University of Massachusetts
Department of Food Science Newsletter
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Opening of the Fergus Clydesdale Foods for Health and Wellness Center

On April 8th, 2011, the Department proudly opened the new 7,800 sq ft, state-of-the-art Fergus Clydesdale Center for Foods for Health & Wellness.

The ribbon cutting ceremony for the opening of the Fergus Clydesdale Center for Foods for Health and Wellness. From left; Noel Anderson, Pepsico and Advisory Board Chair; Robert Holub, UMass Chancellor; Ferg Clydesdale, Man of Honor; Stanley Rosenberg, State Senator; Eric Decker, Department Head; Steve Goodwin, Dean of College of Natural Sciences and JiaJia Rao, graduate student.

This project was made possible by the tremendous generosity of our Alumni whose donations set the stage for unique partnerships with the Food Industry and the University to construct new labs and renovate existing space to the tune of $5.6 million. The center features chemistry and biology laboratory space for research in developing healthier and safer foods.


The new Clydesdale Center includes six named laboratories, one each for food science industry partners ConAgra, Kraft and PepsiCo, and three named for alumni and major donors Charlie and Mickey Feldberg, Gil and Carol Leveille and Karakian "Cutty" Bedrosian. The Department raised a total of $1.8 million. The University matched that $1.8 million contribution to establish the $3.6 million Clydesdale Center and provided an additional $2 million to renovate several labs on the third floor of Chenoweth Lab. Of three new food science labs on the second floor of Chenoweth Laboratory, two will be occupied by researcher Julian McClements and one by Yeonhwa Park. The third floor will house food scientist Hang Xiao's research laboratory and a teaching lab.


Named lab donors Karakian "Cutty" Bedrosian (left) and Charlie and Mickey Feldberg (right with Ferg).

The opening featured several speakers including the Industry representative from the named labs. University catering worked with the Department to create a special menu that features food products from each of the company donors (Kraft, Conagra, Pepsico, General Mills, OceanSpray Cranberry, M&M Mars and Coca-Cola).

Ivette Bassa, Vice President, Kraft Latin America and Mehmood Kahn, Chief Scientific Officer, Pepsico give presentations on Foods for Health and Wellness during the Center opening.

As part of the opening the University also worked with the Department to develop a new set of web pages. To learn more about the Center, please go to:

http://www.umass.edu/foodsci/clydesdale-center/index.html

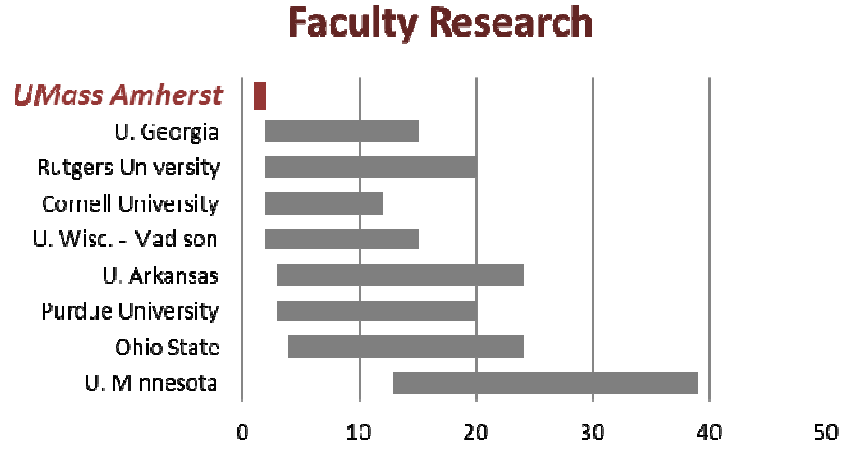
In addition, the senior class developed an outstanding slide show on the history of the Department which was shown during the opening ceremony. As part of this project, the students verified the official establishment of our Department by the UMass Board of Trustees on April 27th, 1918. The students then contacted Oregon State University and found that their Department was established a year later. Due to the hard work of the students we can now say with confidence that we are the **1st Food Science Department** in the U.S. You can see the history presentation using a link on the right side of the following web page:

