



LANDMARK PUBLICATIONS BY MEMBERS OF THE GUT FUNCTION INITIATIVE

As a collaborative group of faculty, the Gut Function Initiative fosters a multi-disciplinary approach to the study of the gut environment, its microbial inhabitants and its role in many complex diseases. Several important publications have recently emerged from this group, led by Drs. Benson, Walter and Peterson of the Department of Food Science and Technology.

In August, Dr. Peterson and Peter Turnbaugh, of Harvard University, co-authored a review titled "A Microbe-Dependent Viral Key to Crohn's Box" which appeared in *Science Translational Medicine*¹. This commentary discusses a new finding made in the study of a genetic polymorphism known to increase susceptibility to Crohn's disease. In the study discussed by Peterson and Turnbaugh, animals developed Crohn's disease-like symptoms if they carried certain gene perturbations, but only after they were infected with a specific type of virus and the inflammation caused by this infection was perpetuated by their gut microbiota. This multi-factorial process of genetic susceptibility, viral infection, and gut microbiota involvement in disease prompted Peterson and Turnbaugh to offer new hypotheses that relate inflammation, host immune status, microbial community structure, and human health.

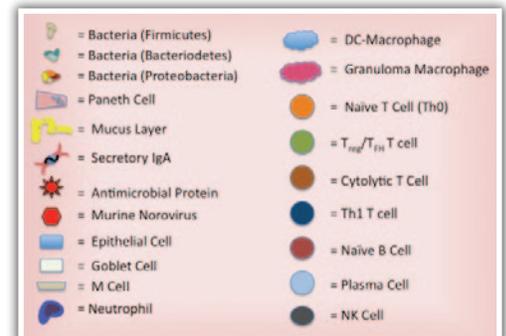
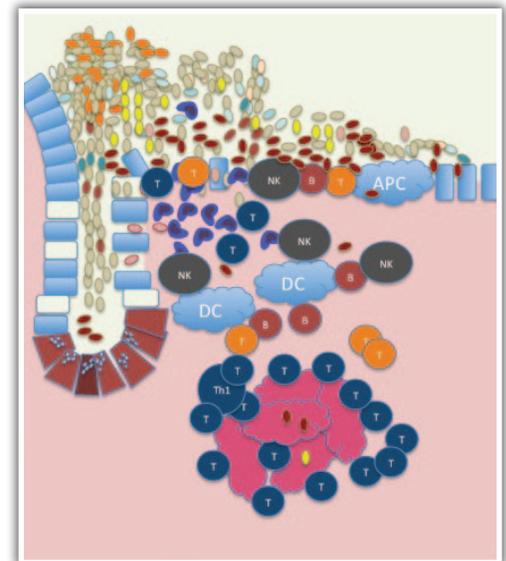
Dr. Walter, whose research focuses on how the gut environment behaves as an eco-system, has published a review article titled "Host-microbial symbiosis in the vertebrate gastrointestinal tract and the *Lactobacillus reuteri* paradigm" in *Proceedings of National Academy of Sciences* (on-line ahead of print, with co-authors Robert Britton and Stefan Roos)². This review discusses the biological principles that underlie the complex symbiosis between host tissues and the massive numbers of microorganisms that reside in the vertebrate gut, and specifically emphasizes a single type of symbiotic relationship: the potential for development of mutualism. Dr. Walter's experimental studies on the vertebrate symbiont *Lactobacillus reuteri* have led him to conclude that the ecological and evolutionary strategies adopted by some gut microbes and their hosts are mutualistic, allowing each partner in the relationship to benefit from the symbiosis. When researchers view other gut microbes' interactions with the host in the context of mutualism, such perspective can advance future efforts at probiotic selection and identification of prebiotic targets. "It is a logical working hypothesis that those symbionts who share an evolutionary fate with their host are more likely to possess adaptive traits that provide benefits," the review concludes.

The third recent publication to come from the Gut Function Initiative is "Individuality in gut microbiota composition is a complex polygenic trait shaped by multiple environmental and

host genetic factors" by Dr. Benson and collaborators, in the November issue of the *Proceedings of National Academy of Sciences*³. This paper, reporting results of research funded by an NIH Challenge grant (part of the Stimulus effort), for the first time demonstrates that the varied species composition of every individual's gut microbial community is guided, in part, by the host's own individual genetic makeup. Scientists recently began to challenge the idea that an individual's gut microflora is formed exclusively through chance encounters with microbes in the environment and dietary preferences. However, identifying and measuring an individual's genetic predisposition to being colonized by a "custom" population of microbes has remained a daunting task. Dr. Benson's team, in collaboration with Daniel Pomp at the University of North Carolina, accomplished precisely that, armed with a unique mouse population of well-documented pedigree and new high-throughput pyrosequencing methodology honed at UNL.

