

# Cereal Chemistry at NDSU...

## APPROACHING A NEW PLATEAU; EXPLORING BROADER HORIZONS

Gary Moran

The Department of Cereal Chemistry and Technology at North Dakota State University is approaching a new plateau in its evolution of service and research that started nearly 80 years ago when the Department of Milling and Baking was established by the North Dakota Legislature to evaluate the milling and baking quality of hard red spring wheat.

Orville J. Banasik, department chair since 1970, calls those early years of the department shortly after the turn of the century the first plateau of service to North Dakota agriculture. At that time, the Minneapolis Grain Exchange was reluctant to purchase North Dakota wheat for use by the milling industry. North Dakota wheat was dismissed as "chicken feed" and discounted heavily by the buyers. Dr. Edwin F. Ladd, one of the original faculty members and later president of North Dakota Agricultural College, was responsible for installing an experimental flour mill and starting investigation of milling and baking qualities of hard red spring wheats. Ladd and his colleagues were able to demonstrate that North Dakota wheat did have good milling and baking qualities.

Following the inspiration of the crusading Ladd, this plateau of service continued until the early 1920s when Dr. C.E. Mangels was hired to head the department. Banasik says Mangels ushered in a new plateau by adding a strong program of basic research on bread wheats, flour, dough and bread properties. Quality testing of new wheat varieties was introduced during his tenure.

Following Dr. Mangels' death in 1936, another new era of service to the College of Agriculture arrived with Dr. R.H. Harris, the new department chairman. Some changes took place with the establishment of this plateau. The name of the department was changed to the Department of Cereal Technology. Quality testing of durum began in 1938. The barley quality laboratory was introduced in 1947. Teaching at the graduate level was introduced in the early 1950s. Milling and baking tests were streamlined for greater efficiency in evaluating wheat quality for variety development. An M.S. degree in cereal chemistry was made available. A new building was constructed to house the department.

Following the death of Dr. Harris, Dr. Kenneth A. Gilles came on board in 1961, bringing yet another era of change and additional service. Under his leadership, department staff was expanded from five to 14, new courses were added and a doctoral program was introduced. Increased emphasis was placed on basic research, and development of methodology for quality evaluation of wheat and barley was greatly expanded. By the mid-1960s the department expanded its role in promotion of wheat sales to foreign countries with overseas trips by Gilles and Len Sibbitt. During this period, the department's name was changed to Cereal Chemistry and Technology.

The department's present plateau was brought about by the appointment of Gilles as vice president for agriculture at NDSU and the naming of Banasik as department chair in 1970. In the years since then, course offerings have been revised and graduate student enrollment has expanded from an average of eight to 28. The department's scope started to expand beyond the cereal grains with addition of a new project on sunflower protein for human food and a project on edible beans. Faculty support for trade team presentations, short courses and overseas consulting work greatly increased the scope of the department's work—service that was instrumental in creating the Northern Crops Institute. Crop surveys have been greatly enlarged and expanded into a regional report encompassing North and South Dakota, Montana and Minnesota so these four states can present a united effort in promoting wheat sales in domestic and foreign markets. Cargo sampling to monitor the quality of spring wheat shipped from the Duluth/Superior, Portland and Gulf Coast ports is another service that has been supplied by the department. Recently the department assumed responsibility for the quality evaluation work on new spring wheat cultivars that was formerly handled by the Crop Quality Council after the council was dissolved.

So, in the roughly 80 years since its formation, Banasik's department has evolved from a department of cereal technology to a department of cereal chemistry and technology, at each step in the evolution providing more service to plant breeders, grain producers, the milling industry and marketing agencies. Now, says

Banasik, it is time to look seriously at the department's next plateau. Banasik, who will retire in 1985, notes that with each change in the department chair the scope and mission of the department has changed. With another changing of the guard on the horizon, this is a good time to examine future objectives.

Banasik says the department has been mainly identified with cereal grains in the past but has also been involved in work with sunflower and edible beans. Now it may be time for a broader perspective. He believes the university and North Dakota agriculture need a department that can evaluate crops like soybean, corn, buckwheat, mustard and others that are likely to become a more important part of North Dakota agriculture. There is a need to maintain the emphasis on quality in all crops that has become a tradition at NDSU, says Banasik, and cereal chemistry can contribute to that part of the development of new varieties.

"We have been involved in development of most new varieties released by NDSU. We have never taken a step backward in quality and see no reason to change," he says.

