultry and about 70% to 75% of the value of soybean meal for feeding swine and ruminants. Suggested maximum inclusion rates on a complete feed basis were basically doubled for all classes of livestock and poultry when canola, with its low level of glucosinolates, became available. The total utilization of canola seed appears to have now reached a level where 7.0 million tonnes annually is the minimum. During the 1998-99 crop year, 3.9 million tonnes were exported and 3.1 million tonnes were processed in Canada.

The oilseed processing industry in Canada currently consists of 11 plants, owned by 5 companies, which receive and crush oilseeds to obtain crude and crude degummed vegetable oils (from canola, soybeans, and flaxseed) and protein meals for animal feed. Two of these plants are currently not in operation but could be expected to start-up at any time. Annual crush capacities for all eleven plants total approximately 4.5 million tonnes of canola. With the potential to expand existing crushing capacities, canola crush capacity is forecast to reach 5.0 million tonnes by the turn of the century. In spite of the growth in the Canadian industry, it is still the reality that Canada produces nearly 20% of the world's supply of seed but represents less than 10% of the value-added processing. As a result, Canada continues to dominate world trade in seed, representing nearly 75% of the world trade. By comparison, although significant in terms of market share, Canada represents only a third of world trade in the oil and 40% of the world trade in the protein meal.

Annual crush capacities for the ten plants total 3.5 million tonnes of canola. With the expected expansion of existing crushing capacities, and with the new plant in Manitoba coming on line sometime in 1997, canola crush is forecasted to reach a level of between 4 and 5 million tonne over the next 5 years.

Two main methods of processing oilseeds are used in Canada:

1. pre-press solvent extraction, which is used for higher oil content oilseeds, such as canola, sunflower and flaxseed; and
2. direct solvent extraction, which is used for lower oil content oilseeds such as soybeans.

Except for the presence of the mechanical expeller in the pre-press solvent extraction method, the steps followed are basically the same. In canola pre-press solvent extraction, the seeds are first flaked and heated, and then passed through a screw press. This squeezes out a large proportion of the oil. The remaining oil cake is sent to the solvent extractor, in which the solvent removes the oil from the meal.

A third method, press extraction, was to be used at the Ste. Agathe plant had it opened. Although this method produces an oil untouched by solvent and a protein meal higher in energy because of higher residual oil levels, it is yet to be proven an economic return can be obtained and sustained, through premiums paid for the products.

Refining removes the natural impurities to improve colour, flavour and shelf life. Total refining capacity of canola oil in Canada is over 1 million tonnes annually and essentially parallels our crude oil production capacity. It is spread across the country in close proximity to both canola oil production and the Canadian population. Virtually all the seed processors are now integrated into oil refining as well. The only exceptions are the Cargill facility in Saskatchewan, one of the Canamera facilities in Manitoba which now has a refinery under construction, and the idle Canadian Agra facility in Manitoba.

Canola oil is also very popular in Japan. Its presence, and dominance, in Japanese diets is due to Japan's import of canola seed as compared to the import of oil from Canada. The consumption of edible oil in Japan entered a low growth phase in the last half of the 1980's and no substantial increases in the volume of oilseed crushing occurred. However, one commodity that did sustain high growth was canola. The greatest reason for that was the recognized improvement in the quality of the protein meal in canola. Rapeseed meal was traditionally a fertilizer for Japanese tea, tobacco and citrus farms, however, canola meal allowed the Japanese industry to direct a large proportion of the production to the Japanese feed industry. Canola oil's penetration of Japan's domestic production of edible vegetable oils has continued to grow since the 1970's, primarily at the expense of oils other than soybean. Canada's penetration of the Japanese market comes as a result of seed exports, rather than oil exports because of an import tariff in Japan on vegetable oils prevents the import of any oil in significant quantities.

Canadian farmers produce about 6 to 7 million tonnes of canola a year. A crush of about 3.0 million tonnes and seed exports of over 2.5 million tonnes, continues to pressure our production levels and leaves a small carryover.

Part of the reason for the continued pressure on acreage required is the need to rotate crops. The recommended rotation for canola is one in four years on the same field. This is done to prevent the build-up of pests. The industry has developed new herbicide-tolerant varieties. Combined with disease and insect resistant varieties in the offing and better canola

management techniques, growers' will have a reduced threat from weeds, disease and insects. This could allow shortening of rotations to, say, one in three or even one in two years.

If we sustain 10 million acres on a four-year rotation, this implies 40 million acres are suitable for canola production. Reducing the rotation to one in three years means there will be 13 million acres available to grow canola. Naturally, if we were able to reduce rotation requirements even further, we would surpass our potential requirements.

