

School of Food Science

Washington State University & the University of Idaho

**A Proposal to the Administration and
Faculty of Washington State University
and the University of Idaho**

Submitted on behalf of Faculty from the

*WSU Department of Food Science and
Human Nutrition*

and

*UI Department of Food Science and
Toxicology*

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School of Food Science Mission Statement

The School of Food Science will strive to provide the highest quality education in food science, serving the citizens of Idaho, Washington and the Northwest, the United States, and the world. The School will:

1. prepare undergraduate and graduate students for rewarding careers and personal leadership in the food industry, academia and government agencies;
2. conduct innovative and responsive research to improve the safety, quality, and availability of food, agricultural commodities, and value-added food products; and
3. provide high impact outreach and extension programs to enhance the safety, economic development, competitiveness, and profitability of the food industry and ensure consumer well-being.

Justification

Formation of the School of Food Science will merge the food science faculty and programs from the WSU Department of Food Science and Human Nutrition with the food science faculty and programs from the UI Department of Food Science and Toxicology into one unit jointly administered by the Washington State University College of Agricultural, Human and Natural Resource Sciences and the University of Idaho College of Agriculture and Life Sciences. The formation of a bistate School of Food Science will provide tremendous opportunities for the citizens of Washington and Idaho with minimal input of new resources. By leveraging existing expertise and facilities of both universities, the implementation of this proposal will result in a value-added enhancement of the food science programs with no additional resources.

Although the departments currently offer a collaborative curriculum leading to the Bachelor of Science in Food Science, additional benefits will be achieved by the formation of a School of Food Science that combines teaching, research and outreach. A School of Food Science will allow for coordinated planning, more efficient use of resources, and less duplication of effort. Benefits include increased faculty numbers and collaboration leading to expanded research and extension opportunities, improved student activities, increased regional, national, and international recognition and respect in the professional food science communities, and a larger base of external industrial and consumer stakeholders.

Numerous benefits will accrue to a merged School of Food Science at both Washington State University and the University of Idaho. A formal agreement will enhance communication and collaboration among individual faculty with similar goals and missions. A larger number of faculty with enhanced research capabilities and productivity will promote articulation of a broader range of research projects, more rapid and efficient response to emerging production, industry, and consumer needs, and provide more experienced and influential mentoring and graduate student training.

Coordinated faculty hiring will reduce overlap and inefficiencies, allowing the School of Food Science to provide expanded areas of expertise. A more coordinated, efficient teaching program will reduce both the competition and duplication in student recruiting efforts, expand internship opportunities and job placement efforts, expand undergraduate and graduate student activities, and promote student retention and career guidance. The School of Food Science faculty will be responsive to a larger group of external stakeholders and have greater access to endowed funding than the faculty of separate food science programs. Artificial barriers resulting from state boundaries, especially in research and extension programming will be reduced. Many alumni of the WSU and UI Food Science programs are already employed by the food industry with food processing facilities in both Washington and Idaho. The School of Food Science will be supported by three regional sections of the Institute of Food Technologists, the Society for Food Science and Technology: the Lewis & Clark, Puget Sound, and Intermountain Sections. Appropriate organization of the school will result in administrative cost savings, reduce administrative barriers to collaboration, and lead to resolution of competitive recruiting, retention, and administrative policies at the two universities.

The formal creation of a bistate School of Food Science will be unique in the nation and provide immediate national impact and recognition. The formation of the School of Food Science will promote food science teaching, research, and extension programs into the top tier of universities with food science programs in the United States based on faculty numbers, undergraduate and graduate student enrollment, degrees granted, research productivity, and extension programming. Formation of the School of Food Science will not only increase faculty and student numbers, but will enhance competitiveness of the School of Food Science for recruiting graduate students, proposing integrated research proposals, and collaborative extension programming.

Career opportunities for graduates in food science are excellent (100% placement). Presently and for the foreseeable future, there is a international, national, and regional deficit in prospective food science employment opportunities in the food industry, government agencies, and academia. Due to continued growth in the food production, preservation, and product development industry, the USDA estimates there will be more jobs than graduates in food science for at least the next fifteen years. Starting salaries for food scientists are highly competitive (\$40,000/yr. B.S., \$50,000/yr. M.S. and \$68,000/yr. Ph.D.). Food science graduates begin careers in food quality assurance, food safety microbiology, technical sales, production management, product extension or development, regulatory affairs, or research in the food/allied industries or federal/state regulatory agencies. Educating Washington and Idaho citizens in food science is an excellent way to provide challenging and profitable opportunities to remain in the Pacific Northwest and enjoy a resourceful professional career. It is clear and fortuitous that consumer and regulatory demands impacting the food distribution, food preservation, and food service industries will continue to provide excellent employment opportunities for food science graduates. Because of the dynamic nature of the food science discipline, well educated and productive food science faculty researchers and educators will provide quality educational experiences for food science majors as well as students from other disciplines.

Background

Food processing is the largest manufacturing industry in the United States, a \$459 billion industry (2002, US Manufacturing Census) that adds significant value to the production of farm commodities. Food processing is the largest manufacturing employment sector in Idaho and the second largest in Washington behind transportation. There are more than 1790 food processing operations in Idaho and Washington, ranging from large international corporations to small entrepreneurial start-up companies. In Idaho, the food and beverage manufacturing industry employs more than 16,900 people and adds \$5.2 billion to Idaho's economy. In Washington, the food and beverage processing industry employs about 40,000 people and adds \$10.3 billion to Washington's economy. Nationally, value-added food processing contributes greater than 8% to the gross domestic product (GDP) and accounts for about 50% of realized profits across the entire food distribution system. Thus, food processing represents a profitable and established area for continued economic growth and development within the Pacific Northwest and the United States.

Market globalization is opening a tremendous opportunity for the food industry. The United States, including Idaho and Washington, primarily export low value commodities and is not taking full advantage of the opportunities for exporting high value-added food products. United States' exports of processed food products are increasing, but the overall worldwide market share of food products is decreasing. To enhance the regional economy, Idaho and Washington must focus on adding value to agricultural commodities to meet the demand of increasingly diverse populations of international consumers. Thus, increasing the safety, quality, and quantity of value-added food products, regional commodities, specialty crops and by-products will provide significant economic benefits through domestic markets and international exports. Growth in food science related manufacturing will continue to provide rewarding careers for the citizens of Idaho and Washington and support the tax base of not only the states, but the counties and cities as well.

Food Science is the scientific discipline that supports the food and beverage manufacturing industry. Food Science is a multidisciplinary science that applies biology, chemistry, physics, engineering, nutrition, and other sciences to improve the safety and quality of food products; develop new food products; and design new, safer, and more energy efficient food preservation methods. Food scientists are employed around the world by large and small food processing companies, food ingredient suppliers, food quality assurance and testing labs, federal and state governmental agencies, and academia. Food scientists strive to improve the microbial and chemical safety of foods, enhance the quality of foods through traditional and emerging technologies. Food scientists conduct research to improve food safety and quality, identify beneficial food ingredients and develop new food products, extend the shelf life of foods, and identify environmentally friendly food preservation technologies. Many of the foods in retail grocery stores or offered on restaurant menus were developed and their safety, quality and shelf life assured by food scientists.

The food science profession is very dynamic due to the many changes in technologies and the identified desires of consumers. Consumers no longer view food in terms of bulk commodities. Although consumer food purchases trended away from commodities (e.g. potatoes, legumes, fruit, cereal grains, meats, poultry, and dairy products) toward value-added food products, food expenditures decreased over the past 50 years and now comprise about 11% of the annual disposable income of Americans. The reduction in expenditures of disposable income for food is not incidental, but attributed to the application of advanced technologies and food chemistry, microbiology and engineering. Large changes in lifestyle are leading to alteration of consumer demands, resulting in the development of a wide variety of safe, high quality, economical and convenient value-added food products. Consumer demand for specially designed convenience foods is increasing as the population of the US ages and becomes more ethnically diverse. Consumers are not only demanding safe and high quality convenient foods composed of essential nutrients, but many consumers are demanding health-promoting 'functional' foods that may protect or offer protection against chronic diseases. Impatient consumers are requesting meal replacements that mimic a complete home cooked meal in taste and quality, but without the preparation and clean up time. Consumers also expect a risk free standard of food safety. Finally, many consumers desire food processed with minimal environmental impact, including reduced energy usage, reduced packaging waste, and improved utilization of agricultural by-products. All of these expectations must be readily available and delivered economically. The food production and preservation industry is a key component of Washington and Idaho's economic base, providing great opportunities for increased academic/industrial partnerships. A School of Food Science will be well positioned to meet the emerging challenges, needs, and opportunities of the food industry. All of these factors will result in increased demand for food scientists competent in molecular biology, biochemistry, material science, engineering and other sciences.

History

In the Pacific Northwest, Food Science programs are offered at Oregon State University, Washington State University and the University of Idaho.

Discussion of a merged Food Science program between Washington State University and the University of Idaho was discussed previously. The concept was first discussed in 1989 when the Food Science and Human Nutrition building on the Washington State University Campus was in the initial planning stages. At that time, a proposal was introduced to merge food science faculty, form a merged Food Science Department, and house the new program at Washington State University. The proposal was not acted upon at that time.

