The Cranberry Connection

Clement Pappas & Co., Inc.
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A newsletter for the cranberry growers of Clement Pappas & Co., Inc.

THE CRANBERRY INSTITUTE

Leading Scientists Review Latest Research on Cranberry's Ability to Help Maintain Health

EAST WAREHAM, MA, November 14, 2006 — Researchers studying the health benefits of cranberries gathered at the Cranberry Health Research Conference, convened by the Cranberry Institute, to discuss a wide spectrum of emerging work. Prominent scientists from across North America met in Charleston, SC, to share current findings and new research into the cranberry's role in helping maintain health and prevent a number of diseases and infections. The Institute assembled researchers in the fields of cardiovascular health, cancer prevention, urinary tract health, oral health, neuroscience, aging, immunology and food safety.

"As a nutrition scientist interested in the health benefits of colorful fruits and vegetables, it is gratifying to see research emerging on scientific studies regarding the beneficial effects of cranberries," stated David Heber, MD, PhD, FACP, FACN, who serves as a Scientific Advisory Board member to the Cranberry Institute, is the founding Chief of the Division of Clinical Nutrition in the Department

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SeaSonS GreetinGS
from everyone at
Clement Pappas & Co.

Aleni Pappas Joins Company

Brooke Peterson

Aleni Pappas is the newest member of the Pappas family to join Clement Pappas & Co. She began employment October 2nd as Product Manager for the Organic Category. She previously worked for Daymon Worldwide as a Supply Chain Analyst and then as a Business Manager. In the Business Manager role, she functioned as an in-house broker for suppliers that generated over $30 million in private label sales for a convenience store chain with 550 locations. Prior to that, she worked for a food service marketing and consulting company where she did marketing and consulting research and analysis of the food service industry across ten food and beverage categories.

Aleni has a Bachelor's Degree from Amherst College and a Master's Degree in Food Studies and Food Management from New York University. She is also a graduate of the French Culinary Institute in New York.

Aleni Pappas

As Product Manager for the Organic Category, Aleni will be working in the Organic and Natural Foods line and in new product development. Collaborating with the Purchasing, Product Development, Sales and Supply Chain Management areas of the company, Aleni will implement a new integrated approach to managing organic and natural products across all Divisions and classes of trade. Her position will be the key resource within the company for knowledge, analysis and projections regarding this category.

Aleni is the daughter of Dean and Zoë Pappas. She joins her brother Dimitri, who is General Counsel and interim V.P. of the Finance Department and cousin Clement (Peter's son). Clement previously was Vice President of Manufacturing and is currently working in sales. The addition of a well-educated and talented "new" generation bodes well for the continued success of Clement Pappas & Co.

Inside this issue:

Forecasting Cranberry Prices

Dr. Ed Jesse, Agricultural Economics Professor,University of Wisconsin

The following article describes the mathematical way in which economists typically look at "Supply and Demand". The price of cranberries, in the most simple and stark terms is determined by supply and demand. What economists attempt to do is "quantify" the factors that contribute to supply and demand (things as simple as the supply of cranberries and slightly more complicated like disposable income). It is always an interesting exercise, for anyone involved in cranberries, to compare the actual price of cranberries, in any given year, to the logic of a regression analysis and then speculate on why the price isn't exactly what the math might predict. Happy reading, math review and speculating! -- Brooke Peterson

A statistical procedure called multiple regression analysis can be used to measure how cranberry prices are affected by supply and demand factors. This procedure was used to forecast season-average U.S, cranberry price based on five variables: lagged price, per-capita supply of cranberries available to U.S. handlers, per capita U.S. disposable personal income, and two binary variables to reflect shifts in demand for cranberry products over time.[1] After extensive evaluation of scatter plots and experimentation with alternative shift variables, the model specification ultimately selected was:

$$Price_t = f(Price_{t-1}, \text{PC Tot Supply}_t, \text{PC Disp Inc}_t, \text{1980-90DUM}_t, \text{1991-04DUM}_t)$$

Variable definitions and rationale for inclusion:

Price = Real U.S. season-average grower cranberry price per barrel as reported by the National Agricultural Statistics Service, USDA.[2] The price deflator is the Index of Prices Received by Farmers, all commodities, 1990-92=100. Lagged price is commonly included in price forecasting models to capture "constancy" behavior in commodity prices — the previous year's price is often used as an implicit or explicit benchmark in establishing the current year's price.

PC Tot Supply = Per capita cranberry supply defined as the sum of current year domestic production, beginning inventory (all forms), and foreign acquisition of cranberries by U.S. handlers divided by U.S. total mid-year population (U.S. Census Bureau). NASS revised production data were used for domestic production. Foreign acquisitions and inventory data are from the CMC. Total supply is adjusted for reported or estimated shrink. Fruit availability, regardless of source, would be expected to be the most important variable affecting farm-level prices.

PC Disp Inc = Real per capita U.S. disposable personal income in $1,000 units, deflated using the CPI-U, 1982-84 = 100. Data are from U.S. Bureau of Labor Statistics as reported by the Economic Research Service, USDA. Since cranberry products are normal goods, consumer income reflects shifts in demand resulting from positive income elasticity of demand.

1980-90DUM = Intercept shift variable equal to 1 for 1980-90 and 0 otherwise. The two dummy variables are included in the model to capture the effect of pronounced shifts in demand for cranberry products. The 1980-1990 shift is likely related to the rapid growth in sales of cranberry juice blends. The later shift may reflect growth in international sales and a one-time increase in demand due to recognition of health benefits of consuming cranberry juice (e.g., prevention of urinary tract infection). Both the slope and the intercept of the 2-dimensional farm-level demand relationship appeared to change, but only the intercept shifters yield significant coefficients.