"This discovery sheds new light on how our own individual gut community develops, allowing us to pinpoint which genetic factors influence this process and what predisposes people to diseases when the colonization goes awry," Benson said.

For article references, please see page 11.



These images illustrate Dr. Peterson's recent findings on Crohn's disease susceptibility.



SELECTED GRANTS

Bayer SAS

Rick Goodman

“Comparison of the relative allergic serum IgE binding to proteins extracted from soybean varieties including a genetically modified (GM) soybean”
\$96,440 (17 months)

NE Dept of Agriculture-Specialty Crop

Vicki Schlegel

“Feasibility of Split Beans (Great Northern and Pinto) to Protect against Cellular Oxidation”
\$25,000 (1 year)

NE Dry Bean Commission

Vicki Schlegel and
Susan Cuppelt

“Characterization of Antioxidative Agents, with an Emphasis on the Phenolic Groups, in Different Varieties of Great Northern Beans Produced Under Different Growing Conditions”
\$5456 (1 year)

UNL-Mussehl

Jens Walter

“Functional characterization of metagenomic phytases from the chicken cecal microbiome”
\$29,924 (1 year)

USDA/FAS

Rick Goodman
“Indian Food Safety Training Workshops”
\$49,999 (1 year)

A MESSAGE FROM DR. FLORES

Right: Dr. Rolando A. Flores

Greetings from the Department of Food Science and Technology and The Food Processing Center. We have concluded a very productive year for the Department and Center.

Our faculty have added a number of high-profile accomplishments in the last few months. Drs. Andy Benson and Jens Walter both published articles in Proceedings of the National Academy of Sciences. In November, Dr. Stephen Taylor delivered the Bram Rose Memorial Lectureship at the Canadian Society of Allergy & Clinical Immunology Meeting in Victoria, British Columbia. Also in November, an article written by Drs. Bob Hutkins and Randy Wehling was named by Elsevier Publishing as one of the top ten cited articles for 2008 to 2010. This year, forty-six of our undergraduate and graduate students received awards for their performance and excellence, and seven of our faculty members received awards for recognition.

In late October, I led a group of Food Science faculty and FPC staff to the Indian Institute of Crop Processing Technology in Thanjavur, India to present at the second International Conference on Food Technology. Joining me were FPC Senior Manager of Product Development Laurie Keeler and Drs. John Rupnow, Jeyam Subbiah, David Jones, and Gordon Smith (of ConAgra). The conference provided an exchange of expertise on subjects such as environmentally conscious development, food safety assurance, and the latest developments in food processing technology. We were treated wonderfully and had the opportunity to strengthen our collaborative links with IICPT and TANUVAS University in Chennai, India.

In November, the Food Science Department hosted a delegation from the city of Shizuoka and the University of Shizuoka, Japan led by University President Dr. Naohide Kinae. The visit allowed a discussion of the unique capabilities and research of both our program and that of our visitors. It provided the foundation for future cooperation; we expect future exchange visits, especially in subjects like food processing, nutraceuticals, and gastrointestinal research.

We had seven Masters students finish their degree programs in December. In total, our Department saw 15 Masters and Ph.D. students and 13 undergraduate students through their studies in 2010. We are thankful for the many contributions and discoveries they have provided during their time here and are very hopeful for their futures.

The Dairy Store had a notable year, first by becoming the flagship partner of the new, official online retailer UNL Marketplace. Despite only being in place for a few months, it has already generated increased sales and positive customer feedback. The Dairy Store launched a new probiotic frozen yogurt which offers a healthy alternative to soft-serve ice cream. The probiotic cultures were developed by Dr. Bob Hutkins using a strain originally created by Dr. Khem Shahani. The yogurt is currently used at institutions like UNL Athletics, but we expect to sell it through the Dairy Store beginning February 2011. Finally, the Dairy Store has presented new ice cream flavors such as maple bacon, sweet corn, cranberry sherbet, and peppermint, a seasonal favorite which proved very popular.

The Food Processing Center, like many of our clients, has faced difficult times these last couple years. As a result, we've looked at our services and ask, “what are we able to do better?” All our staff have met the challenge and are working in new and innovative ways, creating new services or changing our current services. We're sure that all our clients will be surprised and happy with the scope and excellence we strive for everyday in meeting their needs. We expect a great 2011.

This is only a brief description of the events in our Department and Center. I hope you enjoy reading about other activities in this newsletter and that it may encourage you to share. We are always happy to hear about the accomplishments of successful alumni.

If you would prefer to receive your newsletter electronically, please send your email address to mstandley2@unl.edu. The University is trying to find ways to “go green” and this is an excellent way for us to do our part. Thank you.