There is a lot of low quality wheat in the world, he points out, but not much of the high quality that is produced in this area. There is a need to continue to learn to use our wheats with the other wheats produced around the world to make better products.

A departmental mission statement recently agreed upon contains the following mission objectives:

- To provide plant breeders scientific and technical expertise necessary to maintain and/or improve the quality of northern grown crops.
- To assist North Dakota producers by providing quality information on alternative crops.
- To provide undergraduate teaching leading to a B.S. degree in food science and technology.
- To offer M.S. and Ph.D. degrees in cereal chemistry and technology.
- To conduct fundamental studies in areas of pasta, milling, baking, malting and brewing as well as processing and utilization of other northern grown crops.
- To conduct basic research in the area of proteins, lipids, enzymes, carbohydrates and other biochemical components of northern grown crops.
- To provide the technical expertise required to promote the sale and consumption of northern grown crops.

The emphasis of this mission statement reflects the continuing efforts to make NDSU a center of excellence for agricultural research, Banasik says. To make this happen, strong service and support units are certainly necessary.

Cereal chemistry has generally been considered a support unit, providing assistance to researchers in the Department of Agronomy and to other departments and agencies—part of a team effort in applied and basic research. To meet the challenges of the future, says Banasik, there are research and academic areas that require new or broader attention.

For example, quality evaluation work in barley has more than doubled, but there is still need to enhance the program of variety development, and in the area of utilization research, little has been done to develop additional food uses for barley beyond the traditional beverage uses.

Recent concerns about wheat grading and problems associated with identifying wheat classes, particularly with more winter wheat being grown in the area, point to a need for quick, reliable tests for things like grain hardness, class identification and protein quality. Also, with the demand for quality testing of durum increasing, there is a need to strengthen research effort in durum wheat and pasta.

Oil seed crops have received little attention in the area of variety development and utilization research. Further assistance to plant breeders in this area is needed. New crops such as safflower and soybean need assessment work, and utilization of by-products of oil extraction could improve financial returns to the producer.

Research to assist development work for edible beans that meet the needs of the canning industry and outlets like fast food chains featuring Mexican food is needed. Utilization research is needed on the use of bean flour in other food products to enhance protein quality. Buckwheat and triticale usage is increasing, meaning more evaluation work will be needed.

The winter wheat breeding program has meant a significant effort in quality evaluation of hard red winter wheat experimental varieties. An evaluative test system for hard red winter wheat would be initiated so that a winter wheat produced in North Dakota would be equal to a high quality, high protein spring wheat.

Research in potatoes and sugarbeets could be expanded through a cooperative effort with the departments of horticulture and food and nutrition. Utilization research could develop new product uses designed to increase the need for production.

Perhaps the most innovative area envisioned for the next plateau of service in cereal chemistry is to provide an undergraduate teaching program in food technology, eventually leading to graduate programs and research in this area.

Says Banasik, "If the university moves forward with expanded units for agricultural research such as we are seeing for sugarbeets, sunflower and biotechnology, a strong science and support group will be needed. This kind of service can be provided by expanding the scope

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and mission of this department to an undergraduate and graduate unit of food technology.”

Most of the courses needed to offer a curriculum in food technology are already taught at NDSU, Banasik points out. There would be a need to provide some additional courses in food engineering and food chemistry.

The food technology curriculum proposed would prepare students for professional careers in food research and processing technology, research and development, technical services, plant management, quality control, in government regulatory agencies, or other aspects of food technology.