A merger of food science faculty proposed in 1997 led to a cooperative curriculum and teaching program leading to the Bachelor of Science in Food Science and Human Nutrition at WSU and the Bachelor of Science in Food Science and Toxicology at the UI. This cooperative curriculum was formalized by a Memorandum of Understanding signed by the provosts of each institution. Faculty from both universities teach courses and

supervise graduate student research in the Food Science program, allowing students access to facilities and faculty expertise from both institutions. Joint WSU-UI food science curriculum meetings are held regularly throughout the academic year to assess and coordinate teaching responsibilities. The food science faculty of each institution is responsible for approximately half of the courses in the major. Neither faculty is currently able to offer the entire food science curriculum alone without sacrificing research and extension programs. The Food Science BS curriculum is approved as a cooperative curriculum by the Institute of Food Technologists, the Society for Food Science and Technology. This unique cooperation and partnership between neighboring universities permit the food science faculty to offer approved, high quality food science undergraduate and graduate curricula. Alumni surveys indicate student satisfaction with the cooperative curricula in Food Science.

Several recent developments lead to the current proposal for the formation of a School of Food Science:

1. WSU realignment plans include moving the dietetics and nutritional sciences faculty and curricula currently in the Department of Food Science and Human Nutrition into a proposed Division of Health Sciences in the College of Pharmacy, providing the dietetics and nutrition faculty new and expanded research, teaching and outreach opportunities.
2. Cooperation among food science faculty with respect to the teaching, research and extension programs are enthusiastic and energetic, and faculty are excited, ready and willing to explore the proposed formation of a School of Food Science.
3. The administrative chair of the Department of Food Science and Human Nutrition at WSU and the head of the Department of Food Science and Toxicology at the UI are vacant at this time. The proposed merger of departments to form a School of Food Science is supported by Dean Daniel Bernardo, College of Agricultural, Human, and Natural Resource Sciences, WSU, and Dean John Hammel, College of Agriculture and Life Sciences at the UI.
4. Both universities proposed merging the food science faculties with the animal science faculties for economic stability, although there is an absence of faculty support and minimal programmatic bases for this merger. Faculty also expressed concerns about a loss of food science recognition within Animal Science Departments.
5. Robert Bates, the Provost at both Washington State University and Doug Baker, the Provost at the University of Idaho and formerly Associate Provost for Academic Affairs at Washington State University, are familiar with the on-going cooperation among Food Science faculty and supportive of the concept of the proposed School of Food Science.

Administration

Director. A single Director will lead the School of Food Science. The Director will be employed 50% by each university and responsible to both the Dean of the College of Agricultural, Human, and Natural Resource Sciences at WSU and the Dean of the College of Agriculture and Life Sciences and the UI. Fringe benefits will be shared equitably and allocated such that the director is not disadvantaged by the joint appointments.

The Director will be responsible for the budget of the School and allocate funds for teaching, research and extension with input and direction from the appropriate college officials at both universities. Faculty will be given equitable treatment in allocation of these funds distributed on the basis of productivity and merit. All productivity measures of the School (e.g. student credit hours, number of majors, publications, grant funding) will be acknowledged by both universities. The Director will be responsible for assigning support staff and graduate assistants to specific tasks, faculty, research or outreach programs. A proposed description for the Director position is included in the Appendices.

Faculty. UI faculty will hold rank, tenure, or both, at the UI and all academic affairs such as promotion, tenure review, tenure, annual performance evaluation and salary increases will follow the policies in the UI Faculty-Staff Handbook. WSU faculty will hold rank, tenure, or both, at WSU and all academic affairs such as promotion, tenure review, tenure, annual performance evaluation and salary increases will follow the policies in the WSU Faculty Manual. UI and WSU faculty with appointments in the bistate School will be provided employee privileges at both universities. Future faculty appointments in the School may be hired jointly by WSU and the UI.

Initially, faculty will be housed at their respective universities. In the future, faculty may be housed at either university as space is available appropriate for programmatic collaboration and success.

Students. UI students will pay UI tuition and fees and will be awarded degrees from the UI. WSU students will pay WSU tuition and fees and be awarded degrees from WSU. All Food Science courses (proposed prefix, **F S**) will be cross-listed at both universities. About half of the core curriculum necessary to earn a Bachelor of Science in Food Science will be offered on each campus.

Advisory Board. An Advisory Board comprised of individuals from the food and allied industries, alumni, and state and federal governments will be appointed by the Director in communication with the faculty to advise the faculty in creation/evaluation of programs and strategic planning for the new School. A food industry Advisory Board is currently in place at the University of Idaho, and at least one member, Ron Luedeman, representing Basic American, Blackfoot, ID is an alumnus of the Washington State University food science program. The combined Advisory Board will meet semi-annually.

The success of the WA/ID School of Food Science will require close cooperation between the two universities and a commitment by university administration. Procedures for conducting the business of the School will be developed by the Director and faculty in close cooperation with appropriate administrative personnel at both universities, including the Provost, Vice President of Research, and college Deans.

Many administrative procedures will need to be agreed upon before WA/ID School of Food Science is official. The enclosed **Memorandum of Understanding** is being reviewed and revised by the appropriate administrators and the Attorneys General at both Washington State University and the University of Idaho. Particular attention will be necessary to resolve collaborative funding, resource allocation, and intellectual property issues. Grant proposal processes will require simplification and appear seamless to funding agencies. The Deans, Director, and faculty will need to clarify with the research and proposal development offices of WSU and the UI established policies on facilities and administration (indirect cost) sharing and budgeting. A policy on university designation of intellectual property will be required.

Food Science Curricula and Degrees

The undergraduate curriculum leads to a Bachelor of Science in Food Science. The BS in Food Science is reviewed and approved every five years by the Institute of Food Technologists (IFT), the Society for Food Science and Technology.

Undergraduate Enrollment. Undergraduate students complete Washington State University General Education Requirements (40 credits) or University of Idaho core requirements (30-32 credits) and supporting science and mathematics classes (27-28 credits) during their first two years of study. The additional biological and physical sciences (cell biology, microbiology, physics, general chemistry, organic chemistry, biochemistry) and mathematics through one semester of calculus are pre-requisite for completing the food science core curriculum. Calculus is required to study kinetic changes of food constituents and microbial contaminants during food preservation and introduce logical thinking into quality deterioration and shelf life problems associated with maintenance of food acceptability. Food Science majors must integrate knowledge from the traditional biological and physical sciences to understand and resolve food science related problems. Other supporting courses include technical writing, statistics and computer applications to provide students the background skills necessary to analyze, interpret and convey scientific information. Registration for introductory food science courses is encouraged during the Freshman and Sophomore years to potentially recruit and promote retention of students interested in the scientific study of foods and awareness of the food industry.

The Food Science curriculum was extensively revised in 2000-2001 and a new curriculum became effective with catalog year 2002. Program assessment and curricular change is an ongoing process led by a Food Science Curriculum Committee. Joint WSU-UI Food Science curriculum meetings are held regularly throughout the academic year to oversee the cooperative core curriculum. All food science teaching faculty from both

WSU and the UI are participating members of this committee. Students are invited to attend the meetings and participate in the discussions.

Most of the Food Science discipline specific courses are taken in the Junior and Senior years of the Food Science curriculum. These courses build on the supporting science and mathematics classes taken previously. Food science core courses (35 credits) include food safety/microbiology, food chemistry/analysis, sensory analysis, and food processing/engineering. These courses present the core competencies students must have to meet the challenges they will face in the food industry or in graduate school. The laboratory components of these courses provide hands-on learning opportunities. Written and oral assignments enhance communication skills.

Students also select an area of emphasis which includes elective courses in food processing, economics and business, microbiology, or nutrition. Elective internship or directed study courses in areas of emphasis provide experiential learning opportunities for the student.

Food Processing Emphasis. This emphasis provides in depth information on food processing operations. Students may concentrate study within one or more of the dairy, meats, fruits and vegetables, or cereals commodity groups, integrating the study of production and postharvest physiology on food safety as well as food quality, processing characteristics, and acceptability. A food processing emphasis prepares graduates for careers in production supervision, sanitation (HACCP), quality assurance, inspection, product development and process development. Graduates will also be prepared for post-graduate studies leading to research, production and management careers in the food industry, government and academia.

Business Emphasis. This emphasis prepares students for employment in food or food-related businesses where knowledge of scientific methods and food science, as well as economics, marketing and business are important. The recommended course work prepares students for careers in manufacturing management, technical sales, food product marketing or other business careers. Courses in marketing and food systems supplement the core program of basic sciences and food science, thereby integrating the science of food with business, management and economics.

Science Emphasis. This emphasis provides students with an in depth understanding of the physical or biological sciences that supports the food-processing industry. Recommended courses provide fundamental scientific mechanisms involved in improving the safety, quality, preservation, formulation, and risk management of the food supply. Selected courses provide chemical bases for changes in foods that occur during harvest, preservation, handling, storage and consumption. Microbial and chemical food safety issues are addressed in great detail. The science emphasis prepares students for careers in research and development, analytical services, and food safety. The science

emphasis is excellent preparation for admission to research programs in the food industry or government (USDA, FDA), as well as graduate school.