ALUMNA FINDS CONSUMER PREFERENCES AND MORE

Left: Nancy Eicher

Nancy Eicher is the CEO of Food Perspectives, Inc., a Minnesota-based consumer research company specializing in consumer and sensory testing of food products. She is also a graduate of the Department of Food Science and Technology at UNL, having received her Bachelor's here in 1979 and her Masters in 1982.

Originally from Milford, Nebraska, Eicher began her time at UNL with other intentions. "I was an Undeclared Arts & Sciences student, with a heavy emphasis on science and math," she said. "After deciding I wasn't headed to medical school, I was searching for a field that allowed me to stay in science, but offered an opportunity to work more with people than in a lab. A friend of the family put me in touch with Dr. Roy Arnold, who was the department head for Food Science at the time. He was very persuasive, and convinced me to declare Food Science. Dr. Burt Maxcy was assigned as my advisor, who took a personal interest in all of his undergraduate advisees, and I was hooked."

Food Perspectives, Inc., Nancy's company, is headquartered in Plymouth, Minnesota and provides consumer testing for the food

and beverage industry. Food Perspectives utilizes both the experience of their professional staff and a bank of testing panelists to provide direction for companies in product formulation and marketing. Eicher states, "My role involves designing and executing testing programs for food and beverage products that include consumer acceptance, discrimination and descriptive analysis of products."

Eicher feels she owes much of her success to her time at UNL. "Having a strong food science background has allowed me to be a much better sensory scientist, especially in helping clients translate findings to the bench. Having a background that includes ingredient functionality, chemical reactions in food systems, food microbiology and degradation reactions helps strengthen my research recommendations. Tying the consumer to the science is often the 'missing link' between a good product and a great product. Another important part of my education was the 'out of classroom' experiences I had as an undergraduate, giving me an opportunity to develop team and leadership skills."



HELP OTHERS WHO SHARE YOUR HUNGER FOR FOOD SCIENCE.

Donations to the Food Science and Technology Fund are used in scholarships to enhance undergraduate recruitment. To contribute online, go to www.nufoundation.org/foodscience. To learn more, please contact Ann Bruntz, IANR Director of Development, University of Nebraska Foundation, 402-458-1176, or e-mail her at abruntz@nufoundation.org.



DEPARTMENT OF
FOOD SCIENCE
AND TECHNOLOGY



STUDENTS

GRADUATES OF THE B.S. PROGRAM

Laura Hargarten

Bailey Harris

Kristen McCarty

Evlampia Papoutsis

Laurel Weilage

Kate Wheeldon



Left to Right: Laura Hargarten, Kate Wheeldon, Bailey Harris, Laurel Weilage, Kristen McCarty

GRADUATES OF THE M.S. PROGRAM

Lauren Gemar-Davis

Advisor, Dr. Robert Hutkins

Michelle Hoffman

Advisor, Dr. Randy Wehling

Andrew Hoppe

Advisor, Dr. Michael Zeece

Valli Kannan

Advisor, Dr. Harshavardhan Thippareddi

Pei Wen Lim

Advisor, Dr. Stephen Taylor

Yulie Meneses Gonzales

Advisors, Drs. Rolando Flores and Jayne Stratton



UNDERGRADUATE TAYLOR STELK

Right: Taylor in the lab

Taylor Stelk, a Lincoln, Nebraska native, is in the middle of his third year of the Food Science and Technology program at UNL and is an undergraduate associate with the Department's Food Allergy Research and Resource Program. "Growing up in Lincoln, I always enjoyed the atmosphere of East Campus and, as a kid, I especially enjoyed the Dairy Store," Taylor said, "Later on, when I discovered Food Science as a degree located on this campus, I was excited to join the scene."

Taylor expanded on his introduction to Food Science and Technology by saying, "Before I entered my freshman year at UNL, I had close contact with Dr. Steve Taylor. When he discovered that I was entering into Food Science, he approached me and simply asked if I would like a summer job working in his lab. Now in the middle of my third year, I still greatly enjoy working with Dr. Taylor in the food allergy research lab. Dr. Taylor has helped me tremendously by giving me the opportunity to learn about the allergen testing that goes on in his lab daily. I also really appreciate his concern for my general experience at the University outside of the FARRP lab. He not only helps me with career advice, but also gives me the opportunity to do my own allergen research through funding of the UCARE program."

"The FARRP organization has been excellent to be a part of, and I'm glad I was able to join them as soon as I did," Taylor continued, "With food allergens becoming noticeably more prevalent in such a short time, I know being part of a nation-leading research lab will be valuable to many employers, regardless of the job description. One thing I have learned throughout my time here has been how conscious the food industry must be in their handling of the top allergenic products. The testing of these residues is extremely sensitive to contamination, and the slightest mistake could result in a detrimental consequence for the company."