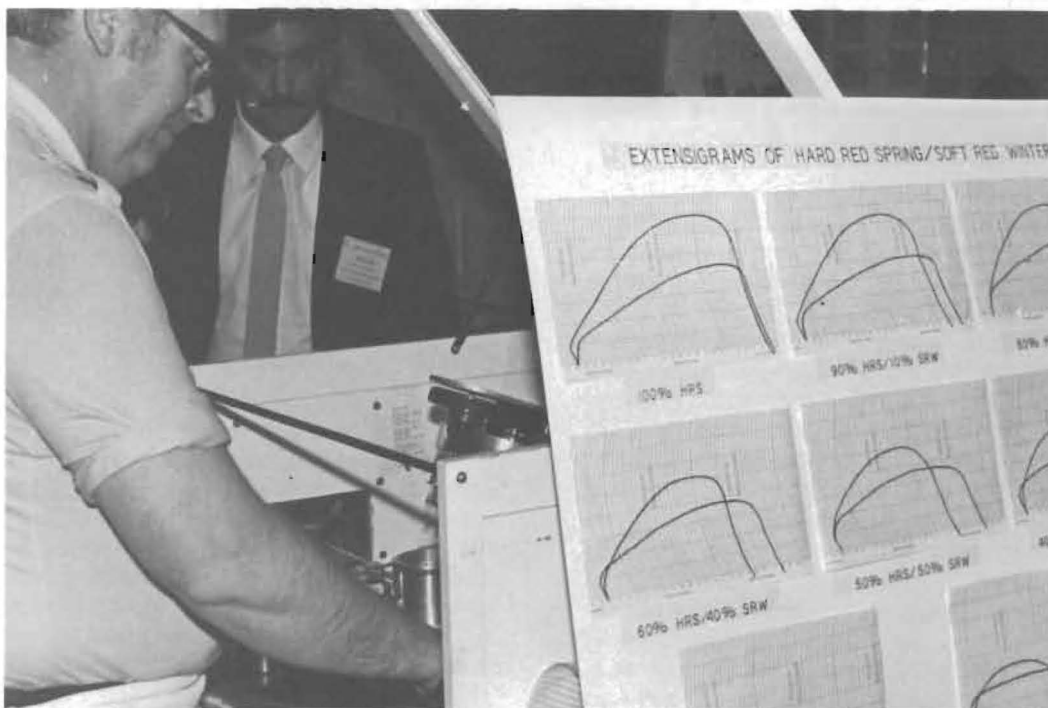
Broadening the scope of cereal chemistry into the food science and technology field would mean providing service and working cooperatively with all university departments associated with food production, food quality or food processing including, in addition to the crop sciences, animal science, bacteriology, agricultural engineering, food and nutrition and others.

Some of the major program thrusts in food science that have been identified by the Cooperative State Research Service include increased research effort to develop more efficient food processing technologies that will maximize quality and nutrient retention, conserve raw materials and energy and reduce environmen-

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A cereal chemistry department lab technician demonstrates how an extensograph measures gluten strength by measuring a dough's extensibility and resistance to extension.



A mixograph for measuring the mixing properties of a dough, including mixing time and tolerance, is demonstrated to visitors to the department of cereal chemistry and technology.

Down the road, Anderson sees all kinds of useful knowledge coming from the Livestock facility. Knowledge he thinks the public needs to improve its day-to-day operations.

“We look forward to seeing a definite increase in production with our cross-breeding and terminal rotation

programs, and we’ve barely seen the beginning—barely scratched the surface—of the efficiency and production benefits of drylot management.”

But, no matter what directions research takes at the Unit, Anderson is still certain the same goal—benefiting the public—will remain constant.

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not the time to back off on our efforts to produce more efficiently and to market our products more effectively.

The NCI represents a positive step in that direction. Last summer’s symposium was another. We have tended to focus on production in the past. We have taken some criticism on that. But I will make no apology for that emphasis. We simply need to broaden our research efforts in the area of post-production processing and the marketing of those products.

The name of our Department of Cereal Chemistry and Technology is soon to be changed to Cereal Science

and Food Technology, and that is more than a cosmetic change. It represents a change of direction, with real emphasis on what can be done with our agricultural products to enhance their marketability. Professor Orville Banasik, who will be retiring in July of 1985, has been a visionary pioneer in moving NDSU in this direction, his efforts culminating in the creation of the NCI.

I suppose the crux of my message is very predictable: this is not the time to back off on our research efforts. They have served us well in the past. They continue to serve us well. The knowledge research generates is our best hope for the future.

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tal pollution while reducing processing, storage and distribution costs. Increased emphasis is needed on developing products that upgrade diets, fit consumer needs and compete in export markets. Basic knowledge regarding the properties of foods and maintaining wholesomeness and safety of food supplies also needs to be upgraded.

Broadened emphasis in these areas could have major implications for NDSU in terms of academic offerings, research and service to producers, processors and marketers of North Dakota products. Increased levels of food processing in North Dakota, rather than exporting raw materials for processing elsewhere, could make

such academic training and research even more important in the future. Or, to look at the other side of the coin, having expertise and training in food processing available might even play a role in expanding North Dakota’s industrial base.

With a long history of excellence in agricultural research to build on, NDSU needs to prepare to meet the changing needs of North Dakota Agriculture. The new plateau of service and research Orville Banasik envisions for cereal chemistry is a vital part of new plateaus of service and research provided by the total university.