

Update

California State University, Fresno

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New lye-peeling system reduces water use in fruit processing

A university-industry partnership begun several years ago is bearing fruit – in the form of new technologies that could significantly enhance the sustainability of California’s food processing industry.

Among several projects aimed at improving efficient use of natural resources is a plan to reduce water use and discharge at Wawona Frozen Foods, a multifaceted fruit processing company based in Clovis, California.

Leading the work for Fresno State is professor Gour Choudhury of the Department of Food Science and Nutrition. Choudhury, who also directs the university’s Center for Food Science and Nutrition Research (CFSNR), is a specialist in food processing systems engineering and development and has obtained several U.S. patents. Directing the work at Wawona is Bill Smittcamp, company president and also a member of the CFSNR advisory board.

Wawona has been involved with Fresno State in various research and development projects for many years, but the partnership to improve water use efficiency began shortly after Choudhury joined the Fresno State faculty in 2004. He and Smittcamp began discussing sustainability in food processing.

One of their shared concerns was water use.

“Water is the most important and essential input to fruit and vegetable processing plants,” Choudhury said. “Companies use large volumes of water and also generate large amounts of wastewater, and disposal issues are becoming a major impediment to growth and expansion of the food processing industry in the Central Valley, particularly in Fresno County.”

A specific problem in the Fresno area is disposal and treatment of wastewater.

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Wawona President Bill Smittcamp (above left) discusses operation of a prototype lye-peeling system with Fresno State professor Gour Choudhury and area processing industry leaders during a recent visit to the Clovis plant.

Gilliland returns to keynote ag safety event

Specialists and speakers from dozens of areas of agriculture and ag business are gearing up to share their insights into California’s most pressing agricultural safety issues at the 15th annual AgSafe Conference to be held Feb. 25-27 at the Hyatt Regency in Monterey, California.

The annual event, which drew more than 800 participants last year, continues to be the state’s premier agricultural safety conference, offering more than 90 classes related to safety at a single venue over three days.

Leading off the conference will be speaker and business consultant Steve Gilliland, back as keynote speaker by popular demand of both participants and the planning committee.

“Steve shared such great

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C A T I



CALIFORNIA
AGRICULTURAL
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Water: New system called 'eco-friendly'

from Page 1

The combination of 500,000 residential water users and a few fruit processing plants has brought Fresno's municipal treatment facility to near capacity. An expansion is planned, but in the meantime, the city may have to reduce inputs.

Smittcamp says the city tends to aim first at industry when it comes to water discharge restrictions, and Wawona is seeking to be preemptive in reducing the company's water use, as well as wastewater discharge, before increased regulations are enacted.

"The water use issue in anything we do is huge," Smittcamp said. "Sometimes it just takes another set of eyes to look at our situation and ask questions on how we could do things differently."

That happened through the new partnership.

Choudhury began exploring ideas for reducing water use and discharge during fruit peeling and in other areas. One idea was to employ a fluid mixture of liquid and gas to take the skin off the peach. A specially-designed process was developed and tested in a laboratory setting at Fresno State; it was successful, with a "very significant" 80 percent reduction in water use, Choudhury said.



Fresno State food science professor Gour Choudhury examines the output conveyor of the prototype lye-peeling unit. The unit operates at approximately one-fifth the capacity of a standard commercial peeler.



water use have to come in."

That will have to wait till next season: since the prototype unit was installed late in the processing season last fall, engineers had just enough time to focus on operation and fine-tuning. During the winter months some adjustments will be made, and next summer, analysis of real water use and discharge will be conducted.

If the system proves viable, the processing industry will have an opportunity to increase sustainability statewide.

"Successful implementation of this project will result in the development of a technology that will comply with state

said once the process is patented and licensed, it could be manufactured locally and processors would have to purchase the equipment and install it.

Not surprisingly, the intent to reduce water use in processing has spawned other ideas that also are being explored, Choudhury reported. In fact, he is testing a second concept that would reduce water use in another phase of peach processing at Wawona. He also is exploring a third idea for reusing processing by-products as an organic substrate for producing specialty crops such as mushroom.

Research work at the Wawona plant will likely continue for several years as new processing systems are evaluated and improved. Choudhury hopes the efforts will expand industry-wide.