"When I first entered into Food Science at the University, I went into it with little knowledge of the tremendous support by the College of Agricultural Sciences and Natural Resources." Taylor said on his early experiences, "As a result, I was thrilled to be offered a scholarship before I had even taken any classes. This was something I had always hoped to obtain, but when I was given it, I was amazed and surprised. This helps keep me motivated to push myself further in the classroom. I was also surprised by the extremely supportive staff across the entire food science department. I remember the very first month of my first year; Dr. Cuppett talked to us about how we should embrace our East Campus family, and think of Filley Hall as a 'second home.' I was skeptical at first, but now, I know just how much the faculty and department want their students to succeed."

Continued on next page



FST HOSTS TANUVAS STUDENTS

Left: Dhivya Nagarajan observes Pilot Plant Manager Steve Weier making ice cream with liquid nitrogen.

Dhivya Nagarajan and Sankari Dhayalan, students from Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) in India visited the Food Science and Technology Department in August, 2010. Their visit was part of ongoing cooperation between TANUVAS and the Department of Food Science and Technology.

At TANUVAS, Dhivya and Sankari study food processing technology. “I think my field is the everlasting field since my country is a quickly developing nation, and the government of India has ventured in developing the food processing field.” explained Dhivya.

While at UNL, both students received an intensive tour of the operations of The Food Processing Center and the Food Science and Technology Department. They also had two weeks of hands-on experience in The Food Processing Center. This opportunity included assisting with various pilot plant operations. Tasks included working on the tortilla line and assisting with cheese and ice cream production in the dairy plant.

Sankari said “I have more interest in dairy processing and my research is on new product development of milk and milk products and also to increase the shelf life of the products. I plan to work in the dairy industry after my graduation to gain experience and knowledge about the industrial production of milk and milk products.”

In addition to involvement in the pilot plants they also participated in product development and microbiology lab services. In Dr. Thippareddi’s laboratory they were exposed to the design and conduct of food microbiology experiments. According to Dr. Thippareddi “They helped the graduate students with their research. One of the topics was ‘Control of Germination and Outgrowth of *C. perfringens* Spores in Reduced Salt Roast Beef.’”

The students spent an additional week exploring the business and marketing services of The Food Processing Center. This included a Sustainable Agriculture Research and Education (SARE) tour of food businesses in Omaha and Lincoln. The SARE program helps advance farming systems that are profitable, environmentally sound and good for communities through research and education grants. This tour provided the students with direct exposure to Nebraska agriculture and value-added food businesses.

Sankari said, “This trip has given me a chance to learn about the food industries, some of the new technologies involved in production, food habits and lifestyle of people in America. I have experienced a nice living environment and really enjoyed the trip. If I got an opportunity to do my Masters in UNL, I will definitely come here again.”

Dhivya added “The quest of knowledge among these people is quite amazing. I hope that will remain fresh in my memories.”

NEW M.S. GRADUATE STUDENTS

Andres Doblado Maldonado
Advisor, Dr. Devin Rose

NagaLakshmi Gompa
Advisors, Drs. Jayne Stratton and
Andréia Bianchini

Katherine Ivens
Advisors, Drs. Joe Baumert and
Stephen Taylor

Bismarck Martinez
Advisor, Dr. Jayne Stratton

Denise Tran
Advisor, Dr. Joe Baumert

NEW PhD GRADUATE STUDENTS

Kwame Andoh-Kumi
Advisor, Dr. Rick Goodman

Krishnamoorthy Pitchai
Advisor, Dr. Jeyamkondan Subbiah

Ma Jesus Quintanar
Advisor, Dr. Heather Hallen-Adams

Monchaya Rattanaprasert
Advisors, Drs. Jens Walter, Robert Hutkins
and Steve Weier





CHALLENGES IN DEVELOPING RESISTANT STARCH ENRICHED PRODUCTS

Wajira Ratnayake, Ph.D., Research Assistant Professor at
The Food Processing Center e-mail: wratnayake2@unl.edu

With the increasing evidence of human health deterioration by high caloric food consumption, traditional foods, such as bread, cookies, and other flour-based baked products, come under negative scrutiny and are now recognized as relatively “unhealthy” by both the health professionals and consumers. The presence of sugars and rapidly digestible carbohydrates (mainly starch and starch derivatives) causes food to rapidly increase blood glucose concentration. These types of foods are commonly known as “high-glycemic foods.” In most cereal foods, starch is the main carbohydrate component. Therefore, the glycemic effects of such foods depend on the rate of starch digestion after consumption. Based on the rate of starch digestion, food starches are generally classified into three groups; (a) rapidly digestible starch (RDS), (b) slowly digestible starch (SDS), and (c) resistant starch (RS). Out of the three categories, RS is considered to be important in improving health because its ability to “escape” digestion and reach the colon. The first reports of RS appeared in scientific literature in 1982 [1], and since then RS has been studied extensively by both fundamental (on chemistry and nutritional functionality) as well as applied research (for product and ingredient development).