Canola production centres that show growers how to obtain yields well beyond a half-tonne per acre, and the funding of research into the development of better performing canola varieties that may shorten rotations will help ensure a stable supply of canola. The Canola Council is also active in product development and utilization research as well as market development and dissemination of information. The Council generates a wide range of canola-related publications and has done considerable work to promote the use of canola oil and meal domestically and around the world.

## Program Area Directives

### RESEARCH

#### *Direction*

This area will continue to organize, co-ordinate and fund activities related to research in the areas of animal and human nutrition, processing, analytical technology, biotechnology and genetics in order to meet the priorities identified in the long-range focus of the Canola Council of Canada. Specific priorities include improvements in yield and quality, and in the utilization of canola seed and its products.

#### *Objectives*

- I. Encourage the development of germplasm with characteristics to increase the sum of oil and protein in the seed from 64% to 69% by 2000.
- II. Encourage the development of germplasm with characteristics to increase yield through improved pest resistance.
- III. Encourage research to improve the quality and utilization of canola meal:
  - reduce glucosinolates to 12 Fmoles;
  - increase metabolizable energy for monogastrics;
  - reduce fibre; and
  - increase percentage protein.
- IV. Encourage projects and activities to improve the quality and utilization of canola oil:
  - improve the stability of canola oil;
  - improve oil quality by reducing saturated fat and chlorophyll; and
  - petition the U.S. FDA for GRAS clearance of canola oil for use in infant formula.

#### *Programs*

##### 1. Canola Germplasm Development Program (CGDP)

###### *Activities:*

- fund traditional breeding and biotechnology research to develop germplasm with improvements in quality and yield characteristics.

##### 2. Canola Utilization Research

###### *Activities:*

- fund utilization and processing research to improve the quality and utilization of canola meal and canola oil.

##### 3. GRAS approval for infant formula

###### *Activities:*

- work through ad-hoc committee consisting of representatives from Agriculture & Agri-Food Canada, Health Canada and the Canola Council of Canada; and
- co-ordinate preparation of a GRAS petition to the U.S. FDA for inclusion of canola oil in infant formula.

##### 4. Research Publications

- distribute research priorities and existing research reports.

#### *Research Priorities for 1998*

This area will continue to organize, co-ordinate and fund activities related to research in the areas of animal and human nutrition, processing, analytical technology, biotechnology and genetics in order to meet the priorities identified in the long-range focus of the Canola Council of Canada.

Specific priorities include improvements in yield and quality, and in the utilization of canola seed and its products as follows:

- Increase in both percent oil in canola seed and canola seed yield while maintaining or increasing seed protein content.
- Continuing improvements in the quality of canola meal and oil.
- Develop commercially oriented alternative uses for canola and its products.

### **Canola Germplasm Development Program**

Increases in both percent oil in canola seed and seed yield while maintaining or increasing seed protein content.

- Improved pest and disease resistance and tolerance to heat and drought.
- Quality of oil-fatty acid modifications (in particular, reductions in saturated fatty acids and lowered chlorophyll).
- Quality of meal-increased protein, lower fibre and reductions in glucosinolates and other anti-nutritional factors.

### **Canola Utilization Research**

#### ***Canola Meal***

The objectives of canola meal research include methods of improving the feeding value and inclusion rates to canola meal for monogastrics with emphasis upon the following:

- improvements in metabolizable and digestible energy; and
- increases in protein and available amino acids.

#### ***Canola Oil***

The objectives of canola oil research include the production of light-coloured oil which is nutritionally superior and has excellent stability.

Research in support of a GRAS (Generally Recognized as Safe) petition to the United States Food and Drug Administration for the use of canola oil in infant formula.

*Alternative Uses:* Alternative uses research should include both food and non-food applications.

*Processing:* The objectives of canola processing research include economical methods addressing:

- fibre and anti-nutritional factor reduction; and
- more efficient technologies for the removal or reduction of chlorophyll, phosphatides, free fatty acids and waxes.

### **Canola Agronomic Research Program**

These include:

- Agronomic factors affecting yield and quality of seed (oil, protein, chlorophyll content).
- Cultural, chemical, biotechnological and biological control of pests and diseases.
- Agronomic practices that are sustainable and cost-effective.

## **CROP PRODUCTION**

### ***Direction***

The crop production committee will continue with the Canola Production Centre Program as its main activity, while assisting in the co-ordination of agronomic research and

communicating results in both of these areas to canola growers, through their organizations, and through the Canola Growers Manual and other extension tools.

