



California Poultry Letter

February 1996

In the January 1996 issue of the California Poultry Letter, Dr. Gideon Zeidler began a two part review of papers presented at the 6th Egg and Egg Products Quality Symposium in Zaragoza, Spain. The second part of that review follows.

What's New in Shell Egg and Egg Product Quality? - Part II

Factors Affecting Foaming During Vacuum Evaporation of Liquid Eggs (Girton, et al., United States of America)

Liquid shell eggs and especially liquid albumen contain high levels of water. It is time consuming and costly to remove the water by spray drying during the production of dry egg powder. Concentration of liquid egg products prior to drying doubles the yield of the **\$1M** drying equipment. Vacuum evaporating processes developed at Pennsylvania State University can double the amount of solids in liquid egg. However, heavy foaming interferes with the process, especially in its initial stages. The foam is produced on the product surface and strongly reduces evaporation as well as the concentration vessel capacity. A **pH** higher than 7.3 and a heating temperature lower than 60°C have been found to minimize foaming. These two conditions weaken the surface tension of the foam bubbles **resulting in** reduced foaming.

Effect of Hydrostatic Pressure on the Egg's Functional Properties (Ponce, et al., Spain)

Very high pressures up to 100,000 psi, have lethal effects on microorganisms and their spores. Currently ultra-high pressure is used to pasteurize products, such as juices, without the negative **effect** of the high temperatures on heat sensitive products. However, protein molecules can be negatively **affected** by the high pressure, thus altering the functional properties of the egg. The effect of **300-450 MPa** pressure (where 300 Mpa = 45,000 psi) for **5- 15** minutes on whole liquid egg and egg white at 36-59°F was investigated.

Foaming, water **holding** capacity of gels, texture of various products and gelling properties were evaluated, as well as microbial reduction. At these pressures, almost all of the bacteria and all of the pathogens were killed. It appears that high pressures can reduce microbiological population without strongly **affecting** functional properties, thus extending the shelf-life of liquid egg products.

Rapid Process for Preparing Salted Egg Yolk (Hou-Pin Su, et al., Taiwan)

Salted egg yolk is a traditional oriental food delicacy made mostly from duck eggs. The conventional pickling process, which provides the cooked product with a desirable granular sandy texture, is time consuming. Shortening the processing time by preparing salted yolk from fresh yolk was unsuccessful as the desired texture was not developed. A successful rapid processing method was developed by pickling the fresh yolk in a solution containing 0.3% citric acid, 0.2% **Fe(+3)**, 2% salt and **pH** adjusted to 6.14. A pickling time of 32 hours at 25°C was used.

Effect of Freeze-Drying on Eggs' Functional Properties (Capella, et al., Spain)

Freeze-drying is one method of drying eggs. Freezing of the egg magma, prior to the drying, can denature protein and therefore, adversely **affect** functional properties such as foaming and coagulation. Adding up to 5% salt and increasing the **pH** to 9 before freezing can preserve these properties. **Adding** sucrose at up to 5% does not restore the desired characteristics.

Omega-3 Fortified Eggs (Farrell, Australia)

The benefits of omega-3 unsaturated fatty acids to human health, including the reduction of cardiac **failures**, were discussed in the November 1995 issue of the California Poultry Letter. Omega-3 fortified eggs are being produced commercially in Australia and New Zealand. Human subjects who consumed these omega-3 fortified eggs were monitored in terms of serum cholesterol and glyceride levels. No changes in these levels were observed when the subjects consumed 7 eggs/week.

Reduction of Lipids and Cholesterol from the Egg Yolk by High-Pressure Oil Extraction (Zeidler, et al., United States of America)

Cholesterol is still a major stumbling block in the race to restore egg consumption to its historically high levels. Several studies have shown that people with normal serum cholesterol can eat a large number of eggs without significantly elevating their serum cholesterol. However, other studies have indicated that high serum triglycerides and LDL, which are widespread in western populations, cannot be reduced without restricting cholesterol intake below 200 **mg/day**. Since the cholesterol issue is here to stay, low cholesterol, low fat eggs are needed to provide consumers with a choice. A method which can remove up to 90% of the cholesterol and 50% of the egg lipids was developed at the University of California. The yolk is mixed with vegetable oil at a ratio of **1:2**, homogenized at 5000 psi and then is centrifuged at 20,000 rpm (this process is repeated twice). The cholesterol-laced oil is circulated back to the system after the cholesterol is removed by steam stripping. The residue which contains 5% cholesterol in oil can be used as a feed supplement for aquacultured shrimp. Sensory evaluation found no difference in palatability and functional qualities of the low cholesterol product in comparison to fresh eggs.