Based on their origin and physicochemical nature, resistant starches are classified into four different groups; RS 1, RS 2, RS 3, and RS 4 (Table 1). This classification is becoming increasingly outdated because some of the new RS products do not fall into either RS 3 or RS 4, due to the complex nature of the new manufacturing processes. For example, some commercial resistant starches are prepared by subjecting raw starch to both physical treatments and chemical modifications, and, as a result, they could not be classified as either RS 3 or RS 4.

Starch manufacturers have developed a variety of RS products to suit specific applications in food manufacturing processes. Specialty resistant starches are widely available for baked and extruded product manufacturing. Most of these commercial resistant starches provide “acceptable” product qualities when used in formulations, usually at levels less than 15-25% of flour weight (Figures 1 and 2). Specific product quality characteristics, however, could change depending on the type of RS and the amount used. The relative amounts of RS in the product formulation could vary based on the properties of the particular RS used. Almost all resistant starches have low water absorption capacities, low solubilities, and different phase transition (i.e., “gelatinization”) characteristics compared to normal starches. As a result, when incorporated in food formulations at high levels,

RS could significantly change the important quality characteristics, such as texture, viscosity, volume, consistency, etc. and sometimes the product might even require process alterations to obtain desired qualities. For example, in extruded products such as corn flour-based snacks (Figure 1), RS incorporation should be less than 20% (of flour weight) to obtain the desired texture and expansion. In bread making, commercial RS 4 starches, produce high quality loaves (Figure 2) because of specific functionalities of the ingredient which have been obtained by chemical modifications (i.e., cross-linking of wheat starch).

Nutritional and health claims on RS fortified foods have increased substantially in the recent past. RS has shown to improve colonic health by providing energy to cells (i.e., colonocytes), and by improving the microbial composition. Other evidence has surfaced to claim that RS also promotes lipid oxidation, lowers the risk of certain cancers, stimulates the immune system, and promotes recovery from epithelial inflammation, etc. [2]. These claims are mainly made based on the fact that RS exerts beneficial health effects in the gastro-intestinal tract in a manner similar to dietary fiber. Hence the arguments have been made on whether to estimate RS as a part of total dietary fiber or not. Despite on-going debates, it is generally accepted that when RS is incorporated in food formulations, the total dietary fiber content of the product could be increased. The laboratory estimations of RS and fiber, however, have become even more challenging because some classes of RS (such as RS 4) could not be estimated, either as fiber or resistant starch, in the laboratory by currently available methods, including AOAC Approved Method 2009.01 [3] due to the chemical modifications to starch polymers. It is reasonable to argue that RS 4 is not “fiber/resistant starch” but “chemically modified starch”, but, in reality, RS 4 is assessed as dietary fiber when a product is subjected to nutritional composition analysis.

Whether it is “natural” (such as RS 1 and RS 2), manufactured (such as RS 3 and RS 4), or any other physico-chemically modified RS, it is generally accepted that when RS is used in food formulations, the potential health effects of the food are increased. The health claims made on RS fortified foods are justified based on the published research evidence on specific health promoting properties of the ingredient. Most such reports, however, have been conducted under controlled experimental conditions, sometimes using laboratory animals fed special RS containing diets (feeding uncooked RS along with diets, in some occasions). The food processing conditions,

and consumption habits of humans could, therefore, make some of the published “beneficial health effects of RS” inapplicable in assessing their health promoting abilities. Our previous studies have shown that the physical structure of most commercial resistant starches changed considerably during hydro-thermal treatments which were comparable to actual food processing conditions ([4] and Figure 3). Such structural changes could potentially increase starch digestion rate, affecting the so-called positive health effects; increased starch structural disruption could expose starch polymer molecules to enzyme action more easily.

Our current research work involves development of RS fortified new products and analyzing how RS changes during processing operations. Developing more reliable methods to assess such processing-induced changes of RS in foods is also an important part of the on-going research.



Figure 1: RS fortified corn snacks prepared using identical extruder settings.

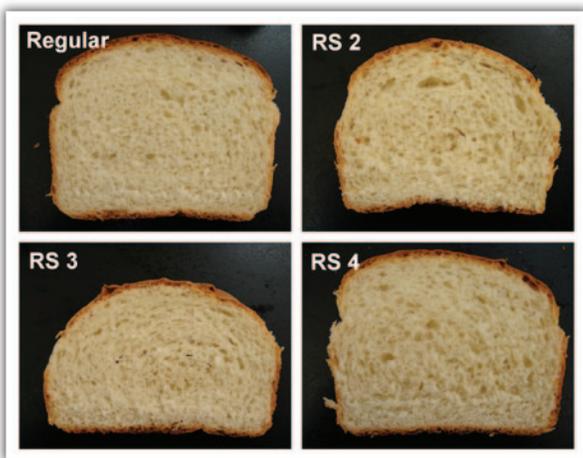


Figure 2: RS fortified bread. Note: RS 4 used in this experiment is specifically sold for baking applications.