***Objectives***

- I. Improve the yield and quality of canola.
- II. Improve margin per unit of production.

***Programs***

1. Field scale demonstrations - Canola Production Centres.

***Activities:***

- maintain 1995 number of centres across prairies;
- emphasize extension of achievements;
- distribution of educational tools;
- co-ordinate reporting; and
- enhance awareness.

2. Canola Growers Manual

***Activities:***

- maintain and improve;
- encourage awareness and use; and
- include Canola Production Centre information.

3. Agronomic Research

***Activities:***

- continue co-ordination with the grower commissions; and
- enhance awareness of research that has been undertaken.

**MARKET DEVELOPMENT**

***Direction***

This area will respond to marketing support needs identified by the funders for the expansion of demand and relative value for canola seed and its products via generic trade activities, technical seminars and dissemination of information.

***Objectives***

**Market Promotions**

- I. To assist the industry in maintaining the Canadian share of market for canola oil by establishing its nutritional superiority.
- II. To assist the industry in maintaining the healthy image of canola oil in the U.S. market.

**Technical Marketing**

- I. To respond to industry needs for assistance in exporting canola seed, oil and meal.

***Programs***

**Market Promotions**

1. Advertisements in professional journals of Canadian dietitians and home economists.
2. Direct mail (re trans-fatty acid and saturated fat study) to Canadian dietitians and home economists.
3. Canadian Dietetics Association annual convention.
4. Participate in National Restaurant Association trade show in the U.S.
5. Direct mail re: canola advantages to food manufacturers.

## **Technical Marketing**

1. Canada/Japan canola consultation series.
2. CIGI International Canola Processing Program.
  - 4th International Grains and Feed Ingredients Course
  - 1st Mexican Canola Meal Program
3. Technical support to Mexico.
  - Technical support to Pacific Rim countries.

## What's on the Horizon in Canada, Australia and Europe?

*Howard Morris*  
*General Manager*  
*Advanta Seeds, Winnipeg, MB*

I would like to share with you my views on some aspects of canola genetic research and development and how this impacts on the major developed world markets of Australia, Canada, and Europe. Topics I will cover are production trends; overall plant breeding objectives; impact of variety registration regulations; the role of component pricing in influencing plant research, and finally, the impact of GM.

I must stress at the outset, however that views on the topics that I will cover represent my personal view, and certainly there will be very divergent views from my peers in the industry.

First, let us look at the global trends in rapeseed production:

We have seen the crop grow from a little over 20 million hectares in the early 90's to approaching 35 million hectares at the end of the 90's. This growth has occurred virtually across all major production areas. Growth has been most significant in Australia, Canada and China.

Similarly the quantity of seed harvested reflects these same trends. It is always dangerous trying to estimate where these trends will head in the future, however I will try to make that forecast. I believe we will not see major growth in area seeded to rapeseed globally over the next 5 years, but we will see a continued increase in production. The Agenda 2000 program will impact the EU, and we may well see an actual reduction in rapeseed area seeded. Canada will continue to plant around 5 million ha annually, but yields will increase as genetic improvement will increase average yields significantly. Australia will gradually increase production above 2 million ha, but will not break 3 million hectares and like Canada, will see average yields increase due to genetic improvement. I will look at the reasons for this genetic improvement shortly.

### **Climate and Crop**

But first let us consider the climates and the types of brassica that make up the rapeseed or canola crop in the three markets that I will focus on today:

In the E U, we see a generally moderate climate that is typified by the climatic averages represented here. These are the average temperatures for the UK Midlands, and are not unlike the temperatures experienced across much of the major producing countries of the EU. Maximum temperatures in summer are mild rarely exceeding 30 C. On the other hand, minimum temperatures rarely drop below 0 C in winter. This provides an ideal climate for the production of WOSR. This crop is generally sown in July/August and harvested in June/July. The long growing season is conducive to high yields, and generally good conditions for the production of high quality oilseed in terms of oil content, low saturates, and low chlorophyll. They do however, suffer from a proliferation of diseases that result from the cool relatively wet growing conditions. SOSR is also grown in the EU but as minor crop compared to the WOSR area.

It is seeded in March/April and harvested in August. Yields are significantly lower than WOSR, but generally are high in oil content and quality due to the mild maturation period.

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The major species grown is *B.napus*, however there is some *B.rapa* grown in the more northern countries.