Nutrition Emphasis. This emphasis prepares students for careers in the food industry where knowledge of nutrition is important. Current consumer interest in functional health-promoting foods is leading to rapidly expanding job opportunities for food scientists with fundamental knowledge of food composition, formulation, and the relationships between food constituents and health and well-being.

A capstone course, F S 489 Food Product Development (3 credits) required of food science students is a senior-level course promoting creative thinking, problem solving, and integration of the knowledge from food science and ancillary courses to solve realistic food industry and consumer issues with food accessibility and security, food safety, food preservation, and acceptability. Food product development provides students with the opportunity to work in teams and develop leadership skills.

An undergraduate seminar is required to promote communication skills and develop professional relationship skills. Students are also introduced to current issues of importance in food science.

Food science core courses are focused toward development of good citizenship and career success skills such as critical thinking, communication, problem-solving, time management, organization, information acquisition and lifelong learning skills. Students also learn to manage multiple tasks and assignments. These skills provide food science students with the set of skills necessary to identify, resolve and communicate solutions to food science related issues in the food industry, media and society.

Undergraduate Research. Food science majors are presented with opportunities to participate in undergraduate research projects mentored by faculty and supported by college and school resources. Food Science faculty mentored two to three undergraduate food science research projects each year for the past few years. Food science faculty mentored high school seniors in a science projects related to food science in 2006 and previous years. The School of Food Science is prepared to provide ~ \$500.00 in matching funds for each proposed undergraduate research project awarded financial support by CAHNRS or other University resources. Undergraduate students may obtain credit for successful participation and contributions to research projects as F S 499 Directed Study.

The undergraduate program in Food Science provides an excellent education and broad preparation for student success. The undergraduate food science program is experiencing increased growth in the number of interested students and admissions. Food science undergraduates from WSU and the UI are competitive for national scholarships, fellowships and awards, receiving an inordinate amount of support relative to student numbers. Undergraduate and graduate students are competitive in acquiring prominent internships, research fellowships, and employment with both the regional and national

food industry. Approximately half of the undergraduates over the past five years went on to graduate school at Ohio State, Purdue, Wisconsin, WSU or the UI and the others students accepted positions in the food industry across the U.S. All food science graduates actively seeking employment find an acceptable position shortly after graduation. Food industry internships and employment opportunities far exceed the number of undergraduate food science students. Food science students are readily placed in food industry internships during each summer of their undergraduate education.

Our undergraduate program is reviewed and approved by the Institute of Food Technologists, the Society for Food Science and Technology. Student evaluations of faculty are excellent. Results of exit interviews and alumni surveys indicate satisfaction with the food science curriculum and teaching efforts. Additional collaboration of WSU and UI food science faculty will improve the mentoring, advising and career guidance available to undergraduate students from individual faculty.

Assessment of Undergraduate Curriculum.

Undergraduate curriculum assessment is an ongoing process in food science. The undergraduate curriculum in food science is approved by the Institute of Food Technologists (IFT), the primary international scientific/professional society for food scientists (28,000 members). IFT instituted an evaluation and approval protocol for undergraduate food science programs in 1960. The collaborative WSU/UI undergraduate curriculum was reviewed by the IFT Higher Education Committee in October 2002 and approved for five years. The IFT education standards for undergraduate curricula in food science require documentation of outcome-based measures of learning and a formalized assessment program. To meet the IFT education standards, the food science curriculum must 1) demonstrate that specific content areas and core competencies are met, 2) document specific learning outcomes for each food science course, 3) document specific outcomes for the overall curriculum, and 4) develop an assessment program to determine if learning and curriculum outcomes are being met.

Joint WSU/UI food science curriculum meetings are held regularly throughout the academic year to assess the curriculum relative to evolving IFT Committee on Higher Education standards. The WSU/UI curriculum committee established and implemented a formal outcome and assessment program.

Core Competencies

IFT requires curricula to meet an extensive list of core competencies in the areas of food chemistry and analysis, food safety and microbiology, food processing and engineering, applied food science and success skills. These core competencies require documented courses in the food science curriculum.

Course Outcomes and Assessment

Learning outcomes for each course in the food science curriculum is documented. Each learning outcome is paired with an instructional activity and a related

assessment technique. The level of learning, based on Bloom's Taxonomy, is established for each learning outcome.

Curriculum Outcomes

Curriculum outcomes for food science majors are revised every five years. The proposed School of Food Science curriculum will be reviewed by the IFT Committee on Higher Education in September, 2007.

Curriculum Assessment

A variety of techniques are in place to assess curriculum outcomes, including:

Student performance in internship. Telephone interview by the school director with each employer at completion of internship

Alumni surveys every three years. Alumni surveys are planned for three-year intervals. Surveys were completed in 2002 and 2005. Questions are based on curriculum outcomes and specific course competencies.

Exit interviews with graduating seniors. The school director will interview each graduating student. A written set of questions is used to guide the interview. Many questions are based directly on curriculum outcomes.

Meetings of FST External Advisory Board. Annual meetings will be held with an established External Advisory Board. The board reviews our curriculum. They discuss their current level of satisfaction with our graduates and present industry expectations of graduates

Student performance. The joint WSU/UI Food Science Curriculum Committee is working with the WSU Center for Teaching and Learning to implement our course outcomes and assessment program. This implementation is a multiple-year project. We have developed a formal assessment plan to evaluate critical thinking and written communication across our major. A critical thinking rubric was developed and tested beginning in fall 2003 by evaluating student essays in sophomore and senior courses.

The WSU/UI food science faculty together with the WSU Center for Teaching and Learning developed and tested a survey instrument to assess job preparedness and the skill set obtained by food science curriculum graduates and a rubric to assess learning outcomes. Graduates of the collaborative food science curriculum generally indicated satisfaction with their food science education and suggested they were adequately prepared for their employment. Attached is a published "Assessment of the joint food science curriculum of Washington State University and the University of Idaho by graduates and their employers" J. Food Science Education 1, 9-14 (2006). Over the last two years the learning outcomes assessment suggested upper division students improved on four of seven assessment measures, while lower division students improved on four of five measures. Competency was defined as professional level performance. Twenty

percent of 200 level essays were rated as competent, while 44% of 400 level essays were rated as competent. The assessment progress report prepared in fall, 2006 is attached in the Appendix. Alumni surveys and exit interviews resulted in numerous changes in the undergraduate food science curriculum.

Undergraduate Fee Differential: WSU academic year resident tuition is \$5888 and nonresident tuition is \$15,528. WSU also requires a \$560 mandatory student services fee. The University of Idaho academic year resident fees are \$3968 and nonresident fees are \$8770.

The Graduate Program in Food Science leads to a Master of Science or Doctor of Philosophy degree in Food Science.

Graduate Enrollment. The graduate programs in Food Science at WSU and the UI experienced deliberate growth during the past five years. Enrollment in the graduate programs in Food Science at WSU over the past ten years averaged 25 students, with approximately 10 MS and 15 PhD students in any year. The graduate students are a very diverse group, both by gender and ethnicity (Appendix).

- An average of six MS degree candidates graduate with an MS in Food Science each year after two to two and one-half years of study;
- The range in number of MS graduates in the years 1992 to 2007 varies from two MS students graduating in 2004-05 and 2005-06 academic years to twelve in 1999-2000 academic year;
- Seventy-two MS degrees in Food Science were awarded between 1992 and 2007;
- An average of two PhD degrees in Food Science were awarded each year from 1992 to 2002, an average of four PhD degree in Food Science were awarded each year from 2003-2004 to 2006-2007; three to six years of study were generally required to earn a PhD in Food Science depending on prior academic and research experiences;
- The range in number of PhD graduates over the 1992 to 2007 varies from zero to five; and
- Thirty-eight PhD degrees in Food Science were awarded between 1992 and 2002.

The MS degree program in Food Science at the University of Idaho enrolls an average of six to eight students and is evolving and growing. The non-thesis M.S. in Food Science was added in 2005 to address industry needs for food science graduates with experience with applied research and food production. The PhD program at the University of Idaho was added in 2004 to address industry needs for fundamental food science training and will provide key personnel to support continued maturation and growth of the Idaho food industry. The number of applicants for graduate degrees at WSU and the UI greatly exceeds faculty capacity to advise academic programs and direct research.

Faculty from both the University of Idaho and Washington State University teach courses and supervise graduate student research in the food science program, allowing students access to facilities and faculty expertise from both institutions. We are dependent on each other as neither program can currently offer the program alone without sacrificing

research appointments. Faculty teach and advise students in the interdisciplinary Environmental Sciences graduate program (MS and PhD), the Graduate Program in Nutrition (PhD), teach in the WOI cooperative Veterinary Medicine Program at Washington State University, and mentor PhD candidates in Interdisciplinary PhD Programs individually approved by the WSU Graduate School.

An assessment program was implemented in 2003. Food Science graduate students exhibited improvement on five of seven assessment measures over the last two years. Seventy-one percent of graduate students were rated as competent by the selected assessment measures. Graduate program outcomes were revised in Spring, 2005.

