



Canadian Grain Commission  
Commission canadienne  
des grains

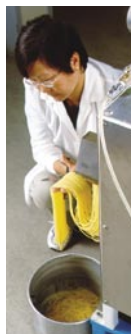
# The Grain Research Laboratory

## Quality matters

Grain grown by Canadian farmers is sold all over the world. Canadian standards for grain quality are known internationally.

The Canadian Grain Commission (CGC) makes sure Canadian grain is good—safe, reliable and useful for many kinds of products. Customers count on this and that's why we put quality first.

The CGC provides independent quality assurance and certification services to producers, the industry and buyers of Canadian grain. The CGC's Grain Research Laboratory (GRL) is an internationally respected leader in grain quality research.



Canada

## The GRL supports the grading and marketing of Canadian grain.

Wheat, durum, barley, oilseeds, pulses and special crops are the main focus of the GRL's quality assurance activities.

When there is a move to set or change grain grades or specifications in a grade, GRL research scientists are involved. Grades and specifications predict end-use quality. They are used to visually grade grain. New grades and specifications are set to meet market needs or to better reflect the effects of environment on quality. Before they are set, GRL research scientists investigate how grain will perform within proposed tolerance ranges. In this way, grades and specifications are precise, accurate and reliable.

Nothing works like face-to-face contact with the customer. Our staff travel to customer countries to understand the processes that customers use and to recommend the class of grain that best suits each process. When customers are concerned about the quality of a shipment, we work with all parties and provide after-sales service.

During the CGC's annual harvest survey, GRL staff analyse the end-use processing qualities of over a dozen cereal grains, oilseeds and pulses. Staff use the CGC web site to give producers, buyers and marketers up-to-date crop quality data, and our research scientists visit customers each year after the harvest. The GRL routinely tests export cargoes to verify the consistency of grades and classes from year to year and to confirm the safety of Canadian cereal grains, oilseeds and pulse crops.



Analytical Services provides a full range of quality component tests.



Testing protein content of wheat samples in the harvest survey



A deck oven used for hearth breads

## What makes bread crusty? Spaghetti yellow? Beer foamy?

What constitutes quality and how can it be measured? Research teams in the fields of wheat, durum, barley, oilseeds and pulses explain the relationship between end-use processing quality, variety, environment and technology. Information about the biological, chemical and physical properties of grain helps buyers choose the grade of Canadian grain that best meets their needs.

Ask a question about the quality of Canada's wheat classes and our baking and milling research staff will find the answer. Through flow field-flow fractionation, wheat chemists in Baking Research investigate how proteins behave. Using custom-built ovens, bakers replicate baking processes. In the Milling Research unit, wheat chemists and millers identify wheat attributes associated with superior milling performance. Staff apply precise milling procedures and use laboratory and pilot-scale milling equipment to replicate current commercial practices. Whether Canadian wheat is used to make maraquetta sold by street vendors in South America or it's processed in a high speed mill in Japan, our staff know why Canadian wheat works for millers and bakers around the world.



The tandem Buhler pilot mill

Oodles of noodles are sold in Asian countries. They can be fresh, dried, steamed, boiled, frozen, or steamed and deep fried. Colour, appearance, cooked texture and eating quality are as important as taste and freshness. The Asian Products and Wheat Enzymes teams improve the noodle-making quality of Canadian wheat by studying end-use qualities that make new wheat lines attractive to Asian markets. Research scientists also investigate the effects of oxidases on noodle discoloration.

Pasta comes in many shapes and sizes. Pasta processing technology continues to develop along with consumer taste. For many processors and buyers, Canadian durum wheat is the grain of choice for pasta and couscous. Canada is a leading exporter of durum wheat to markets that use a variety of processing equipment and technology. As quality needs change, the Durum Wheat Research laboratory answers questions that meet the needs of customers.

While wheat and pulses both go back thousands of years in human history, the study of pulses for food and feed has just scratched the surface in comparison to wheat research. The Pulse Research team is working with researchers from the world's leading pulse exporting countries. The team is developing internationally accepted methods for measuring and assessing pulse crops grown in Canada. Another priority is to relate seed quality characteristics to end-use quality. Research will increase scientific understanding about environmental and genetic factors that affect pulse quality.



Asian noodles are prepared then evaluated for colour and texture.



Testing the firmness of cooked pasta

Evaluating the efficiency of methods used to hull red lentils





Measuring oil content by solvent extraction



A micromalting system in the Applied Barley Research laboratory



Chromatograph system used to characterize barley carbohydrates and proteins

The Oilseeds Research team is a leader in developing and applying methods for analysing the quality of Canadian oilseeds. The team provides insights into the factors that affect the quality of canola, mustard, flax, and soybeans. The team assesses the end-use quality of Canadian oilseed crops through chemical and physical tests that measure quality factors in the seed and final product.

Canada leads in providing large shipments of variety-specific malt barley. Depending on the malting process, one malt barley variety may perform better than another. The Applied Barley Research team works closely with plant breeders in the development of varieties that suit the needs of maltsters, as well as the needs of barley growers. At the heart of Applied Barley Research are two malting systems: an automatic micromalting system for 500-gram samples and the pilot malt plant for larger samples of commercial-scale malt.