In Australia, the crop grown is SOSR, but it is seeded in the autumn and grown through the winter and spring, maturing into very hot dry conditions of summer. The species is entirely *B.napus*. This means there can be and is significant variation in yield, oil quantity and quality depending mainly on climatic conditions prevailing from July to October. The other climatic variable that significantly impacts the Australian crop is rain to provide moisture for seeding and early crop growth. This manifests itself in two ways, fluctuations in area seeded and average yields. The temperature graph also tells us another story that causes a great deal of concern, and that is the disease Blackleg. You will note that the growing season for canola in Australia lasts a very long time of approx. 110-120 days from planting to flowering. In Canada by comparison flowering occurs in around 40 days from planting. The lengthy growing season allows the Blackleg pathogen to survive and seriously impact the crop prior to flowering. As an example of this, cultivars considered resistant to blackleg in Canada will often die before flowering, if grown in Australia due to the disease.

In Canada, SOSR is seeded in April/May and harvested in August/September. The challenge we face in Canada compared to Australia and the EU is a very short growing season. Frosts at seeding time and early frost at harvest time impacts the Canadian crop. This of course impacts on seed yield, oil content, oil quality and particularly elevated chlorophyll levels. Today we are growing almost entirely *B.napus* with *B.rapa* making up less than 5% of the total crop.

So why is all this important to a plant breeder? These conditions largely set the challenges that the breeder must try to adapt cultivars to perform better or more consistently under the conditions.

### **Trends**

Lets take a very quick look at how these conditions impact on the various markets: Yield in the EU tends to be very high with minimal year to year fluctuations. In Canada overall yields are lower but quite consistent from year to year. Australia on the other hand has similar overall yield to Canada but has huge year to year variation. Compare this to the global average yield and we see the EU is very high while Canada and Australia are very close to the global average. We can also compare some limited data on SOSR yields in the UK. These fall in line with the other SOSR yields in Australia and Canada.

If we look at trends over the last decade, we see that EU yields have been increasing at a quite rapid rate. Canada has been also increasing yields quite well, however, not quite as fast as the EU. Australian yields have actually decreased. Does this mean the Australian breeders are not doing a good job? Well no, they are in fact doing a great job! They have been the reason the crop in Australia has grown from 100,000 ha in 1990 to close to 2 million ha last year. This expansion has occurred in quite low yielding but very extensive farming areas in Australia, especially in the state of Western Australia. As a result of this expansion, yields have gone down on average. This expansion was made possible through the development of herbicide tolerant cultivars, improved blackleg resistance and earlier maturing varieties. Unfortunately, I have not been able to access data on oil quality characteristics for the EU so these next few slides I will limit my discussion to only Canada and Australia. Glucosinolates

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are generally a few points higher in Canada than in Australia. In both countries glucosinolates have been remaining relatively flat over time.

Total saturates are very similar, although there has been a slight upward trend over the past decade in Canada as B.rapa has diminished in area relative to B.napus. This trend will now stabilize and likely reduce over the next decade as focus is placed on reduction by the breeding industry. This will be slow and will be at the expense of other genetic gain such as yield, and oil content.

Oil content is higher in Canada than in Australia. Here again, we see the impact to the harsh climate in Australia impacting on oil in some wild fluctuations from year to year. It is also worthy to note that there is huge regional variation in oil content again caused by variable weather conditions in Australia. The same cultivar can vary by as much as 10% due to climatic variation.

In the interest of time I will conclude our comparison of trends, although I am sure we all recognize there are many other traits that play a part in determining the “value” of the canola to the stakeholders involved.

### **Crop Improvement**

So, as a plant breeding organization, who should we be taking guidance from on all of the variables that might “improve the value” of the product we are supplying?

Is our customer, the farmer, the local crusher, the exporter or his customer, the offshore crusher, the manufacturers, or the consumer? The reality is that we must listen to all and take notice of all aspects. It is very important to recognize however, for the seed company developing new cultivars for the industry, it is the farmer who decides which seed cultivar to purchase. It is thus he who we focus on the most. I encourage those of you who are crushers in Canada, Japan, or elsewhere, exporters, and manufacturers; we all are interested in making improvements to the canola product, but the pipeline through which it passes always includes the farm. Industry that is downstream of the farm when looking for product changes will only get these changes when those changes are reflected in farmers cropping program and his seed purchase decisions. This of course means there will be a continual move toward tighter relationships throughout the supply chain linking seed company and/or genetic trait developer through to the manufacturer.

### **Breeding Objectives/Targets**

So where is all this leading us?

At the moment, input trait development is dominating the research activities. Output traits are gaining greater attention by all, but will be several years away of having significant impact on the industry.