Listing of Departmental Graduate Curriculum in Food Science.

FSHN 406/506	Evaluation of Dairy Products I (1 cr)
FSHN 407/507	Evaluation of Dairy Products II (0-3 cr)
FSHN 508	Seminar in Technical Writing (2 cr)
FSHN 509	Oral Seminar (1 cr) - May be repeated for credit
FSHN 510	Advanced Food Chemistry (3 cr)
FSHN 511	Food Carbohydrates and Lipids (3 cr)
FSHN 512	Food Proteins and Enzymes (2 cr)
FSHN 513	Minerals and Vitamin Metabolism (4 cr)
FSHN 422/522	Sensory Evaluation of Food & Wine (4 cr)
FSHN 429/529	Dairy Products (4 cr)
FSHN 464/564	Food Toxicology (3 cr) - Web based course
FSHN 465/565	Wine Microbiology and Processing (3 cr)
FSHN 466/566	Wine Microbiology and Processing Laboratory (1 cr)
FSHN 470/570	Advanced Food Technology (3 cr)
FSHN 582	Food Process Engineering Design (3 cr)
FSHN 583	Advances in Cereal Science & Technology (2 cr)

About 50% of the course credits offered in the graduate program in food science result from concurrent undergraduate and graduate (400/500) courses. Students enrolled in the graduate 500 level class must complete additional in-depth assignments and spend out of classroom time with the professor.

In an effort to incorporate contemporary issues and concepts into the food science graduate program, modular classes of five to nine weeks in length (1-2 cr) were implemented beginning in the fall of 2003 and taught as Special Topics classes. Responsibility for these classes was accepted relative to faculty experience and research expertise.

FST 504 Special Topics include:

- Food Laws and Regulations, Rasco (2 cr) fall 2005
- Physical Properties of Food and Biomaterials, Singh (2 cr) fall 2005
- Food Biotechnology, Yuksel (2 cr) spring 2006
- Food Packaging, McCurdy (2 cr) spring 2006

Lipid Chemistry, McCurdy (1 cr) fall 2004
 Lipid Functionality and Health, Swanson (1 cr) fall 2004
 Carbohydrate Chemistry, Baik (1 cr) fall 2004
 Carbohydrate Chemistry – Starch/Hydrocolloids, Huber (1 cr) spring 2005
 Protein Chemistry, Powers (1 cr) spring 2005
 Protein Structure and Functionality, Smith (1 cr) spring 2005)

The inclusion of the modular classes in the graduate curriculum is still being evaluated, however the scheduling and acceptance of the initial modular classes is resulting in assessment of the syllabi, rigor, and concepts presented in all of the graduate courses currently in place at Washington State University and the University of Idaho.

The Food Science and Toxicology faculty at the University of Idaho also added FST 588, Food Science Teaching Practicum (1-3 cr.) to encourage PhD students to develop teaching skills and FST 590, Food Science Research Seminar (1 cr.) to provide UI graduate students greater exposure to current research topics. At Washington State University, Univ 590 Preparation for College Teaching and requirements for the presentation of classroom subject matter (3 lectures) and laboratory experiences (2 laboratories) are required components of the PhD degree requirements.

Additional FSHN 600, Special Projects or Independent Study, FSHN 700, MS Research and Thesis, and FSHN 800, PhD Research and Dissertation credits are in place to fulfill the program research requirements for graduate degrees.

Graduate School Fee Differential: Washington State University Graduate School resident tuition for the academic year is \$7066 and nonresident tuition is \$17, 204. An additional mandatory fee of \$510 is required of graduate students. The University of Idaho academic year resident Graduate School fees are \$4508 and nonresident fees are \$9310.

Current Faculty, Technical Staff and Areas of Expertise

Washington State University

Boon Chew, Professor	functional foods
Stephanie Clark, Associate Professor	dairy chemistry, quality
Michael Costello, Research Technician	dairy analyses, entrepreneur
Richard Dougherty, Professor/Ext	food processing, safety, HACCP
Charles Edwards, Professor	wine chemistry, microbiology
James Harbertson, Assistant Professor/Ext	wine and grape quality (IAREC)
Dong-Hyun Kang, Associate Professor/Ext	food safety, microbiology
Karen Killinger-Mann, Assistant Professor/Ext	consumer food safety
Alan McCurdy, Professor	food safety, food processing, lipid chemistry
Jean Soon Park, Assistant Research Professor	functional foods
Joseph Powers, Associate Professor	protein and enzyme chemistry

Barbara Rasco , Professor	seafood quality, food analyses, food laws and regulations
Carolyn Ross, Assistant Professor	wine and food sensory chemistry
Russ Salvadalena, Creamery Manager	dairy products processing
Barry Swanson, Professor	emerging food processes, food chemistry
Karen Weller, Research Technician	sensory evaluation
Frank Younce, Supervisor	food process engineering
VACANT (IAREC position)	wine, fruit juice processing

University of Idaho

Drew Dalgetty, Supervisor	entrepreneur, economic development
Jerry Exon, Professor	food safety, toxicology
Kerry Huber, Associate Professor	starch chemistry, potato/wheat quality
Jeff Kronenberg, Extension Specialist	food processing, safety
Greg Moller, Technical Director	analytical laboratory
Caleb Nindo, Assistant Professor	food processing
Gulhan Unlu, Assistant Professor	food microbiology, biotechnology
VACANT (in negotiation)	food safety, distance education
VACANT (in negotiation)	food processing
VACANT	administration

Current and potential collaborating/adjunct faculty

Byung-Kee Baik, WSU Crop and Soil Sciences (Cereal Chemist)
 Gustavo Barbosa-Canovas, WSU Biological Systems Engineering (Food Engineer)
 Carter Clary, WSU Horticulture and Landscape Architecture (Food Processing)
 Marc Evans, WSU Statistics (Experimental design, statistics)
 Charles Gaskins, WSU Animal Sciences (Experimental design, statistics)
 John Fellman, WSU Horticulture and Landscape Architecture (Postharvest Physiology)
 Robert Haggerty, UI International Programs (International Food Security)
 Bingjun He, UI Biological and Agricultural Engineering (Food Engineer)
 Herbert Hill, WSU Chemistry (Food Analyses)
 Stephen Love, UI Plant Sciences (Potato Breeder)
 Jason Mann, WSU Animal Sciences (Meat Processing)
 Jill McCluskey, WSU School of Economic Sciences
 Sandra McCurdy, UI Family and Consumer Sciences (Extension Food Safety Specialist)
 Craig Morris, USDA-ARS Wheat Quality Laboratory (Cereal Chemist, Wheat Quality)
 John Miller, UI Animal Sciences (Meat Processing)
 Craig Parks, WSU Psychology (Sensory assessment of foods)
 Marvin Pitts, WSU Biological Systems Engineering (Rheology of Foods)
 Shyam Sablani, WSU Biological Systems Engineering (Food Engineer)

Juming Tang, WSU Biological Systems Engineering (Food Engineer)

Research Expertise and Emphases of Faculty.

General areas of research emphasis in food science are focused on improving:

- 1) food safety and quality;
- 2) health promoting, nutritional, and economic value of foods, food constituents, and bioproducts produced in the Pacific Northwest; and
- 3) environmental quality and energy conservation in the preservation and packaging of foods.

Research emphases in *Food Microbiology and Biotechnology* are directed to the genomics of lactic acid bacteria, enhancing the quality of dairy products, microbial food safety, and value-added chemicals from agricultural and industrial waste. Specific areas of research include: understanding and controlling common defects (flavor, texture, and appearance) associated with Cheddar-type cheeses; biopreservation of dairy and ready-to-eat meat products using bacteriocins from lactic acid bacteria; repair and improved detection of metabolically-injured foodborne pathogenic bacteria; and production of lactic acid and ethanol from potato processing and dairy industry waste.

Food Chemistry research centers on processing and development of foods from dairy, legume, fruit, vegetable, and cereal grain commodities, many of which possess starch as the predominant dry matter. Specific research emphases include development of screening methods for predicting potato end-use quality/processability; identification of wheat starch characteristics critical to functional behavior and product quality; assessment of the functionality imparted to whey proteins by ultra high pressure treatment; manipulation of starch properties within processed foods; and development of novel value-added foods or potential food ingredients from legume, wheat, asparagus, or potatoes.

The *Food Engineering/Processing* research program investigates transport of moisture and heat within food processes and products as a function of food quality. Projects involve experimental and computational techniques to optimize heat and fluid transport operations for producing safer and more wholesome food products with reduced energy consumption. Specific research areas include assessment of the rheological properties of fruits and potato cultivars; NMR imaging and computer simulations for optimizing drying of foods; applying porous media theories to minimize loss of food products due to stress-cracking; and modeling of bacterial inactivation during cooking processes.

The impact of processing methods on physicochemical properties of foods is being studied by assessing novel drying and evaporation technologies that achieve greater retention of bioactive compounds in foods to promote improvement of human health. This research is facilitated in a food engineering laboratory with state-of-the-art facilities for investigating the behavior of food materials under selected flow and thermal conditions. Many food science faculty collaborate with food engineering faculty from the Biological Systems Engineering Department conducting research on emerging food

processing technologies as a focus of the Center for Nonthermal Processing of Food. Thermal, rheological, and mechanical properties of foods and the raw materials used in food processing and packaging are studied to understand their impact on food quality. Viscoelastic properties as well as glass-liquid and other weak transitions in food are investigated at non-destructive frequencies to explain the physicochemical changes encountered during processing.