Meanwhile, research focusing on the chemistry and biochemistry of malting barley probes the most basic processes that transform barley into malt. The Barley Research team uses advanced technology to understand the genetic and environmental factors and molecular mechanisms responsible for the functionality and performance of barley components during malting and brewing. The GRL works closely with the malting and brewing industries and provides space and expertise to the Canadian Malting and Brewing Technical Centre.

Scanning electron microscopy of biochemical changes in barley during malting



## Grain quality inspection and certification services are changing.

Changes in CGC services are made to respond to the needs of customers and processors, revolutionary developments in plant breeding, and the emergence of crop types with different end-use qualities and better agronomic traits. CGC services assist producers in making decisions about the crops they grow. Speed, accuracy, precision and efficiency are key in providing versatile certification services to grain handlers, exporters, marketers and buyers. The GRL is developing the technology to meet these challenges.

The Variety Identification section uses biochemical methods such as protein electrophoresis and DNA fingerprinting to determine the variety composition of grain samples. The ultimate goal is to develop rapid, automated and affordable methods for identifying visually indistinguishable grain varieties. These methods will be used by the CGC and the grain industry to assure the varietal integrity of Canadian grain exports. The Variety Identification section is also developing and evaluating techniques to detect and identify genetically modified grains.

In the long term, technology may be used to segregate grain by a greater range of quality parameters. The result could be diversified end uses, including feed and industrial uses, for Canadian grains. Research teams are developing instruments for measuring quality components. This technology includes near infrared spectroscopy, computer-assisted image enhancement and measurement, and high-resolution digital photography.



Loading samples for DNA fingerprint analysis



Examining protein fingerprints to identify varieties in a wheat shipment

Determining sprout damage in wheat





The TrueGrade System for grading lentils

The Image Analysis team is involved in understanding the relationship between grain structure and quality. Computer-assisted image enhancement and measurement are used to develop rapid methods for grain quality assessment. The team developed the technology to objectively assess lentil colour. A private company, in partnership with the CGC, used the technology to develop and market an instrument called the TrueGrade System. The Image Analysis team is studying how to apply the same technology to grade other crops.

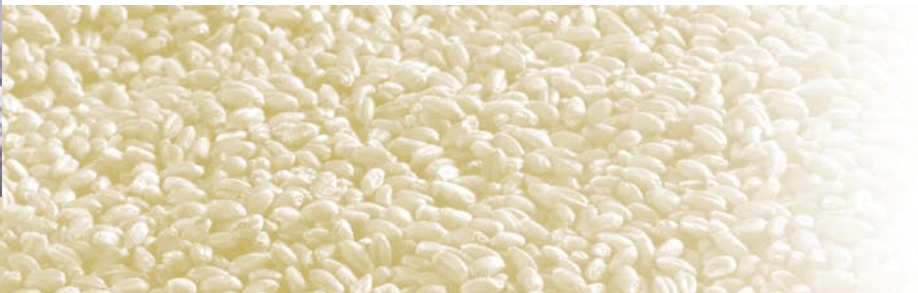
High resolution digital photography is used to provide colour grading guides for special crops. Seed Biology staff use their expertise in seed analysis to monitor grains for weed seeds. Macroscopic photography is used to characterize and document the visual grading factors associated with Canadian grains, oilseeds and pulses. In conjunction with Image Analysis, Seed Biology staff produce photographic varietal guides and Grain Biology bulletins.



Using gas chromatography to analyse for mycotoxins

Grain safety is a high priority with producers, processors, exporters and customers. The GRL's Grain Safety Assurance group is the leading Canadian authority on food safety issues affecting grain. Its expertise is in testing grains for toxic substances such as pesticide residues, mycotoxins and heavy metals. Canadian marketers and processors frequently request statements of assurance to reassure customers and meet contract requirements on grain safety matters. Data from grain safety monitoring are the scientific base for official CGC statements of assurance. The group also responds to safety issues relating to the effects of environment and disease. To support international sales, the group provides grain safety inspection services on cargoes.

Preparing samples for residue analysis



## **GRL scientists and technicians share diverse skills and experience.**

We have specialists in cereal, oilseeds and pulse chemistry and product functionality, biochemistry, plant genetics, biology, image analysis, spectroscopy, grain safety and food science. We collaborate with CGC experts in grain inspection, statistical analysis and computer programming. Canadian and international scientific associations have recognized the achievements of our staff.

We collaborate with other agencies in the Agriculture and Agri-Food Canada Portfolio, and with research organizations, companies and processors around the world to further grain quality research.

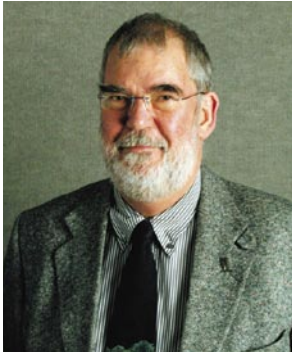
GRL tests conform to standardized procedures and methods developed by the GRL or by scientific associations such as the AACC International and AOAC International. The proficiency of our testing is certified by scientific associations.



Research results are published in scientific journals and presented at conferences worldwide.







**We put quality first.**

When you have a question about  
how quality works, contact the GRL:

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