http://www.umass.edu/foodsci/clydesdale-center/history.html

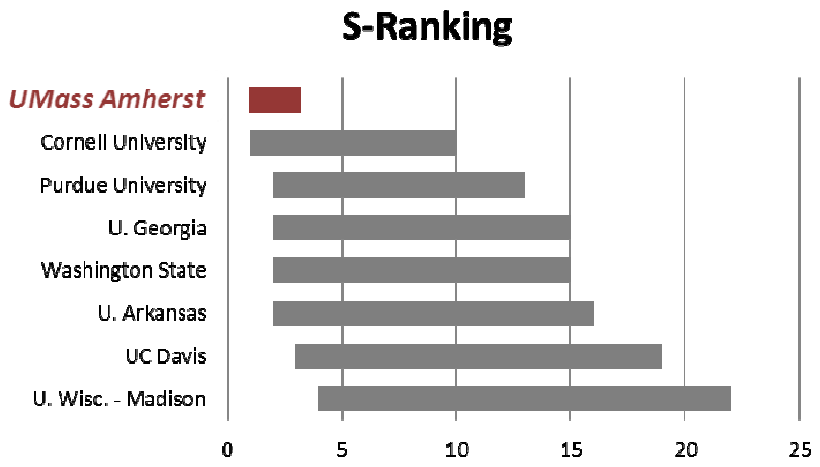
National Academy of Science Ranks UMass Food Science PhD Program Tops in the U.S.

The Department received exciting news that our PhD and research programs are tops in the U.S. as determined by the National Research Council of the National Academy of Sciences. This is the accumulation of years of hard work that wouldn't have been possible without the support of our Alumni and Industry friends. The rankings were done as ranges based on statistical analysis of different program characteristics. Below is a summary of the research categories:

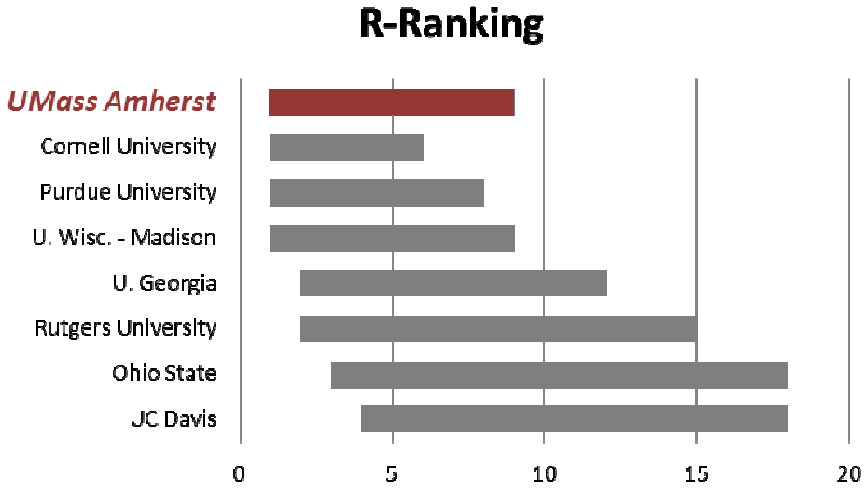
Research activity. These rankings reflect program characteristics such as publications, citations, the percent of faculty holding research grants, and recognition through honors and awards. UMass Food Science led the pack with a ranking of 1 to 1.



The S (or survey-based) rankings are based on a survey that asked faculty to rate the importance of the 20 different program characteristics in determining the quality of a program. UMass Food Science again led the pack with a ranking of 1 to 3.



The R (or regression-based) rankings are based on an indirect way of determining the importance faculty attach to various research characteristics by randomly selecting faculty who ranked programs in their field. UMass Food Science was in the top four Departments in the U.S. with a ranking of 1 to 8.