Specific research projects include:

- development of new processes and emerging food preservation technologies to improve the microbial safety of foods;
- investigations into mechanism(s) of action of food borne constituents that may improve human health or reduce chronic human disease;
- investigation of soft wheat and potato quality, functionality and end-use potential;
- assessment of starch behavior and function in food processing operations;
- investigation of the physicochemical and functional properties of dairy and meat proteins;
- utilization of novel protein and starch ingredients in food systems;
- improved food dehydration processes;
- binding and controlled release of flavors from whey proteins; and
- examination of natural and engineered processes in the characterization, fate, transport, and control of environmental and food system contaminants.

A more specialized area of research emphasized by the School of Food Science is *enology*. The Pacific Northwest is witnessing a tremendous increase in the size of the wine industries, from less than 80 Washington wineries in 1989 to more than 400 in 2006. With this rapid expansion, problems involving the microbiology and chemistry of wines and their impact on sensory characteristics are being identified by local wineries. To solve these problems, research information from other wine regions of the world can be utilized, but application is limited due to differences in viticulture and enological practices. Furthermore, scientific understanding of the complex microbiological and chemical processes which occur during production of wines is surprisingly minimal. Research with locally produced wines is necessary to solve enology related problems in Washington and to assist winemakers' production of high quality value-added wines.

WSU Prosser Enology Research/Extension Program is a liaison between the wine industry and the university. Insight gained through basic and applied research is shared with the wine industry as we both have the same goals - the betterment and continued success of Washington winemaking. In addition to seminars and other outreach activities, the Enology faculty supplies coursework for the online Certificate Program in Viticulture and Enology.

The research portion of the enology program explores multiple established parameters of wine and fruit quality assessment. A special emphasis is placed on phenolics in grapes and wine, specifically their biochemical and chemical changes during grape ripening, winemaking and aging. The program also plays a support role for the

viticulture program, helping to validate field experiments by conducting chemical analysis of fruit and small lot winemaking at the Prosser IAREC facility.

Toxicology is defined as the adverse effect of chemicals on living organisms and assessment of the probability of their occurrence. Food toxicology is an applied research division of toxicology that deals specifically with synthetic or natural chemicals in foods. Many foods, especially fruits and vegetables contain beneficial health promoting chemicals. These bioactive chemicals, such as antioxidants are also called nutraceuticals because of their health promoting properties. Foods that contain health promoting constituents are often called functional foods. The functional foods research program in food science is directed to the study of health promoting constituents of functional foods and their relationship to enhancement of the immune system and prevention or treatment of cancer.

Outreach and Extension.

Outreach and extension contributions to the food industry and consumer safety in Washington and Idaho include short courses, workshops and continuing education programs to improve food safety, quality and preservation efficiencies. The extension efforts of Richard Dougherty and Karen Killinger-Mann in Washington and Jeff Kronenberg and Sandra McCurdy in Idaho are accomplished and well recognized. Both WSU and UI faculty provide outreach support for the food industry, with efforts of Jeff Harbertson, Charles Edwards, and Carolyn Ross in the wine industry; Stephanie Clark in the dairy industry; and Joseph Powers in the vegetable and fruit processing industries deserving of special recognition. Dick Dougherty, Michael Costello, Jeff Kronenberg, and Drew Dalgetty provide direct analyses and support for entrepreneurial food product development and marketing efforts in Washington and Idaho. Frank Younce supervises the Food Science Pilot Plant and Drew Dalgetty supervises the Food Technology Center (Caldwell, ID), pilot-scale processing facilities, to respond to explicit inquiries and support product development efforts of small food businesses and food entrepreneurial activities. The pilot plants also provide valuable guidance and consulting services to food and allied industries.

The food processing industry extension programs go well beyond traditional activities in food processing extension to provide on-site professional level technical assistance to food processors interested in improving their safety, efficiency and profitability. Technical assistance is provided in such areas as sanitation practices, Hazard Analysis Critical Control Point (HACCP) programs, food safety, microbiological collection and identification, waste water analyses, workplace safety, strategic planning, quality assurance, lean manufacturing techniques to enhance productivity, packaging, product traceability, marketing, and product distribution. This unique combination of educational programs and on-site assistance yields a documented several million dollar positive economic impact on the Washington and Idaho food industries annually. Outreach efforts also include a web-based certificate program in Food Science and Technology providing food industry professionals with needed training on essential food science and technology topics.

There is an on-going planning effort to organize the food processing extension specialists in the Pacific Northwest states of Idaho, Oregon and Washington into a consortium to respond to issues and problems associated with preserving safe foods. The organizational effort was initiated by Dick Dougherty and includes representatives from the USDA supported Food Innovation Center, Portland, OR, and an advisory role from representatives of the Northwest Food Processors Association.

Food Science Facilities

The School of Food Science at Washington State University is housed in a 35,000 square foot building (1989) containing contemporary well equipped chemistry, microbiology, and sensory research laboratories, as well as a processing pilot plant. The faculty are provided adequate office space, personal computers, and research laboratories as needed. The WSU food processing pilot plant, a modern 7,100 square foot facility in the Food Science and Human Nutrition Building, consists of a large process room with quick utility connections for steam, three phase electric power, potable water and compressed air. A large rear entry provides access for large equipment and forklifts. Adjoining support rooms include space for product storage, equipment maintenance, and plant administration. The pilot plant provides space for equipment and process performance comparisons, small batch optimization, and food preparation. Users can choose from a wide range of plant equipment or bring their own for custom processes. Instrumentation systems on networked computers for process monitoring are available for special requirements. A laboratory for determination of the texture, color and other physical properties of foods is also available.

The faculty of the School of Food Science at the University of Idaho has offices or laboratories in four buildings on the Moscow Campus: Holm Research Center (15,435 sq. ft.), the Food Research Center Sensory Lab (302 sq. ft.), Agricultural Sciences Building (8,500 sq. ft.) and the Agricultural Biotechnology Building (2,336 sq. ft). The Holm Research Center primarily houses food science toxicology faculty and the Analytical Sciences Laboratory, a contract service laboratory for the State of Idaho. The School of Food Science also oversees the Food Technology Center, a 7,000 sq. ft. pilot plant plus adjacent offices and classrooms, in Caldwell, Idaho. A food processing specialist has an office in the UI Water Center in Boise with the Department of Engineering. One faculty member is based at CAMBR in Post Falls, ID.

The success of School of Food Science teaching, research, and extension programs are highly dependant on both WSU and UI food science facilities.

Washington State University Creamery.

Washington State University has its own creamery, where students, staff, and visitors may purchase delicious ice cream and cheeses. The cheeses produced here have won national and international awards, as well as earned a reputation worthy enough to support a direct marketing business. The WSU Creamery is a self-supporting unit of the Department of Food Science & Human Nutrition in the College of Agriculture, Human &

Natural resource Sciences. Aside from providing jobs for up to 70 students per year, the revenue from the sales of ice cream and cheese helps support teaching and research. The creamery includes a research laboratory adjacent to the production area for the preparation of small volumes of cheeses, ice cream, and other dairy products.

The Creamery manufactures 450,000 pounds of cheese each year, made from Grade A pasteurized milk produced at the university-owned dairy farm and using lactic acid cultures. Cougar Gold, the most popular cheese, accounts for about 80% of the total cheese produced. Other cheeses include a Monterrey Jack-type cheese that is called Viking, Crimson ***FIRE!***, American Cheddar, Smoky Cheddar, Dill Garlic, Sweet Basil, and Hot Pepper, which includes diced jalapeno peppers.

USDA/ARS - Western Wheat Quality Laboratory

The mission of the Western Wheat Quality Laboratory is threefold:

- 1) To conduct cooperative investigations with breeders, geneticists and pathologists in the seven western states (Arizona, California, Idaho, Montana, Oregon, Utah and Washington) to evaluate the milling and baking quality characteristics of wheat selections produced each crop year. These investigations include several market classes and subclasses of wheat which are grown commercially in the Pacific Northwest and the Western Region. The investigations relate to wheat cultivar quality for commercial production and consumer acceptance with the goal of increasing economic benefit to the wheat industry.
- 2) To conduct basic research into the biochemical and genetic basis of wheat quality in order to better understand the fundamental nature of end-use functionality. The results of this basic research are incorporated into the cultivar development program to provide enhanced feedback into the selection process.
- 3) To develop new and better means to assess the quality of potential wheat cultivars through identification of critical quality parameters. This is coupled with the creation of new methods to assay the identified quality attributes.

Library Facilities

Washington State University and the University of Idaho libraries currently collaborate in their provision of hard copies of periodicals. Access to electronic peer reviewed food science, biochemistry, microbiology, and biotechnology journals and research manuscripts is excellent. Stephen Borrelli is currently the librarian responsible to the food science faculty at Washington State University, and Charles Edwards is the faculty liaison to WSU libraries. No new or additional facilities, subscriptions, or other library holdings are expected or proposed upon the approval of the School of Food Science.