Results will be reported, as work continues, through various Fresno State outlets, including through the California State University Agricultural Research Initiative (ARI) program, which provided funding jointly with Wawona for this work.

For additional project information, contact Choudhury via email at gchoudhury@csufresno.edu.

"Sometimes it just takes another set of eyes to look at our situation and ask questions on how we could do things differently."

Choudhury then designed a commercial prototype unit and contracted with a local manufacturing company for fabrication. Wawona engineers helped to oversee installation and operation in the Clovis plant last summer.

Choudhury has labeled the new process an "eco-friendly lye-peeling system," because it uses significantly less water than a conventional system and generates less wastewater.

"It peels very well," Choudhury said. "Now the hard numbers on its

and federal pollution control regulations and decrease the discharge from fruit processing plants, thereby reducing the disposal cost," Choudhury said. "Such a system will reduce water intake and improve the profitability and the overall economic viability of the food processing industry in California."

Smittcamp noted that cost of conversion to new systems can be high for the processor and will likely take years to accomplish, assuming the technology proves durable. Choudhury

Center for Agricultural Business

Safety: New courses target human resources

from Page 1

insights last year, that participants wanted to hear him again," reported Sabrina Dilley, executive assistant for AgSafe and one of the lead conference planners. Gilliland also has been scheduled to lead two breakout sessions – one on "Tactics for Managing your Workforce," and another on "Dealing with Negative Attitudes during Uncertain Times," Dilley noted.

Following Gilliland's keynote will be another plenary address on Feb. 26 by Len Welsh, chief of California's Division of Occupational Safety and Health (also known as Cal-OSHA). Welsh will discuss the broad implications of heat stress in agriculture and also will serve on a panel addressing the proposition: "True or False: I'm from the government and I'm here to help you."

For this year, California's Division of Labor Standards Enforcement has approved a variety of classes which qualify for credit for all eight hours of coursework required by the state for farm labor contractors to earn or renew their license, Dilley said. California Agricultural Safety Certificate Program classes are included in the approved courses, she added.

Ten human resources courses will be offered, featuring titles such as "The 5 W's of Performance Reviews," "Developing Leaders," "How to Prevent your HR from Becoming a PR Nightmare," and "All in the Family: What Happens When You Hire a Village."

Additional courses will cover workers' compensation, hazard risk assessment, and incident investigation. Several roundtable discussions are planned, where participants are encouraged to bring their ideas, questions and comments. Discussion topics will include vineyard safety, winery safety, and safety in plants, packing houses and coolers.

Participant surveys indicated desire for more training in how to handle personnel issues

Four course tracks totaling more than 20 classes will be presented in Spanish, Dilley said. Topics will include heat stress prevention, machine hazard awareness, gas and electric safety, and the California Agricultural Safety Certificate Program.

Several train-the-trainer classes are offered in both English and Spanish. They include "Tractor Safety" and "Pesticide Train-the-Trainer for Field Workers."

Conference participants will be able to visit exhibits featuring safety products, services and equipment,

and to network with others at Wednesday evening's reception and Thursday evening's awards banquet.

Preceding the conference on Feb. 24 will be the second annual AgSafe Golf Tournament at the historic Old Del Monte Golf Course.

Registration for the entire conference is \$395 for AgSafe members or \$495 for nonmembers. One- and two-day packages also are available. Fee includes continental breakfast, lunch, the reception and awards dinner. Golf tournament fee is extra.

For conference registration information, visit the AgSafe website at <http://www.agsafe.org>.

Commodity information available

Special reports on more than a dozen of California's top commodities are now available from the Center for Agricultural Business (CAB).

The reports are part of the proceedings for the annual Agribusiness Management Conference hosted by CAB last November. The conference offers insights from experts on expected trends in agriculture and agribusiness for the coming year.

The commodity reports present data on production and sales trends of

the top farm commodities in the region.

This year's outlooks covered almonds, beef cattle, citrus, cotton, dairy, grains and protein meals, pima cotton, pistachios, raisins, table grapes, tomatoes, tree fruit and wine grapes. Copies of the proceedings may be ordered from CAB by calling 559-278-4405. Cost is \$10.

For more information on CAB, including current research activities and upcoming events, visit the website at <http://cati.csufresno.edu/cab>.