I will attempt to list the key breeding objectives in each of the three markets that we are discussing today:

In the EU we see oil yield as the key focus. The European industry pays farmers on a component price basis. This of course immediately ties the factors of oil content and seed yield into one package of oil yield per hectare. The next several objectives are all associated

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with minimizing the impact of disease. Oil quality is low on their list and my opinion is that herbicide tolerance and insect tolerance is not even on their list.

In Australia, blackleg resistance heads the current list or priority. However, I suggest that following close behind is herbicide tolerance, oil yield and maturity. Oil quality plant architecture and modified fatty acids are much lower. Australia appears to be heading into the GM canola business, with full approvals of both Roundup and Liberty resistance in 2001 or 2002 being discussed. In addition Clearfield technology was released there this year. As these new technologies replace the current HT technology (triazine resistance) we will see rapid gains in oil yield, as there are considerable oil and yield penalties associated with the current cultivars. Australia also purchases its crop on a component priced basis so the focus there is on oil yield.

Canada's list is topped I believe with yield, but this is closely followed by blackleg resistance and lowering saturate levels. The aspects oil content, maturity, MFA, insect and disease tolerance fits into the next group. Herbicide tolerance in Canada is now a basic trait that is needed in any new cultivar released, so I list it only to recognize it in this manner.

The biggest impact we will see across all of these markets in the next 5 years will be in the area of oil yield. This will be largely associated with the rapid introduction of hybrids cultivars. Introduction of hybrids have been slow to date due to several different factors however there appears to be at least 3 hybrid production systems that will be delivering new products to the market at an increasing rate over the next 5 years. In addition, in Canada and Australia, introduction of herbicide tolerance has had a slightly negative impact on yield of the new introductions. We will see this rectified quite quickly from this point forward.

Significant improvements will be seen in blackleg resistance over this timeframe as well. This will reflect positively on oil yield. It is worthy of noting the MFA situation. I believe we will see Canada develop this market faster than either of the other two markets. This is driven by the development of high oleic/low linolenic cultivars to service emerging markets in the US and Japan.

### **Does component pricing play a role?**

I strongly believe that Canada will slip behind in oil content unless we shortly introduce component pricing for oil content. I recognize this will cause some real challenges for the Canadian export industry in particular, however I am concerned that the other two competitors we are reviewing today will overtake us in this critical aspect if the industry does not act soon. Regulation is not the solution to this problem. Seed yield and oil content holds a close negative correlation. The farmer needs to be rewarded for oil yield in Canada if we are to compete effectively with the EU and Australia.

### **What is the impact of variety registration on the industry?**

Across the three markets we are discussing, we have a complete spectrum of variety registration. The EU has probably a more arduous system than Canada. As well as getting a cultivar listed on a the EU list, something akin to the Canadian system of variety registration, one then has to get through recommendation trials in each country in which the cultivar will be marketed. While the later is not mandatory, it is almost essential to have if market potential is to be reached. Another complication of the EU system is the need for each new cultivar to pass DUS tests.

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In Canada, we have the current system of variety registration, combined with optional participation in provincial trials.

Australia on the other hand has a completely open market driven system. There is no variety registration system, nor any overriding quality checking system. There is however, a system of National trials to benchmark performance of cultivars for a number of the critical traits such as yield, oil content, quality characteristics of the oil and meal, as well as disease resistance.

I believe the data supplied earlier in my presentation speaks clearly to this issue. Variety registration systems have neither positive nor negative impact on the genetic gain in each of the countries discussed. In the end, it is the farmer who decides which cultivar of seed to purchase for planting his canola crop. Of course many things impact on that decision, but he is a very sophisticated businessman, and I strongly believe he is more than capable of making his own decision on the best products to suit his farming needs. I do accept that there is a need for a system of benchmarking for performance of canola cultivars.

### **Genetically Modified Canola**

Finally, what is the latest position on GM canola development in each country?  
Again we see the full spectrum in these three markets.

Canada - has greater than 50% of its canola production now coming from GM cultivars. The impact on the production capabilities in Canada has been significant. The second generation is still some years away from full commercial release, but I expect will be in the area of output traits. Any significant gains in oil quality from our present oil profile will almost certainly come in the form of GM canola.

Australia - will go down the GM path, however I do not expect that this will be commercial reality prior to 2002. The impact there on production capability will be greater than it has been in Canada, due to the yield and oil drag of the major current HT tolerance available in Australia.

Europe – while I am confident that eventually Europe will accept GM canola, I am not even going to try to forecast when that might occur.

Ladies and Gentlemen, thank you.