School of Food Science Benchmarks

1. **Benchmark:** Recruit and retain an increased number of high achieving undergraduate majors per academic F.T.E. in Food Science.

Target: Increase the number of undergraduate Food Science majors at WSU by 25% each year for the next five years. Considering a current undergraduate enrollment of 20, the targeted undergraduate enrollment in food science at WSU after five years (2012) is 61 students.

Impact: Provide more educated food science graduates to fill positions in the Pacific Northwest food industry.

Tools: Increase student recruitment by assigning recruitment responsibilities to selected faculty. Increase the number of scholarships and the scholarship awards to attract students to food science.

2. **Benchmark:** Undergraduate participation in programs of research/scholarship.

Target: Continue the steady increase in number of faculty with one or more undergraduates participating in their research program.

Impact: Expose undergraduates to the scientific method, development, planning, conduct, and interpretation of research results, and opportunities presented by admission to graduate school.

Tools: Develop proposals and identify scholarship funds to financially support undergraduate employment in research laboratories. Distribute and advertise employment opportunities in the WSU Creamery among the undergraduates in food science.

3. **Benchmark:** Increase numbers of food science graduate students.

Target: Increase the number of graduate students in food science 10% each year for the next five years. Considering a current baseline of 30 graduate students in food science, the target graduate student enrollment in 2012 is 48 graduate students.

Impact: Greater research productivity observed as peer reviewed research manuscripts, intellectual properties, and extramural and food industry resource support.

Tools: Increased recognition accompanied by increased extramural and industry resources to support graduate students. Reward faculty during annual review for successful recruiting and mentoring graduate students, and increased research productivity. Promote collaboration with food science faculty at the University of Idaho as well as faculty in Biological Systems Engineering, Horticulture and

Landscape Architecture, Crop and Soil Sciences, and the School of Economic Sciences to recruit and mentor graduate students.

4. **Benchmark:** Ratio of doctoral to masters students.

Target: The current ratio of PhD to MS students in food science is 1:2. The goal of the food science faculty at WSU over the next five years (2012) is to increase the PhD to MS graduate student ratio in food science to 1:1.

Impact: Strive to reach the Washington State University Graduate School goal to achieve a 1:1 ratio of PhD to MS graduate students across the University. The quality and productivity of graduate students is expected to improve with an increased number of PhD candidates.

Tools: Increase recruitment efforts for graduate students from graduates of the fundamental physical and biological sciences within WSU, and increase recruitment of domestic and international graduate students into selected research programs.

5. **Benchmark:** Increase extramural and industry resources supporting research and scholarship in food science.

Target: Increase extramural support for research, teaching and extension activities by 10% each year for the next five years. Selecting \$750,000/year as a baseline, the School of Food Science goal is \$1,207,882/year by 2012.

Impact: Provide additional funding to conduct research and scholarly activities, recruit and mentor additional graduate students, and provide additional support for teaching and assessment activities.

Tools: Encourage attendance at proposal writing workshops within the University as well as workshops promoted by professional societies and federal agencies. Identify and allocate financial rewards for seed grants and pilot projects that can be submitted as larger proposals for extramural or industry support. Encourage and support collaborative multidisciplinary research efforts to propose and conduct research.

6. **Benchmark:** Foster integrated research and extension programs to increase intrastate, interstate, regional, national and international impacts.

Target: Increase multi-state extension programming to improve sanitation, hygiene and food safety throughout the production, food preservation, retail, food service, and consumer handling, preparation, and consumption control points along the food chain. Increase the number of food science faculty with no extension appointment participating in documented outreach activities. Increase the documented extension outreach and engagement activities, publications, and citations accorded to food science extension faculty each year. Increase the documented transfer of food science research and technologies to the food industry each year.

Impact: Improve overall food safety in production, processing, retail, food service, and consumer handling, preparation or consumption of foods. Provide a safe and accessible food supply for consumers. Improve food safety and quality provided by the food industry.

Tools: Encourage food science faculty to participate in collaborative efforts to improve the safety of the food supply from production to consumption. Encourage extension faculty to increase their efforts to improve the safety of the food supply.

7. **Benchmark:** Increase the total amounts of gifts received from alumni and the food industry.

Target: Increase financial gifts to the School of Food Science by 10% each year for five years. Utilize the gifts to increase the number and amounts of scholarships awarded to undergraduate and graduate students of food science. Using \$20,000 annual contributions as a baseline, the food science goal is \$32,210 per year by 2012.

Impact: Increase the number and quality of undergraduate and graduate students. Increase the visibility and recognition of food science, as well as promoting the personal rewards associated with supporting the continuing efforts of food science faculty and students to provide safer foods for all consumers.

Tools: Promote both the needs and rewards associated with financial contribution to the School of Food Science. Recognize all financial contributions personally, taking the time to identify the way(s) in which the financial contributions were used and the rewards garnered by faculty or students of food science.

School of Food Science Hiring Plan, 2007-2008.

The School of Food Science hiring plan is directed at three prioritized goals: 1) to maintain attention to regional research needs, 2) maintain instruction excellence in undergraduate classes in the core food science curriculum, and 3) improve research productivity and introduce classes to identify and exemplify the health-promoting qualities of foods.

The ranked order of position priorities for the School of Food Science for the 2007-2008 academic year are:

1. Director, School of Food Science, Pullman/Moscow
2. Assistant/Associate Professor, Dairy Chemistry, Microbiology and Processing, Pullman
3. Assistant Professor, Food Chemistry (health promoting functional foods), Pullman
4. Recruiting and Development Coordinator, Pullman
5. Assistant Professor, Cereal Chemistry, Pullman

6. Assistant Professor, Food Microbiology (wine fermentation), Pullman
7. Research Technician, Classroom and Laboratory Support, Pullman

Director, School of Food Science, Pullman/Moscow (50% WSU/50% UI, 100% Administration)

Responsibilities: Administer the School of Food Science faculty and staff; Manage the School budgets and provide oversight for the recruitment, retention and time to graduation for undergraduate and graduate food science students; Effectively communicate policies and procedures of the Universities, Colleges and the School of Food Science to the faculty and staff; Evaluate the performance of faculty and staff; Encourage continual progress and improved productivity in research, extension and teaching programs of the School. Effective administration will lead to successful achievement of the School of Food Science, CAHNRS, and WSU/UI benchmarks and goals. The strategic areas of excellence will be better defined, refined and approached with effective communication and administration.

Dairy Chemistry and Processing, Assistant/Associate Professor, Pullman (60% research/40% teaching).

Responsibilities: Plan, propose, conduct, interpret and communicate independent and collaborative research directed to the chemistry of milk, whey, cheese, and other dairy products of interest to the regional dairy industry and the dairy products research community. Teach classes in Dairy Chemistry, Microbiology, and Processing; Evaluation of Dairy Products; and Food Safety. Provide requested recruiting, advising and mentoring for undergraduate and graduate food science students with attention to providing undergraduate food science students with research opportunities and successfully mentoring graduate food science students. The proposed position will contribute to food safety and quality research and identification of health promoting foods emphases of the School of Food Science, as well as respond to the prominent and influential dairy industry in Washington and Idaho. This position will provide continuity in dairy products education and research, with expectations for successful contributions leading to expansion of undergraduate and graduate programs, and excellent opportunities to generate significant regional commodity commission and extramural funding.

Food Chemistry (Health Promoting Foods), Assistant or Associate Professor, Pullman (75% Research/25% Teaching).

Responsibilities: Plan, propose, conduct, interpret and communicate independent and collaborative research directed to identification, elucidation, validation and potential contribution of health promoting constituents and qualities of selected foods. Plan and teach undergraduate classes in food chemistry and graduate classes in the identification, analyses, validation and promotion of health promoting functional foods. This position will contribute to the food safety and quality and health promoting foods emphases of the School of Food Science, as well as providing recruiting and advising of undergraduate and graduate students. The position will provide excellent independent, collaborative, and integrative

opportunities to generate internal and extramural research funding. There exists great potential for this position to provide substantial leadership and contributions to the emerging CAHNRS area of preeminence identified as functional foods. The potential contributions to the food industry and the improved health of consumers upon identification of foods that will promote the health or extend a healthy life style are self evident.

Recruiting and Development Coordinator, Pullman (100% Teaching)

Responsibilities: Plan, develop and organize a marketing and recruiting program to improve recruiting of undergraduate and graduate food science students. Design, develop and maintain the School of Food Science website. Coordinate a School of Food Science development effort with the WSU and UI Foundations, the Development Officers in CAHNRS and CALS to improve gifts and donations to the School; identify benefactors, foundations and other resources willing to entertain submission of selected research proposals from the School of Food Science faculty. Encourage and assist School of Food Science faculty to prepare, consolidate and submit research proposals for review and consideration by granting agencies and philanthropic organizations.

Cereal Chemistry, Assistant Professor, Pullman (70% Research/30% Teaching).