References

1. Englyst, H., H. Wiggins, and J. Cummings, Determination of the non-starch polysaccharides in plant foods by gas-liquid chromatography of constituent sugars as alditol acetates. *The Analyst*, 1982. 107(1272): p. 307-318.
2. Brouns, F., B. Kettlitz, and E. Arrigoni, Resistant starch and “the butyrate revolution”. *Trends in Food Science & Technology*, 2002. 13(8): p. 251-261.
3. AOAC, official methods – 2009.01, Official Methods of Analysis. 2009 – AOAC International, Gaithersburg.
4. Ratnayake, W.S. and D.S. Jackson, Thermal Behavior of Resistant Starches RS 2, RS 3, and RS 4. *Journal of Food Science*, 2008. 73(5): p. C356-C366.

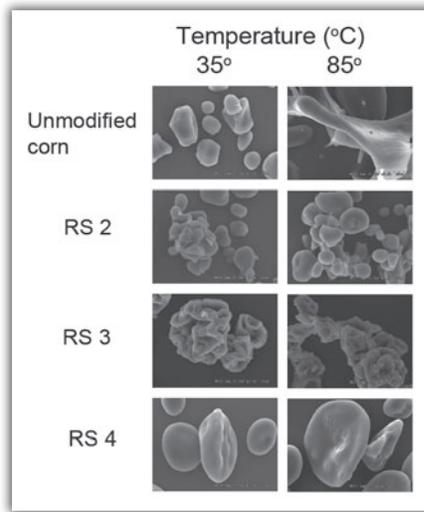


Figure 3: Scanning electron microscopic images showing heat effects on unmodified corn starch and resistant starches (RS) after keeping at specific temperatures for 30 minutes (2500 times magnified).

Table 1. Resistant starch classification*

RS 1	Physically inaccessible (for digestion) starch in food.
RS 2	Starches that are naturally resistant to enzyme digestion upon ingestion. Starch in potatoes, bananas, etc. fall into this category.
RS 3	Starches that are modified by physical processes (i e., various combinations of heat and moisture treatments).
RS 4	Starches that are modified by chemical processes. Cross-bonding and chemical substitutions could create starches that are resistant to enzyme digestion.

* Note: There are commercial resistant starch products that do not fall into any specific class in this classification.



GRANT ASSISTANCE FROM THE FOOD PROCESSING CENTER

Right: Suzanne Weeder Einspahr

For eight years, The Food Processing Center has been providing grant preparation assistance to businesses.

The Food Processing Center offers several benefits to grant seekers. The FPC can provide basic grant information such as admission requirements, required uses of funds, dates of funding, and more. The Center assesses companies to determine eligibility for a grant. The Food Processing Center also provides assistance in writing, reviewing, and submitting the grant application. In addition, The FPC can provide synergistic services such as feasibility studies, business plans, and marketing plans.

One example of the grants The FPC provides assistance for is the USDA Value Added Producer Grant (VAPG). Grant-seekers are able to use FPC templates which were developed in concert with USDA Rural Development and are now replicated by numerous entities

nationwide. The FPC liaisons with local USDA Rural Development personnel who administer VAPG. The award rate for VAPG applicants working with The Food Processing Center is an incredible 84 percent (49 of 58 submitted applications have received funding). The FPC's growing expertise in this grant program has resulted in an award rate of 100 percent for each of the last three years.

The VAPG is only one of many grants The FPC can assist with. Others include Nebraska's Value-Added Agriculture Grant, the USDA Rural Business Enterprise Grant, the Nebraska Cooperative Development Center Assistance Grant, and the USDA Rural Business Opportunity Grant Program. If you are interested in grant assistance from The Food Processing Center, please contact Suzanne Weeder Einspahr by phone at (402) 472-5806 or by email at sweeder1@unl.edu.

INNOVATION ENGINEERING

Mark Hutchison, manager of The FPC's Food Innovation and Entrepreneurship Unit, and Lori Byrne, assistant director of The FPC, recently attended Innovation Engineering Leadership Institute and Jump Start.

The leadership institute focused on "giving leaders the tools and confidence to lead the creation, communication and commercialization of meaningfully unique ideas." Throughout the three day training, the creation of innovative products or services was taught and reinforced using stimulus mining, which incorporates tech, future, insight and market mining. These methods stress diversifying thinking through linear and classic creativity. Exercises that tapped into the strengths of analytical, practical, conceptual and relational thinking styles brought energized thinking and innovative ideas forward.