The New Era of Retail Egg Products (Zeidler, United States of America)

In the last two years a wave of new retail egg products was **successfully** launched in retail outlets in the United States, while few products were introduced in western Europe, Canada and Australia. Egg substitutes constituted the bulk of these introductions, however, a large number of other products

such as egg burritos, egg sandwiches, egg pizzas, egg pockets, egg quiches, low cholesterol liquid eggs, omelettes, **hard-cooked** eggs, pickled eggs and others were also introduced. Many products were targeted toward children or health-conscious **consumers**. The convenience and time-saving aspects of the products were also emphasized. The striking fact is that most of these products were produced by food companies rather than egg producers. These products successfully compete against shell eggs in retail stores, even with a price tag that is 300% higher. As a result, total out-of-the-shell egg consumption has reached 30% of total egg consumption and is expanding by an estimated 2% per year. This partially explains why consumption of the shell eggs continues to decline by an average of 5 eggs per year in the United States.

Salmonella Control Program in Finland (Him, *et al.*, Finland)

The aim of the program is to maintain favorable *Salmonella* situations in all livestock, **fresh** meat and eggs during production and slaughter. In poultry, samples are drawn **from** breeding poultry, day-old chicks, laying hens, poultry for slaughter and from eggs. Samples are also drawn **from** feces of live birds, surface of carcasses and lymph nodes and from egg and meat processing lines. The number of samples is sufficient to detect 5% *Salmonella* levels with 95% **confidence**. ISO method 6579 (1993) is used for bacteria testing. Laying hens are tested throughout their lives: as one-day-old chicks, 2-3 weeks before moving to a laying unit, and every 25 weeks thereafter. National monitoring is conducted by sending all data **from** approved laboratories to the National Vet & Food Research Institute, where they are summarized monthly and annually and reviewed by a commission.

Genetic Resistance of Poultry Hens to *Salmonella Enteritidis* (*S.e.*) Infection (Colin, *et al.*, France)

Genetic **variability** to artificial infection of *S.e.* type PT4 was observed in poultry of **different** ages. Certain lines exhibited a degree of resistance which might be attributed to major genes.

Destruction of Food Borne Pathogens on Eggs by High pH, High Temperature Wash Water - Alka-Therm Process (Knabel, *et al.*, United States of America)

Cram-negative food borne pathogens which include *Salmonella* could be destroyed by high **pH** (above 10) and high temperatures (above 95°F). Under these conditions the cell membranes will break, allowing the cellular contents to move out. The high **pH** is obtained with sodium hydroxide and sodium bicarbonate which act as a buffer for maintaining the **pH**. The action of the two parameters is found to have a synergistic effect as they work much faster than **pH** or temperature alone. Commercial applications of the Alka-Therm process could drastically reduce cross-contamination of *S.e.* in eggs during washing. Best results occurred at 122°F and **pH** 11. In comparison, washing eggs at 100°F and **pH** 9 promoted **cross-contamination** and penetration of bacteria into the egg.

Mano-Thermo-Sonication: A New Method for Pasteurizing Whole Liquid Eggs (Manas, *et al.*, Spain)

Mano-Thermo-Sonication employs heating and ultrasonication of liquid eggs under pressure. This method results in a 3 to 15 times better microbial destruction than **thermo-**

processing **alone** and the process can be conducted under lower temperatures than standard pasteurization. The process is conducted in the **Mano-Thermo-ultrasonic** resistometer, which was developed for this purpose.

***Salmonella* Monitoring in Integrated Egg Production and Processing Facility (Facchin et al., Italy)**

An integrated plant for egg production which consists of feed mill, various laying flocks and egg processing plant was monitored for *Se.* presence by various methods. Results indicated that the processing plant is the site for amplifying the contamination. Shells, raw liquid eggs and stainless steel bins were 61 to 76.5% contaminated **with *Salmonella***. The albumen processing area had the highest contamination as albumen was not subjected to pasteurization. On the other hand, feed and flocks showed low contamination of 11% and **2.8%**, respectively.