Center for Irrigation Technology

Bill Power (right) and son Devin (left), of Power Hydro-dynamics Inc. of Modesto, California, calibrate their flow testing equipment at a recent seminar hosted by the Center for Irrigation Technology at Fresno State.



CIT training helps to equip specialists in testing program

It's all about efficiency – pumping efficiency; it will save you energy, save you money, and it can increase water use efficiency.

That's the message repeated regularly by members of the Agricultural Pumping Efficiency Program (APEP), based at Fresno State and directed by the university's Center for Irrigation Technology (CIT).

Twin goals of the APEP are “to get highly efficient hardware in the field, including pumping plants, irrigation systems, and water distribution systems, and to ensure that this hardware is managed correctly,” said John Weddington, pump test and retrofit manager for the program. “We're working to save kilowatt hours by making pumps more efficient.”

Program eligibility extends to all owners or users of a nonresidential, PG&E electric or natural gas account that is primarily used for pumping water for production agriculture, landscape or turf irrigation, and municipal purposes, including potable and tertiary-treated (reclaimed) water. It excludes pumps used for industrial processes, raw sewage, or secondary-treated sewage.

Education and training also are key facets of the program, Weddington said. Workshops are offered regularly for both pump users and testers.

Workshops for pump testers focus on equipment testing and calibration. Recent workshops were held in December, and more are planned for late spring.

For more information on the APEP program and workshops, visit the website at <http://www.pumpefficiency.org>.

Irrigation technology seminar set for Jan. 15

The Center for Irrigation Technology is hosting a free irrigation technology seminar on Thursday, Jan. 15, to help growers take advantage of irrigation technology developments.

The first seminar in 2009, “WATERIGHT – Web Based Irrigation Scheduling,” will be from 9:00 a.m. to noon in the Agricultural Sciences

Building at Fresno State.

The seminar will teach participants how to use web-based WATERIGHT irrigation scheduling programming to develop site-specific, seasonal irrigation schedules.

To register or for more information, visit www.californiawater.org/IrrigationTech or call (800) 845-6038.

Institute water study draws commentary

Conclusions of a major water study recently released by the Pacific Institute of Oakland have been questioned by a group of researchers from California State University and the University of California.

The challenge comes as a published report titled, “Agricultural Water Conservation and Efficiency in California – A Commentary.” Authors include David Zoldoske, Ed.D., director of Fresno State's Center for Irrigation Technology and the executive director of Water Resources and Policy Initiatives for the California State University.

According to Zoldoske, he and other irrigation specialists were troubled by some of the methodology used to draw conclusions in the Pacific Institute report, titled “More with Less: Agricultural Water Conservation and Efficiency in California – A Focus on the Delta.” Among that report's conclusions: California farmers could save up to 3.4 million acre-feet of water each year by utilizing what the authors call “Smart Irrigation Scheduling.”

In fact, California's agricultural industry has been developing and implementing more efficient watering systems and management for decades, and that effort continues today, Zoldoske said.

“It is our opinion that certain points in the Pacific Institute paper draw incorrect conclusions, or infer incorrect conclusions based on errors in the underlying assumptions,” stated Zoldoske and the other writers in their commentary.

A potential problem for the

See Commentary, Page 7

Viticulture and Enology Research Center

Kudos given to enology program leader

Retired professor Muller honored with release of 10th Anniversary Syrah

One of the founding fathers of Fresno State's enology program and commercial winery was recognized last month with a reception at the university winery, where an official 10th Anniversary vintage Syrah wine was released in his honor.

Carlos J. Muller, professor of enology at Fresno State for 26 years prior to retiring in 2004, was not able to attend the Dec. 5 ceremonies because of an illness. But he sent his greetings and thanks to the more than 100 guests who gathered to celebrate his service to the university.

Muller was one of the visionaries who made the winery possible, stated Robert Wample, director of the Viticulture and Enology Research Center (VERC) and chair of the Department of Viticulture and Enology, at the reception.

"Dr. Muller is credited by many as being the individual driving force behind making the Fresno State Winery a reality," Wample said. With students actively involved in all aspects of



Left: VERC Director Robert Wample (left) and university President John Welty (right) celebrate release of the new Carlos Muller 10th Anniversary Syrah, with the honoree's photo in the background. Muller was unable to attend the celebration because of illness but has since recovered, friends say. Below: Close-up of label.



production and marketing, the program now sells 27 wines and one vinegar, Wample noted.