Alumni Weekend

Save the Date! The **9th UMass Food Science Alumni Weekend** will be held on **September 16 and 17, 2011**. In the tradition of past Alumni weekends we will hold a dinner

and social event Friday evening followed by tours of the building to learn about current research and student activities, product grab bags and a prize raffle. This year we will combine the dinner with our student scholarship recognition so you will be able to see the great students you are supporting with your generous donations. There will also be an optional football game against Rhode Island as UMass starts its transition into Division I football. As we get more information we will post it on the following web page which can also be used for registration. Please pass the word to your fellow Alumni so we can have a tremendous reunion with all of our friends.

https://secure.www.alumniconnections.com/olc/pub/UMS/events/UMS2314388.html

Research News

Food scientist develops new approach to food-handling safety

Using nano-scale materials, food scientist Julie Goddard is developing a way to improve food safety by adding a thin anti-microbial layer to food-handling surfaces. Only tens of nanometers thick, it chemically "re-charges" its germ-killing powers every time it's rinsed with common household bleach.

Goddard recently received a four-year, $488,000 grant from the United States Department of Agriculture's Agriculture and Food Research Initiative to lead the development of the new method for modifying polymer and stainless steel processing surfaces by adding a nano-scale layer of antimicrobial compound to gaskets, conveyor belts and work tables, for example.

As she explains, "This layer replenishes its anti-microbial qualities with each repeated bleach rinse. So at the end of the day in a meat-packing plant, for example, when employees clean their equipment, the regular bleach rinse will re-charge the surface's anti-microbial activity. They will not need to add any more steps." The chemical action comes from a halamine structure that holds chlorine in an applied layer only nanometers thick. The treatment does not affect the strength of tables or trays.

Food production is increasingly automated and as the number of surfaces contacted by food increases, there is greater potential for contamination. Goddard and colleagues' new method will cost industry less than incorporating anti-microbials into an entire conveyor belt construction, for example. The technique is effective at the square-inch scale in the laboratory now, the food scientist adds, and a major goal will be to show that it can be effective at larger scales in commercial food processing.

Goddard, who did the preliminary work to show that this nanotech method is effective against organisms relevant to food safety and others relevant to food spoilage, such as E. coli and Listeria, says the technology is already being applied in hospital textiles whose anti-microbial properties are replenished each time they're laundered in bleach.

"It's not meant to replace thorough cleaning, which should always be in place, but it's meant to add power to the process and a further layer of low-cost protection against contamination." Goddard's collaborators on this project include McLandsborough of the Department of Food Science and Joe Hotchkiss, director of the Michigan State University School of Packaging

From: ”In the Loop” February 18, 2011.

McLandsborough studying anti-salmonella strategies for tomato safety

Assuring the safe handling and cleanliness of commercially grown tomatoes is the goal of a new, two-year grant to food scientist Lynne McLandsborough and colleagues. Her laboratory is one of 17 receiving grants from the Center for Produce Safety in Davis, Calif., to improve food safety in growing and harvesting fresh produce.

Specifically, McLandsborough, an expert in bacterial growth, biofilm formation and cross-contamination from one surface to another, received $235,787 to begin this month studying the survival, transfer and inactivation of salmonella bacteria on plastics used in harvesting tomatoes. Her team includes food chemistry expert Julie Goddard of Food Science and pomologist Wes Autio of Plant, Soil and Insect Sciences. Though tomatoes are treated like vegetables by many cooks, they are actually true fruits.

"Bacterial cross-contamination from one surface to another is a more complex problem than we once believed," says McLandsborough. Food scientists would like to better understand how moisture levels affect biofilms and bacteria dispersal, for example. It's counter-intuitive, but there is some evidence now that less moisture in a biofilm makes it brittle and more easily shattered into tiny flakes that quickly disperse, she adds.

The new studies should yield new basic knowledge about how and under what conditions bacteria form biofilms on different surface types and provide practical, science-based guidelines on how to prevent cross-contamination.

At the food lab, McLandsborough and colleagues will set up an experimental tomato-handling station modeled on those found in farm fields in California and Florida. But in the lab, the researchers will be able to change parameters, for example, comparing bacterial transfer rates on smooth vs. abraded plastic tubs and ramps and evaluating contamination rates between work gloves made of a variety of materials. In this way, they can determine where and when salmonella most often hitches a ride onto the tomato's outer skin and into the food supply.