After the leadership institute concluded, Hutchison and Byrne then participated in a two day "Jump Start" training, which focuses on helping clients identify new products that are meaningfully unique. Companies that participate in Jump Start take action on ideas for growing company profitability through process improvements, sales and marketing, and new or adapted products/services. Innovation is stressed in all areas. The three principles that drive the Jump Start process are stimulus mining, diversification of thinking, and driving out fear.



Mark Hutchison



Lori Byrne

Future profitability and being able to compete with foreign manufacturers depend upon innovation, customer benefit and ability to effectively market the products. With the help of these new acquired tools, the staff at The Food Processing Center is excited about helping companies and organizations meet this global challenge.

To jump start your business profits, please contact Lori Byrne (email: lbyrne1@unl.edu, phone: (402) 472-3991) or Mark Hutchison (email: mhutchison1@unl.edu or phone: (402) 472-0381).



THE FOOD PROCESSING CENTER

TRAINING AND ASSISTANCE IN SAFE QUALITY FOODS (SQF)

The Food Safety group at The Food Processing Center is committed to helping the food, pet food and feed industries deliver safe and high quality products to consumers and clients. However, assuring the safety of final products throughout the food and feed chain is never easy and requires a dedicated, professional staff with special expertise.

Because reliance on end product testing alone is not enough to assure the safety of the product, it is important to evaluate the ability of the manufacturing process to control, reduce and/or eliminate potential contaminants or foodborne pathogens. In the food and pet food industry, this is achieved through implementation of pro-active food safety programs, such as Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Points (HACCP).

To help the food and pet food industry stay current with the latest safety standards, The FPC as part of its New Initiatives is

seeking certification in Safe Quality Foods (SQF) to be able to provide training and assistance to food and feed companies interested in this system. SQF is recognized by the Global Food Safety Initiative (GFSI) as one of four systems to help manufacturers meet safety standards, and HACCP is a prerequisite for its implementation. With increasing pressure to conform to higher quality standards, more companies will need education on how to implement new quality programs to ensure the safety of their products. Once FPC personnel are certified, The FPC will help the food, pet food, and feed industry walk that path towards safer and higher quality products. Individuals receiving this training include Food Process Engineer Steve Stephens and Drs. Jayne Stratton and Andréia Bianchini.

For more information, please contact Dr. Andréia Bianchini at abianchini2@unl.edu.

THE FPC ASSISTS HUNGER RELIEF INTERNATIONAL

In 2010, The Food Processing Center assisted the charity Hunger Relief International. The FPC's services were used to develop a nutrient rich flavoring component for food aid bound for Haiti, Pakistan, and other areas in need of assistance.

Hunger Relief International is a relief and development organization which provides nutritional support to needy children and families and has the additional goal of long-term family and community self-sufficiency. All of the food distributed by Hunger Relief International is grown and processed in the region being assisted. This method both saves money for the charity and assists the local economy.

On the work The FPC performed, FPC Product Developer Julie Reiling said, "HRI wanted us to develop a flavoring component that would also contain nearly 100% of the important vitamins and minerals needed for good health and development. These packets would be added to locally produced rice and beans."

The Product Development Unit of The FPC, consisting of Reiling and Senior Manager Laurie Keeler, formulated beef, chicken, and vegetable based flavor components for Hunger Relief International. Reiling said of the process: "We talked through the nutrients and amounts of each that we wanted in their blends. We then contacted a vitamin and mineral pre-mix company to provide that proprietary blend for use. Laurie also put HRI in touch with a company that would blend and package their product to be shipped to developing countries around the world."

The FPC completed development of the supplements in late August and delivered product formulations to HRI at that time. Through a co-manufacturer, HRI will mass produce the supplement and from there use The FPC's work in trouble spots around the world.

THE FOOD PROCESSING CENTER

THE DAIRY STORE ON UNL MARKETPLACE

In summer of 2010, The Dairy Store became the flagship retailer for the new online service UNL Marketplace. The UNL Marketplace was developed to provide all UNL retailers with a single, robust infrastructure for online transactions, integrated into the UNL website. UNL Marketplace helps UNL's efficiency by reducing redundant purchases of software and reduces the security risks involved in UNL e-commerce by requiring the safeguard of one system rather than many.

Bryan Scherbarth, Dairy Store manager, commented on the new service by saying, "Marketplace affords our customers much more functionality than our previous program. Additionally, being run by University Communications, it is getting much more exposure and traffic than our previous version. For an example, you can find a dedicated link to the UNL Marketplace on UNL's homepage. We are getting better analytics, vastly better support and services, and are benefitting from the synergy of other UNL departments as they become members of the marketplace."

You can find the Dairy Store, as well as other UNL products and services, at the Marketplace website: marketplace.unl.edu.



Among the items available at UNL Marketplace are the new Dairy Store t-shirts.

THE ALWAYS ACTIVE FOOD SCIENCE CLUB

The UNL Food Science Club stayed busy this past Fall Semester.