Wines produced by Fresno State students, under the direction of Muller, as well as university winemaker Kenneth Fugelsang and winemaker John Giannini, have won more than 200 awards in prestigious competitions, and many Fresno State enology graduates have gone on to important positions in the wine industry both regionally and internationally.

"This kind of success among our

alumni is a testament to Fresno State's viticulture and enology program and especially to faculty like Dr. Muller," Wample said. "It is very significant that many former students have returned to honor him with us."

Fresno State viticulture and enology programs have served students since 1948 through several departments.

Upcoming events

Jan. 28 – Annual Fresno State Alumni & Friends Reunion at the Unified Wine & Grape Symposium, from 6:15 to 7:45 p.m. at the Hyatt Regency Park Capitol Hotel in Sacramento. Sponsored by the Viticulture and Enology Alumni Association. For more info, visit <http://cast.csufresno.edu/ve>.

Feb. 7 – FFA Vine Pruning Contest at the Fresno State Vineyards. Call 559-278-2089 for details.

March. 6-8 – Annual Fresno State Wine-masters Weekend at the Tenaya Lodge at Yosemite. For more information, see article on Page 7 or visit <http://cast.csufresno.edu/ve>.

Indigenous yeast study provides new insights into red wine fermentation

A Fresno State enology research team has made advances in fermentation techniques by identifying methods of detection and control of yeasts that grow naturally on red wine grapes.

Microbiologist Roy Thornton, a professor and scientist for the Viticulture and Enology Research Center (VERC), recently completed a study of two new methods for detecting the indigenous yeasts. The methods are known as flow cytometry (FCM), and Fourier Transform Infra Red (FTIR) spectroscopy.

The research was prompted by

current trends in winemaking featuring the use of indigenous yeasts. These yeasts – found on the skin of the grapes as they are harvested, can produce pleasing new flavors and aromas in wine when compared to the use of conventional yeasts, but the "spontaneous" yeast fermentations also can produce an assortment of undesirable characteristics if they are not properly controlled.

With the help of fellow VERC research scientists Susan Rodriguez, Thornton successfully developed antibodies that could be used in a

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JANUARY 2009



CIMIS

California
Irrigation
Management
Information
System

Upgrades improve data quality, accessibility

The CIMIS program is continually working to respond to the increasing demand for CIMIS data and the growing needs of data users.

One aspect of meeting this demand is regularly upgrading the system as needs become apparent. The most recent upgrade to CIMIS included several major and minor fixes based on user feedback. We are also implementing significant upgrades to our hardware (database server and polling PCs) and communications software. Here are some additional notable upgrades that have either been released or are to be released in the near future:

Email Scheduler – A recent upgrade to the CIMIS system involves the addition of an important feature known as the Email Scheduler. This new feature enables users to receive CIMIS data automatically via email. Although some

Visit the CIMIS home page at
<http://www.cimis.water.ca.gov>

users already download CIMIS data automatically (via FTP or the Web), the vast majority get their data by manually retrieving from the CIMIS website. The Email Scheduler is a quick and convenient method for getting the CIMIS data; it does not require the user to perform computer programming. It can be set up by clicking on the MyCIMIS tab from the CIMIS web site, logging into the user's account, and clicking on the "customize" link. More detailed instructions can be found at CIMIS FAQ's at www.cimis.water.ca.gov.

Daily ETo Map – The daily ETo map is the result of coupling satellite imagery from the Geostationary Operations Environmental Satellite (GOES) with

data from the CIMIS network. This upgrade will provide a daily map of reference evapotranspiration (ET_o) for California on a two-square-kilometer grid. Users will be able to retrieve ET_o information from any location in California by specifying geographic coordinates, zip codes, or selecting an area of interest. This product is being beta tested and will be released in early 2009.

Web Services – This upgrade will allow automated direct delivery of updated ET data to any device with Internet connectivity, such as irrigation controllers, PCs, and PDAs. The user will specify the data that is wanted, how often, and where it is to be delivered. DWR and water agencies statewide are working on the development of a standard protocol for the transmission of the ET data in order to facilitate this upgrade. The web services will be released in 2009.