McLandsborough, who is an expert in the bacterium listeria, has documented its transfer rates from food handling equipment to cheese, bologna and other cold cuts in many previous experiments. The new work with salmonella should reveal new knowledge about this process in a different organism. "While we're not sure about the cross-contamination levels we'll find with

these new experiments in salmonella and tomatoes, it's clear that growers need to know the facts and how best to carry out a safe harvest," she summarizes.

From: "In the Loop"; January 19, 2011.

Natural sugar ester shows potential as food-grade surfactant

Food-grade surfactants – an extremely exclusive club – may soon have a new member, as the University of Massachusetts report that a natural sugar ester may be of use in foods and beverages.

The study, published in *Food Hydrocolloids*, provides an insight into the properties of the non-toxic sugar ester sucrose monopalmitate as a food grade surfactant for use in the production of colloidal dispersions (such as micro- and- nano- emulsions) with natural flavor oils.

The researchers from the Department of Food Science at the University of Massachusetts noted growing interest within the food and beverage industries *"in the utilization of colloidal delivery systems to encapsulate functional agents, such as flavors, colors, antimicrobials, micronutrients, and nutraceuticals."*

"The focus of our study was to establish the factors that influence the formation and stability of micro-emulsions, nano-emulsions and emulsions fabricated using sucrose monopalmitate (SMP) as a surfactant and lemon oil as an oil phase," said the authors, led by Professor Julian McClements.

Emulsions

The authors noted that micro-emulsions, nano-emulsions and emulsions *"are of particular interest as colloidal delivery systems because they can easily be fabricated from food-grade ingredients using relatively simple processing operations."* McClements and his co-workers said that one of the most important applications of micro- and nano- emulsions is to incorporate fat soluble (lipophilic) ingredients into water-based foods or beverages that need to remain transparent – for example fortified waters, soft drinks, sauces, and dips.

However, they noted that the widespread application of nano- and micro- emulsions in food and beverage products is currently limited – partly due to the limited number of food-grade surfactants currently available. *"Many of these are synthetic surfactants that are not permissible for application in all countries, or that can only be used at low levels due to regulatory, economic, or sensory issues,"* wrote the authors.

In addition, they noted that it is difficult to prepare micro- or nano- emulsions from commonly used edible oils, such as fish, corn, or soybean oil. *"There has been increasing interest in the utilization of sugar esters as surfactants within the food and pharmaceutical industries, which can be attributed to their good taste and aroma profile, low toxicity, and high biodegradability compared to petrochemical-based surfactants,"* noted McClements and his team.

Study details

The research investigated the formulation of lemon oil micro-emulsions, nano-emulsions, and emulsions using the sugar ester sucrose monopalmitate (SMP) as a food-grade surfactant. McClements and his colleagues reported that emulsions or nano-emulsions could be formed at relatively low surfactant-to-oil ratios (ratios less than 1), whereas micro-emulsions could be formed at higher values (ratios above 1).

They added that relatively stable nano-emulsions could be formed at pH 6 and 7, and stable micro-emulsions were formed best at pH 5 and 6. The authors also found micro-emulsions to be relatively stable to salt addition, however nano-emulsion droplets were reported to aggregate and grow after the addition of relatively low levels of salt.

Oil composition

McClements and colleagues added that it is important to note that the compositions of commercial lemon oils may vary appreciably: *"Differences in the chemical composition of lemon oils may impact the type, stability and properties of colloidal dispersions formed,"* wrote the researchers.

They added that preliminary experiments have shown that two different commercial lemon oils had different abilities to form dispersions, explaining that *"at the same surfactant and oil concentration one formed a micro-emulsion but the other formed a nano-emulsion."*

By Nathan Gray, 18-Apr-2011 Source: *Food Hydrocolloids*
*"Food-grade microemulsions, nanoemulsions and emulsions: Fabrication from sucrose monopalmitate & lemon oil"*Authors: J. Rao, D.J. McClements

Finally, don't forget our **Annual Alumni Breakfast at IFT** which will be held at 7:30 am on Tuesday, June 14th in New Orleans. I am looking forward to seeing some of you there as well as at the Alumni Weekend in September.

Eric Decker
Department Head