***Lactobacilli* in Eggs and Egg Products (De Lorenzo, et al., Spain)**

Lactobacilli are gram-positive bacteria which operate well under reduced oxygen, low **pH** (5.0) and high **salt** (10%) **conditions**. They are heat resistant and are not destroyed by pasteurization temperatures of **147-149°F** for **2-3 minutes**. On the contrary, pasteurization which kills pathogens and many other organisms provides the space for vigorous growth of ***Lactobacillus*** due to the lack of competition. ***Lactobacilli*** are responsible for about 25% of egg and egg product spoilage. ***Lactobacilli*** are found much more in egg

products than in fresh eggs, either brown or white. Older shell eggs have more ***Lactobacilli*** than **fresh** eggs, as the bacteria have the capability to penetrate the shell through the pores. The presence of the bacteria changes through the year and minimal presence exists in winter.

Method for Pricing Shell Eggs According to Consumer Preference (Narushin and Bakhmutov, Ukraine)

Egg pricing methods which utilize consumer preference parameters were developed based on Gmoshinsky's morphological dismemberment method. In addition to egg weight, the parameters chosen were egg size, shell **color**, yolk **color**, yolk quantity and quality of the egg contents. Each parameter was evaluated by a consumer questionnaire, at range 1 to 5. The price range for eggs with various characteristic differences was calculated **according** to a mathematical model formulation.

More information can be obtained from:

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Introducing Professor Joy Mench

In late 1995, U.C. Davis welcomed Dr. Joy Mench. The new faculty member received her B.A. in Physiology from California State University, San Francisco and her Ph.D. in Ethology (the study of animal behavior) from the University of Sussex in the United Kingdom.

Prior to her arrival in Davis, Dr. Mench spent ten years on the Poultry Science Faculty at the University of Maryland, College Park. Her primary research interests have been the welfare and behavior of chickens and quail. In particular, she has studied the handling, transport and slaughter of broilers; stress; environmental enrichment; and social behavior.

Her numerous publications include scientific papers on cage and floor pen management of layers, aggressive behavior in male broiler chicks, feed restriction in broiler breeders, and welfare issues involved in the artificial insemination of broiler breeders. In addition, Dr. Mench has facilitated and contributed to many jointly authored documents on animal **welfare**. One very important example was her co-authoring of the Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching.

With her international reputation in the areas of poultry production and welfare, Dr. Mench has been called upon to head numerous industry and **scientific** society committees. She has served as the Chair of the Poultry Science Association's Animal Care Committee -and since 1988 has chaired the Institutional Animal Care and Use Committee of the Scientists' Center for Animal **Welfare**.

Dr. Mench's appointment at U.C. Davis is in both the Department of Avian Sciences and the Department of Animal Sciences.

Five Cackle and Crow Salute

Congratulations to Dr. Art Bickford, Associate Director of the California Veterinary Diagnostic Laboratory System (CVDLS) and Chief of CVDLS, Turlock. The American Association of Avian Pathologists recently presented Dr. Bickford with their C.A. **Bottorff** Award. The award was given in recognition of Dr. Bickford's untiring service to the poultry industry.

Good News from the North

Word from Canada is that University of California alumnus, Dr. Bill Stevens, has received the Ontario Poultry Council Award of Merit. During his career, Dr. Stevens has been a faculty member at the University of Guelph, managing Director of Hybrid Turkey Inc. and Vice-President of Corporate Development for Cuddy International Corporation.

The Aggies are proud of you, Dr. Stevens.

California 4-H Poultry Members Gain National Recognition

The California State Avian Bowl Champions (Rachel Rubii **Karla** Langner, Lori Conkling, and Dan Famini) were victorious at the 4-H National Poultry and Egg Conference in Louisville, Kentucky. The team, with captain Rachel, successfully fended off challenges by teams **from** 10 other states. All team members answered questions in every round and therefore, the Californians always received a bonus question. Special congratulations to **Lori** who scored highest on the written examination. 'Dark chicken' Ohio made a fine showing and captured second place. Mrs. Pat **Rubin** was the coach for California.

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In the Poultry Judging Contest, California was represented by **Maryanne** Duttarer, Dan Famini, Emily Moore, and **Christal** Winter. Team coach was Mrs. Jan Duttarer. The California team placed 6th out of 20 teams in market poultry. This was California's highest finish ever in poultry. Special thanks to Mike Bloom and Randall's Poultry in Vernon who welcomed team members and leaders into his plant. Willing and patient inspectors helped give the team some extra training.

The Conference is organized by a national committee of Extension Poultry Specialists. The Conference only happens because of the generous financial support received from companies and individuals. **California** donors were California Poultry Industry Federation, Chilson Management Controls, and Nicholas Turkey Breeding Farms.