For more CIMIS information...

CIMIS information is published quarterly in the CATI *Update* newsletter. Articles are provided by the California Department of Water Resources, CIMIS program staff.

For more information about CIMIS or its programs, contact any of the following representatives at these offices:

Northern District
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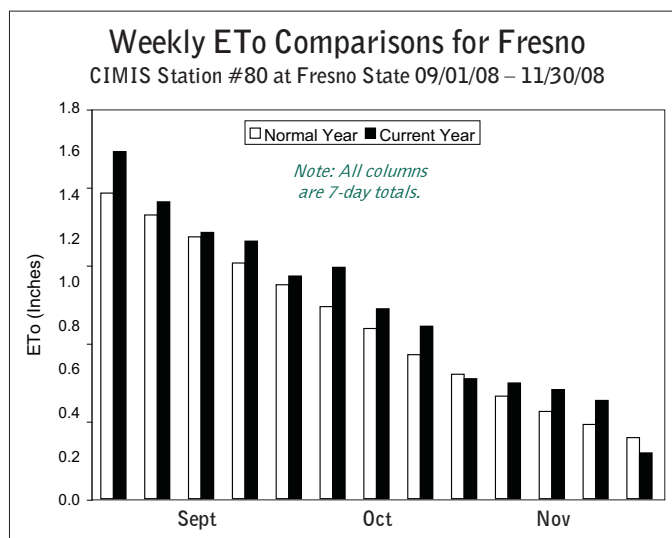


Chart shows ETo variation from normal over last three months.

Blending planned for winemasters weekend

Specialists in wine blending and food and wine pairing will be among the guests sharing their expertise at the 2009 Winemasters Weekend slated for March 6 and 7 at the Tenaya Lodge in Yosemite.

The annual event includes a wine reception Friday, followed on Saturday by winemaking courses and a five-course gourmet dinner featuring Fresno State wine and agricultural products.

Commentary: Paper available for viewing

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irrigation industry is that the Pacific Institute paper has been circulated in Sacramento and could be used by some as a basis for new legislation affecting state water policy.

"We want to make sure that any legislation is based upon good science and not on questionable assumptions or outdated information," Zoldoske said. "I would also note, however, our agreement with some of the conclusions found in the report. Those would include promoting wider acceptance of proven efficient irrigation technologies, improved data on actual water use, and, of course, more funding for agricultural outreach."

Additional commentary authors include Charles M. Burt, Ph.D., professor of irrigation at California Polytechnic State University, San Luis Obispo; Peter Canessa, P.E., program manager for the Pumping Energy Efficiency Program at Fresno State; and Lawrence Schwankl, Ph.D., irrigation specialist with the University of California Cooperative Extension.

The authors invite interested persons to read the full commentary, which is located on the California Water Institute website at <http://www.californiawater.org>.

The Pacific Institute report may be viewed at <http://www.pacinst.org>

Viticulture and Enology Research Center

The Saturday morning wine-blending workshop will be led by Ondine Chatten, director of winemaking at Geyser Peak Winery in Geyserville, California. Chatten earned her master's in enology from Fresno State and joined Geyser Peak in 1999. Her areas of expertise include natural yeast fermentations, traditional winemaking and advances in science and technology.

The food and wine paring workshop will be led by Fredrick Clabaugh, executive chef at Tenaya Lodge. Specializing in the use of organic and seasonal local ingredients, Clabaugh has developed one of the most respected

gourmet kitchens in the Sierra Nevada and in the Central Valley area.

The Saturday afternoon workshop is titled "Wines of the World," and will be led by Paul Wagner, founder of Balzac Communications. Wagner is a columnist for *Vineyards & Winery Management* magazine. He also teaches

at the MIB school in Trieste Italy and the ENESAD program for the University of Burgundy in Dijon.

For Winemasters Weekend registration information, visit the website of Fresno State's Viticulture and Enology Department at <http://cast.csufresno.edu/ve>.



Yeast: Indigenous species can compete

from Page 5

process to identify two of the indigenous yeasts, *Hanseniaspora/Klorckera* and *Metschnikowia pulcherrima*. With that accomplished, he was able to use two experimental tracking procedures to determine how the two yeasts performed under different fermentation regimens.