Responsibilities: Plan, propose, conduct, interpret and communicate independent and collaborative research in cereal and grain legume chemistry and processing. The interest in generating safe foods from traditional, genetically modified, and recently identified cereal and legume grains is growing based on the improved health associated with whole grain and fiber consumption. Research focused on the health promoting constituents of cereals and legumes is contemporary and important to the dry land production of wheat, barley, and legume crops in Washington and Idaho. The individual in this position will be expected to teach an undergraduate course in cereal chemistry and develop a graduate course in the identification, extraction, fractionation, and utilization of constituents from selected cereal and legume crops identified as being of economic importance to regional producers and providing functionality and health promoting qualities of benefit to the food industry and consumers. The research and teaching expected from this position will contribute to the food safety and quality and health promoting emphases of the School of Food Science and CAHNRS. Additional contribution to the dry land farming area of preeminence, and interdisciplinary opportunities with cereal and legume geneticists and producers may result in extraordinary contributions to intramural and extramural research funding.

Food Microbiology, Assistant Professor, Pullman (40% Research/30% Teaching/30% Extension).

Responsibilities: Plan, propose, conduct, interpret and communicate independent and collaborative research directed to the fermentation of fruit juices into quality wines. Teach classes in food microbiology, wine and beer fermentations, and the quality fermentation of other foods. Potential collaboration with the proposed dairy chemistry and cereal chemistry positions on fermentations in cheese and

bread making, respectively, will promote both the research and teaching programs in the School of Food Science. The extension portion of this position will be expected to collaborate with Jim Harbertson, Dong Hyun Kang, Dick Dougherty, and other Viticulture and Enology faculty to strengthen on-going face-to-face and DDP workshops and certificate programs. This position will contribute to the School of Food Science, Viticulture and Enology Program, and CAHNRS emphasis on being responsive to the expanding wine industry in Washington and Idaho. Although the potential to generate extramural research funds to improve wine fermentations may not be great from agencies supporting fundamental research, the potential to generate extramural support from the wine industry in support of fermentation research and the potential for generating extramural support for more specific research on selected microorganisms with food safety implications may be greater.

Research Technician, Classroom and Laboratory Support, Pullman, (50% Research/50% Teaching).

Responsibilities: Provide continuity to teaching and research programs in the School of Food Science by coordinating purchase and maintenance of shared instrumentation, equipment and supplies.

Proposed Memorandum of Understanding for the formation of a School of Food Science merging the faculty in Food Science from Washington State University and the faculty of the Department of Food Science and Toxicology at the University of Idaho.

DRAFT

MEMORANDUM OF UNDERSTANDING

**Between Washington State University and the University of Idaho
Proposing the Formation of a**

Bi-State School of Food Science

This Memorandum of Understanding (MOU) is made and entered into by and between Washington State University, hereafter referred to as **WSU**, and the University of Idaho, hereafter referred to as **UI**, to form a Bi-State School of Food Science, hereafter referred to as **BSSFS**, by merging selected and designated faculty, staff, facilities and resources presently in the Department of Food Science and Human Nutrition, hereafter referred to as **FSHN**, at WSU and the Department of Food Science and Toxicology, hereafter referred to **FST**, at the UI. The Bi-State School of Food Science will be one administrative unit within the College of Agriculture, Human, and Natural Resource Sciences at WSU and the College of Agriculture and Life Sciences at the UI.

Administration

- A single Director will lead the BSSFS. The Director position will be funded with 0.50 FTE at each university. Fringe benefits will be shared equitably and allocated at the University of the Director's choice such that the Director will not be disadvantaged by two part-time appointments. The Director will be responsible to both the WSU Dean of the College of Agriculture, Human and Natural Resource Sciences and the UI Dean of the College of Agricultural and Life Sciences.
- The Director will be responsible for administration and oversight of budgets, personnel and programs in teaching, research and extension/outreach/service for faculty, staff and students at both WSU and the UI.
- Procedures for conducting the business of the BSSFS will be developed by the Director and faculty in close cooperation with appropriate administrative personnel at both universities, including the Deans, Provosts, and Vice Presidents of Research and Finance.
- The BSSFS will initially be funded from existing resources of the Department of FSHN at WSU and the Department of FST at the UI. Any inter-university transfer of funds will be by mutual agreement of the appropriate administrators at both universities. Funds originating from each university will be used according to financial policies and procedures established at the respective universities.

Faculty

- WSU faculty in the BSSFS will be evaluated for promotion, tenure, performance and salary adjustments according to the relevant policies and procedures in the CAHNRS at WSU. UI faculty in the BSSFS will be evaluated for promotion, tenure, performance and salary adjustments according to the relevant policies and procedures of the College of Agriculture and Life Sciences at the UI. Faculty from both universities eligible to review and vote for promotion and tenure of junior faculty will be involved in the BSSFS vote for tenure and promotion of faculty at WSU and the UI.
- WSU faculty in the BSSFS will be granted all privileges normally associated with adjunct faculty status at the UI and UI faculty with appointments in the BSSFS will be granted all privileges normally associated with adjunct faculty status at WSU. Faculty in the BSSFS will be listed in WSU and UI catalogs as BSSFS faculty.
- BSSFS faculty will initially remain housed at their respective universities, but in the future faculty may be housed at the university most appropriate for programmatic collaboration and success.

- Financial support for faculty, staff, or TA/RA positions in the BSSFS will not be unilaterally reduced or eliminated without consulting appropriate college and university administrators at both WSU and the UI.

Students

- Students may enroll in the BSSFS at either WSU or UI. Students will be required to meet financial and undergraduate and graduate curricular requirements of the respective universities in which they are enrolled.
- Degrees will be granted from the respective universities in which the students are enrolled.

Curricula

- The curricula for the undergraduate and graduate degree programs will be formulated by a BSSFS curriculum committee and approved by the BSSFS faculty.
- General education and other degree requirements (i.e. non-food science courses such as mathematics, social sciences, humanities, etc.) will be satisfied by existing courses at either university for students in the BSSFS.
- Food science courses will be the responsibility of the faculty in the BSSFS from both campuses depending on expertise, facilities and scheduling logistics. It is anticipated that an appropriate balance of courses in Food Science curricula will be taught on each campus.
- Food science courses will be cross-listed at both universities unless exempted by a faculty consensus. Examples of exemptions may be undergraduate lower division courses used for recruitment and/or retention of students.

Productivity and Scholarly Activity (Research)

- Productivity measures such as undergraduate and graduate student numbers, student credit hours, certified majors, research proposals, publications, and grant funding resulting from the efforts of the BSSFS faculty will be acknowledged by both universities.
- Faculty within BSSFS will have appointments as tenure track faculty at their home university, and as adjunct faculty at the partner university. BSSFS faculty must adhere to both the WSU Faculty Manual and the UI Faculty-Staff Handbook for responsible conduct of research.

- BSSFS single investigator grants or contracts will be managed by the investigator's home university and the home university's Facilities and Administration (F&A) policies will apply. For BSSFS multi-investigator research awards or contracts, the lead Principle Investigator's university will manage the grant or contract. The F&A rate will match the federally approved rate for the project's lead university.
- Faculty from either university may serve as collaborators to principal investigators at the other university for multi-university funded projects. To encourage and promote collaboration among faculty in the BSSFS, both universities agree to waive subcontract F&A costs.
- For multi-investigator grants and contracts, the lead university's F&A indirect cost recovery (ICR) will be distributed according to that university's business policies. Portions are distributed to the College and Department or School to support their research programs. The ICR for BSSFS multi-investigator grants or contracts will be apportioned to the respective WSU and UI faculty based upon their respective effort contribution to the research. Generally, the principal and collaborating investigators will predetermine in writing the degree (percentage) of participation in the proposed research. As the research proceeds, the efforts of the investigators may vary and the Director will define an equitable distribution of the BSSFS portion of the ICR.
- At both universities, the university is the assigned owner of new intellectual property generated on its premises and by its employees. Intellectual property includes patentable inventions, know-how, copyright, software, materials and/or trade secrets. When BSSFS faculty members generate new intellectual property, they must file an invention disclosure in which the percentage of each inventor's contribution is declared. BSSFS faculty inventions arising from single institution management will be managed by the inventor's university. In the case of multiple inventors from both universities, the rights to the invention will be jointly held by the two universities. Mutually agreed upon management of the disclosed intellectual property will be assumed by either the WSU Office of Intellectual Property Administration or the Idaho Research Foundation, Inc. Management practices will adhere to the policies of the managing university. After intellectual property protection is secured, technology commercialization will be undertaken by the respective research foundations and may include licensing to established for-profit companies or company spin-out opportunities.
- Distribution of license income resulting from intellectual property commercialization will follow the policies of each university with benefits accruing to the research foundations, universities, BSSFS, and inventors apportioned by the inventors declared percentage of invention. Similarly, the respective universities and their research foundations will absorb the costs and liabilities for management of new technologies.

- Other resources may accrue from the research conducted by BSSFS. Examples include purchase and location of major research instrumentation, donor created Fellowships or endowments, or construction of research facilities. The location and obligations of these resources will be determined by the Director in consultation with BSSFS faculty.