Agricultural and Environmental Sciences Field Day (AESFD)

AESFD, a weekend of competitive events open to FFA members and high school age 4-H members will be held on Saturday, March 2, 1996 at U.C. Davis. Once again there will be the Poultry Judging Contest and Avian Bowl, with Drs. Ralph Ernst and Francine Bradley, as the respective faculty advisers. The Poultry Judging Contest will be the 1996 State **Qualifier** for 4-H. That is, the 4-H team winning on March 2nd will be eligible to represent California next November in Louisville.

Some 2,000 4-H and FFA members are expected to compete in the 22 agricultural based judging contest. The California agricultural industries remain an important

component of the Field Day, providing animals, plants, products, **industry** judges and monetary support.

Application forms may only be obtained by writing to: Dr. **Linda Whent**, Agronomy and Range Science, University of **California**, Davis, CA 95616; telephone (916) **752-3040**.

Specialty Poultry Meat Symposium

University of **California** Cooperative Extensionists are frequently contacted by individuals who wish to embark on an avian meat enterprise. Many realize they cannot compete with the large integrated broiler and turkey producers. Instead they want to produce food items for a specialty or niche market.

At this year's **Pacific** Egg and Poultry Association (**PePa**) Annual Convention, an **afternoon** symposium will be held on specialty poultry meat. The following individuals have confirmed their participation: internationally recognized gourmet, oenophile and marketer, Darrel Corti of Corti Brothers of Sacramento; Tim **Cowden**, CEO of the United Ratite Cooperative; and Bill Chan of Stockton Poultry.

The Symposium will be moderated by Francine Bradley of University of California, Davis.

PePa is offering a special one-day registration package for those interested exclusively in the specialty poultry meat aspect of the program.

For registration information contact **PePa**, 1521 "I" **Street**, Sacramento, CA 95814; (916) 441-0801; FAX (916) 446-1063.

1996 Coming Events

February 18-20 - California Farm Conference, Radisson Hotel and Convention Center, **Visalia**. For information call the California Federation of Certified Farmers' Markets at (818) 449-0179 to request a registration packet.

March 2 - Agricultural and Environmental Science Field Day, UC Davis Campus. 4-H and FFA students may participate in a Poultry Judging Contest or in an Avian Bowl Contest. For information contact Linda Whent, (916) **752-3040**.

March 19-22 - Pacific Egg and Poultry Association **Annual** Convention, Hyatt Newporter in Newport Beach, California. For information telephone **PePa** (916) 441-0801.

May 1-5 - Western Poultry Disease Conference, Hotel Fiesta Americana Condesa, Cancun, Mexico. For information contact Conference and Event Services, UC Davis, (916) 757-3331.

July 8-11 - Poultry Science Association Meetings, Galt House, Louisville, **Kentucky**. For information contact Poultry Science Association, 1111 N. **Dunlap** Avenue, Savoy, **IL** 61874; (217) 356-3182.

September 2-5 - XX World's Poultry Congress, New Delhi, India. For information contact Congress Secretariat, The World's Poultry Science Association (India Branch), "**Janaki**", 189 Bhandarkar Road, **Pune** - 411-004, **INDIA**; Telephone **+91-212-366380**, FAX **+91-212-361729**.

Avian Sciences Seminars at UC Davis

Avian Sciences Departmental seminars are held on Tuesday afternoons (4: 10 - **5:00** p.m.) during the academic quarters. Seminar speakers are solicited **from** on and off the campus and cover a wide range of avian topics.

The Winter Quarter seminars will be held in Room 2154, Meyer Hall. All seminars are open to the public. Parking near the building does require a permit (daily fee - \$2.00). The schedule for February and March 1996 is as follows:

February 6 - Development of the ratite meat market*, Chet McIntosh, General Manager, United Ratite Cooperative, Placerville, California.

February 13 - Basic and applied ratite nutrition*, **Rosalina** Angel, Ph.D., Nutritionist, Purina Mills, Inc., St. Louis, Missouri.

February 20 - Opportunities in California's poultry industries, Dave Willoughby, DVM, Staff Veterinarian, Animal Health Branch, CDFa, Sacramento, California.

March 5 - The impact of primary breeders on turkey health, Yan **Ghazikhanian**, DVM, Vice President, Veterinary Department, Nicholas Turkey Breeding Farms, Sonoma, California.

*Seminars co-sponsored by the Departments of Avian and Animal Sciences.

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