As part of his conclusions, Thornton determined that the two indigenous yeasts "can compete with other yeasts in wine grape fermentations and survive in sufficient numbers to present possible

spoilage threats to the wine."

He also found that one of the yeasts, *Hanseniaspora/Klorckera*, showed resistance to sulfur dioxide, which is typically used to eliminate bacteria and sensitive wine grape yeasts.

Details of the project, including methodology, results and recommendations, have been made available through presentations and reports presented by the research team. For more information on this work, contact Thornton via email at rthornton@csufresno.edu

ARI/CATI on the Web!

The California State University Agricultural Research Initiative (ARI) oversees applied agricultural, agribusiness and natural resources research on behalf of California agriculture. For information on our research and project results, visit our website at <http://ari.calstate.edu>.

The California Agricultural Technology Institute (CATI) administers ARI funding and oversees additional applied agricultural research. For more information about CATI and its research centers, visit us at <http://cati.csufresno.edu>, or at our centers:

Center for Agricultural Business (CAB) – cati.csufresno.edu/cab

Center for Food Science and Nutrition Research (CFSNR) – cati.csufresno.edu/cfsnr

Center for Irrigation Technology (CIT) – cati.csufresno.edu/cit

Viticulture and Enology Research Center (VERC) – cati.csufresno.edu/verc

Agricultural Technology Information Network (ATI-Net) – cati.csufresno.edu/atinet

Study confirms benefits of 'designer eggs'

Pomona researcher finds diet using Omega-3 eggs increases serum lutein levels in test participants

A food nutrition specialist from California State Polytechnic University, Pomona has completed research that could boost the standing of California's poultry industry.

Recent studies conducted by nutrition scientist Bonny Burns-Whitmore indicated that omega-3 eggs increase long-chain omega-3 fats, while decreasing C-reactive proteins – thus providing a healthier diet for consumers.

Omega eggs are a type of "designer egg," in which the yolk's fatty acid profile has been modified by altering the hen's diet. Specific lipids – fatty acids and fat soluble vitamins – can be modified in the egg yolk by feeding the hen increased proportions of "good" fatty acids and increased amounts of fat soluble vitamins from dietary sources such as flax seed, fish oil or bioengineered algae. Omega eggs contain increased amounts of n-3 fatty acids and decreased amounts of saturated fatty acids.

"Studies have shown that Americans do not receive enough omega-3 (n-3) fats in their diets," Burns-Whitmore wrote in

her report outlining the study.

A major source of certain long-chain omega-3 fats is cold-water fish, Burns-Whitmore noted. However, for those who do not consume fish, another good source of these nutrients is necessary.

The goal of the study was to provide more information regarding changes in blood lipid and other compound levels as a result of eating eggs regularly.

Subjects participating in the study were lacto-ovo vegetarians – people who do not eat beef, pork, poultry, fish, shellfish or animal flesh of any kind, but do consume cheese, butter, yogurt and eggs. Lacto- means "milk" and ovo- means "egg."

The treatment for study participants consisted of diets including one organic egg, one n-3 fatty acid-enhanced egg, or one ounce of walnuts, six times per week for one month, with a four-week "washout" period between each diet treatment.

Results indicated that omega-3 enriched eggs provided essential n-3 fatty acids in the lacto-ovo vegetarian diet, and these n-3 fatty acids may maintain optimum blood lipid parameters in healthy populations.

The study results substantiate results of earlier research indicating that lutein from eggs seems to be highly bio-available in healthy, lacto-ovo vegetarian subjects. Whitmore concluded that both types of eggs increase serum lutein levels in the test volunteers.

The work was funded in part by the California State University Agricultural Research Initiative (ARI), based at the California Agricultural Technology Institute (CATI) at Fresno State.

Full project details, including technical information and data tables, are available in the final report and research report, accessible on the ARI website at <http://ari.calstate.edu>. The project is titled, "Effects of Feeding Regular Eggs, Omega-3 Eggs, and Walnuts on Serum Lipids, Membrane Incorporation of Essential Fats, Prostaglandins, and Serum Lutein Levels in Free-living Lacto-ovo Vegetarians," (ARI Project #04-4-085).

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