External Advisory Board

- An Advisory Board comprised of individuals from regional and national food and allied industries, alumni, and state and federal governmental agencies will be invited to advise the faculty in creation and evaluation of programs and strategic planning for the BSSFS. Representation on the Board will include members with interests in food related programs in Idaho and Washington. The Advisory Board will meet at least twice a year. Membership on the Advisory Board will be determined by a cooperative effort of the faculty and Director, with oversight by college administrators at both universities.

Indemnification

To the extent legally liable, each university shall remain responsible and agree to hold harmless the other university for claims, judgments, losses, and/or costs (exclusive of attorney's fees) arising from specific tasks, acts or omissions for which each university is responsible.

The respective liability of either university is subject to the application of limitations of each university as a government entity and by the application of laws of each state.

Each university shall promptly notify the other of any and all claims for which that university possesses knowledge; each university shall fully cooperate with the other or its respective representatives in the defense of any and all claims, complaints or causes of action.

Nondiscrimination

Each university agrees that it shall not discriminate in any of its programs or contracts against any person because of race, color, religion, sex, age, marital status or presence of any sensory, mental or physical disability. Both WSU and the UI agree to comply with all federal, state, and local laws and regulations pertaining to discrimination.

Entire Agreement

This Memorandum of Understanding and any attachments constitute the entire understanding between the universities with respect to the formation of a Washington State University and University of Idaho Bi-State School of Food Science and supersede

any and all prior understandings and agreements, oral and written, relating hereto. Any amendments hereof must be in accord with the following paragraph on “Amendments”.

Amendments

This MOU may be amended by mutual agreement in writing executed by WSU and UI representatives executing this MOU or their successors, and appended hereto.

Additional Operational Guidelines for the School of Food Science

In addition to previously described administration, the following operational guidelines for particularly pertinent issues are set forth. The School of Food Science faculty holds these precepts for the overall and day-to-day administration of the school.

Faculty Searches: When faculty positions are authorized to fill requested faculty positions, vacancies from retirements, resignations or other reasons, the School Director shall appoint a search committee to 1) prepare a position description and 2) screen and prioritize candidates for presentation to the Director and College administration. The position description will be consistent with priorities established in the School of Food Science strategic and hiring plans for achieving excellence in designated areas of emphasis. The search committee will be composed of faculty familiar with the expected performance in research, teaching and outreach from WSU and the UI.

Support for Faculty Operations: The School of Food Science Director will allocate discretionary support funds allocated to the School by the College administration for office supplies, computers, telephone, travel, and other operational expenses. Current allocations for the WSU Department of Food Science and Human Nutrition are: Research ~ \$48,300, Teaching ~ \$34,800, and Extension ~ \$5,100. Future allocations for the School of Food Science from CAHNRS (WSU) and CALS (UI) are being negotiated. Support for research will be allocated as a one time allocation each fiscal year for faculty holding appointments in the Agricultural Research Center of CAHNRS. The current allocation for research (2006-2007) is \$500.00 and travel is \$250. Future allocations will be determined by the Director after discussion with the faculty. Surplus operational funds will be held in reserve and allocated at the discretion of the Director for research, travel, or operational support.

Dispute Policy: The Director of the School of Food Science, with advice from senior faculty, will resolve disputes arising among faculty, staff, and students of the School. The Director, in accordance with the provisions of the Faculty Manual, will resolve all other faculty issues. The Director will resolve student issues with advice from the appropriate graduate committee or undergraduate advisor.

Annual Review: Annual review will address performance evaluation based on the productivity, accomplishments, contributions, awards, effort, and service of each faculty member to the School of Food Science, the College, and the University during the past year. The review process will value both established accomplishments and work in

progress. The School of Food Science will not expect each faculty member to contribute in the same manner. Given the potential for comparative strengths among faculty members, each faculty member in conjunction with the School Director will establish personal performance expectations for the next year, including individualized expectations for the evaluation of each activity. The annual review merit score assigned by the Director for each faculty member will reflect a measure of success in meeting the established performance expectations. The annual review will reflect agreed upon performance expectations in research, teaching, and extension/outreach/service.

Evaluation of teaching, recruiting and advising: Each faculty member assigned advising responsibilities is expected to be available for students at times appropriate for registration, general academic advising, and career planning. Faculty advisors are expected to understand and articulate the rules that apply to student advising. Exceptional commitment to advising shall be noted in the annual review and evaluation. In addition, faculty members making efforts to recruit undergraduate or graduate students will receive consideration in the annual evaluation commensurate with the level and success of their recruiting efforts.

Teaching will be evaluated on several dimensions. The Director will consider, but not rely solely on, student evaluations of teaching when evaluating teaching performance. With respect to student evaluations of teaching, any summary, individual or overall scores shall be considered in the context of the number of students in each class, the level of the class (principles, intermediate, advanced undergraduate, core graduate, elective graduate), the nature of the class (writing in the major, etc.), the availability of teaching assistants, and any other particular characteristics that may influence student evaluation. In addition, teaching evaluations may rely on peer evaluations or a review of the course materials such as syllabi, tests, assignments or distribution of grades. The teaching evaluation will also take into consideration the number of classes taught and service on MS and PhD committees, with additional value placed on chairing graduate committees when compared to serving as a member of graduate student committees.

Evaluation of Service: The Director will evaluate the participation of each faculty member in service activities, giving due credit especially to those activities that reinforce the progress of the School of Food Science to achieve its stated mission and goals. Service on departmental and college committees will be recognized. Public service and professional service contributions and awards bringing recognition to the School of Food Science within the University, region, United States and internationally will be identified and rewarded.

Evaluation of Research: The School of Food Science will encourage high quality research. Research and scholarship is expected of all faculty. The Director will evaluate faculty performance on research and scholarship by taking into consideration the quality of research based on peer review and the contribution of the research and scholarship to the strategic plan, mission, and goals of the School of Food Science. Peer reviewed research supports the tradition aspirations of scientific study, but is not the only measure of research output. In the annual process of establishing expectations for

individual faculty members, consideration will be given to identifying the most appropriate and effective outlets and quality measures for an individual faculty member's approach to research and scholarship contributions. The research evaluation will consider the advising and teaching assignments and outreach expectations for each faculty member. Examples of research productivity and scholarly activity (alphabetically) include:

- Articles in the popular press
- Authorship of research proposals
- Awarded research proposals
- Book reviews
- Bulletins, reports, and circulars
- Chapters in books, professional monographs
- Editorship (Professional Journal) or editing responsibilities (Books)
- Presentations (oral or poster) at professional meetings
- Peer reviewed research manuscripts, review manuscripts, or other publications
- Research manuscripts accepted and in press
- Research manuscripts submitted for review

Evaluation of extension/outreach: Evaluation of extension activities may be applicable to any faculty member because of the nature and composition of extension, outreach and policy programs often the end result of food industry or consumer needs. Evaluation of extension, outreach or policy development programs must remain flexible and measurably appreciative of the dynamic and varied environments leading to the formulation of such programs. Differing only to the extent that their audiences are often heterogeneous and voluntary, faculty clearly function as professional educators and are expected to convey knowledge and deliver program information proficiently and effectively. The size of the audience alone does not reflect the merits of program delivery. An assessment of alternative means employed to best fulfill this function reflects the specifics of the operational environment.

A second dimension of evaluation of extension, outreach and policy development programs rests on the faculty member's ability to identify science and economics based problems and opportunities, and to deliver educational programs compatible with the mitigation and exploitation of those problems and opportunities. Faculty will be evaluated on their ability to identify, prioritize and resolve problems, and to utilize their professional training, institutional research efforts, and experiences to articulate scientific concepts and economic relationships that are meaningful and relevant to problem resolution.

Faculty will also be evaluated on their ability to identify interested groups, establish working relationships with selected groups, and design tailored programs that fulfill client needs in a manner that contributes towards the world class reputation of the faculty, the School of Food Science, College and University. Faculty will also be evaluated on their ability to organize and articulate food science research and regulatory

issues to their clients and colleagues, and function in a manner complementary to problem resolution. The overall evaluation of extension faculty will be impact based and linked to industrial and social decision-making and enhanced economic and social welfare.

Budget Considerations: The operational budgets for the School of Food Science will be dependent on negotiations with College Deans upon approval of the formation of the School of Food Science from the merger of the Department of Food Science and Human Nutrition, WSU, and the Department of Food Science and Toxicology, UI. Current operational support is adequate to support the on-going programs in food science at both Washington State University and the University of Idaho. Reduction in these operational allocations is not anticipated. The only additional funding necessary for the formation of the School of Food Science is the search and identification of a Director for the School. The allocation necessary for identifying and employing a successful Director is fully supported by the Deans of the College of Agricultural, Human, and Natural Resource Sciences, WSU, and the College of Agriculture and Life Sciences, UI.

RA/TA Assignments: The Director of the School of Food Science and Graduate Affairs Committee of selected faculty from WSU and the UI will prioritize applications for assistantships and assign graduate students to state supported RA/TA positions. RA/TA assignments will be based on the teaching, research, and extension needs of the School of Food Science faculty.

Development Funds: Discretionary gifts to the development fund will be available for allocation by the Director consistent with the mission of the School of Food Science. Dedicated funds will be retained in individual development fund accounts assigned to individual faculty for their use at their discretion.

APPENDICES