In the month of September, the Food Science Club continued their tradition of selling Dairy Store ice-cream by travelling to Nebraska City for the AppleJack Festival. In addition to ice-cream, the club sold apple pie caramels and gave an educational presentation.

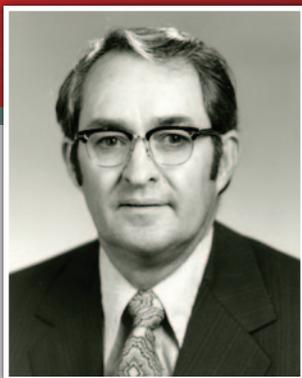
The fun continued in October as the club dressed up in costumes and went Trick-or-Treating for canned goods in the neighborhood around East Campus. The canned goods were donated to the Salvation Army.

The month of November brought about a new fundraiser. Homemade bread made by the Food Science Club was sold on the 10th and 18th. They sold an assortment of breads including baguettes, ciabatta, and artisan round.

The Food Science Club will continue to be busy during the Spring Semester as well. On February 19th, the club will be catering for the Nebraska Robotics Expo. Caramels will also be sold in the month of February as a wonderful Valentine's Day gift for that special someone. The Food Science Club remains one of the most active student organizations.



The Food Science Club at Nebraska City's Applejack Festival. From Left to Right: Heather Berck, Kristen Drvol, Taylor Stelk, Juliann Starman and Brooke Grossenbacher.



CONTINUING CONTRIBUTIONS OF DR. BURT MAXCY

Left: Dr. R. Burt Maxcy

Dr. R. Burt Maxcy, who passed away in 2009, taught at UNL for 31 years before retiring in 1989. More than 20 years after his departure, Dr. Maxcy still has a strong impact on the Department and the people with whom he interacted.

Dr. Maxcy began teaching at UNL in 1958 after receiving his doctorate in dairy science from the University of Wisconsin-Madison in 1950. In 1968, Dr. Maxcy and colleagues in the Dairy Science Department became the first faculty members of the newly incorporated Food Science and Technology Department. While in the new department, he conducted research on the capabilities of radiation to control microorganisms in food. Dr. Maxcy's student James Dickson, now a professor in the Animal Science Department of Iowa State University, stated, "Dr. Maxcy was well known for his work in food irradiation, and some of his research papers are still routinely cited. I think that his work has "stood the test of time", in that it is still accepted and still relevant today. There is one paper in particular, by Jim Lambert and Burt Maxcy on the irradiation of *Campylobacter*, which is still one of the key references on the subject almost 30 years later."

Dr. Susan Cuppett, who briefly worked with Dr. Maxcy, said, "Burt was truly a Southern Gentleman. Burt was very astute about the functioning of the university and he helped me learn how to look at my position so that I could and would succeed and he was right each time."

Dr. John Rupnow added, "He gave his entire life to teaching and research at the university and was very helpful to young professors. He was welcoming and served as a mentor."

Dr. Maxcy still contributes to the Department today. He and his wife, Dorothy, established the Maxcy Food Science and Technology Scholarship Fund in 2008. NU Foundation director Ann Bruntz explained this gift, stating, "Bert and Dorothy Maxcy set up the professorship fund many years ago, this funded a professorship in Agriculture. Several years ago the Maxcys chose to amend the agreement with the excess income flowing into the Maxcy Food Science and Technology Student Scholarship Fund. This provided an endowed scholarship in the Department."

In addition to the Department's scholarship, the Maxcys had established an education trust that pays for all tuition, books, and lab fees to any descendant of Burt and Dorothy's parents. "My husband believed very much in education. It was very important to him," said Dorothy Maxcy on the scholarship, "He loved the young people in the department and he wanted to help them."

VISITING FACULTY

In November, Dr. Michael Zeece hosted Drs. Joe Bogue and Alan Kelly from University College Cork in Ireland. Dr. Bogue is a senior lecturer in the Department of Food Business & Development and Dr. Kelly is an associate professor of food and nutritional sciences and the dean of graduate education.



PAGE 1 ARTICLE REFERENCES

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CONFERENCES & WORKSHOPS

Food Entrepreneur Program Workshops

March 5, 2011 – Storm Lake, IA
March 18, 2011 – Lincoln, NE
April 15, 2011 – Chicago, IL
June 3, 2011 – Lincoln, NE
August 19, 2011 – Lincoln, NE
October 22, 2011 – Lincoln, NE

Food Allergen Sanitation Workshop

March 29, 2011 – Rosemont, IL

Better Process Control School for Acidified or Low-Acid Foods

April 11-13, 2011 – Lincoln, NE

National Small Foods Manufacturing Conference

May 23-24, 2011 – Lincoln, NE

Better Process Control School

October 4-7, 2011 – Lincoln, NE

ONLINE REGISTRATION AVAILABLE AT FPC.UNL.EDU

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