1991-04DUM = Intercept shift variable equal to 1 for 1991-2004 and 0 otherwise.

This specification represents a simple demand relationship under the assumption that supply is exogenously determined. This assumption is reasonable in light of the multi-year lag between planting of cranberries and first commercial harvest. In other words, there is no contemporaneous relationship between quantity supplied and price. The binary variables depict discrete parallel shifts in demand.

The model was estimated over the period 1975-2004 in order to utilize 30 observations,

(Footnotes)

[1] Prices of substitutes and complements would usually be included as explanatory variables in a demand relationship. Experimentation with per-capita supplies of possible substitute fruit juices failed to divulge significance and complements to cranberry juice are not obvious.

[2] NASS publishes its final estimate of season average price in its July publication, *Non-citrus Fruits and Nuts, Annual Summary*. For example, the final estimate for the 2004-05 crop year (beginning September 1) would be reported July 2005. NASS reports a preliminary price estimate in mid- to late-January.

[3] Of course, using the same supply and income levels over the entire period is inappropriate since both were increasing over time.

Forecasting Cranberry Prices

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generally considered minimal in time series forecasting models. No observations were omitted. The results are shown in the table at right.

All of the coefficients have the correct (a priori hypothesis) sign and are significant at high levels of confidence. The total supply coefficient can be more easily interpreted by converting it to represent total barrels rather than per capita pounds. Using 2004 U.S. population of 294 million, the coefficient implies that a 1 million barrel year-to-year change in total cranberry supply would change grower price by $9.20 per barrel in the opposite direction. The price flexibility based on mean price and total supply over the entire 1975-2004 period is -1.47, indicating an inelastic demand. Demand is increasingly inelastic over time. Using intra-period means, price flexibility is calculated as -1.0 from 1980 to 1990 and -1.9 from 1991 to 2004.

The income coefficient suggests that an increase in per capita disposable income of $1,000 would increase grower price by about $7 per barrel. The associated very high income elasticity of 1.25 likely means that the income variable is likely picking up a trend effect beyond what is captured by the intercept shift variables. The binary variable coefficients show how demand shifted over time. At any given level of supply and income, deflated grower prices are shown to be $16 per barrel higher than 1975-79 in 1980-89 and $26 higher in 1991-2004.[1]

Fruit Price Forecasting Model, 1975-04 Period

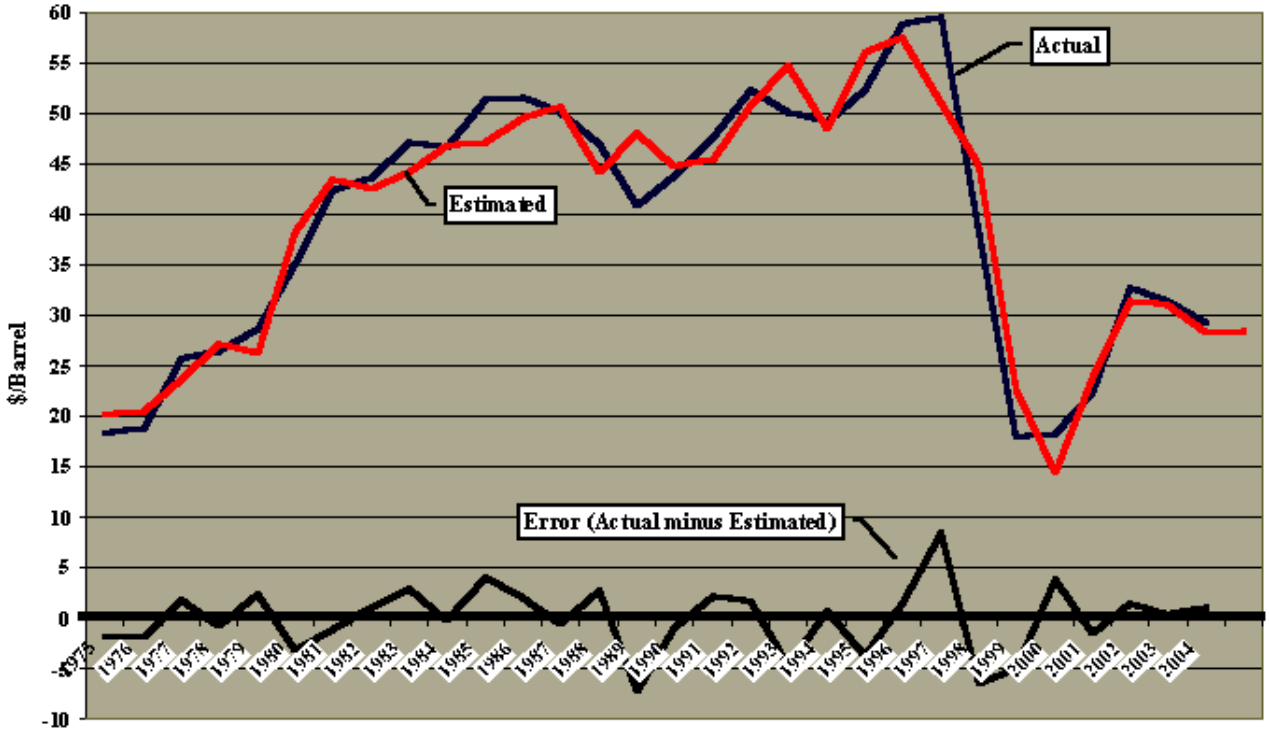
Regression Statistics

Adjusted R^2	0.92
Standard Error	3.67
Observations	30

	Estimated Coefficient	*Standard Error*	*t Stat*
Intercept	-24.56	12.92	-1.90
Lagged Price	0.47	0.08	6.13
PC Tot Supply	-27.06	3.93	-6.88
PC Disp Income	6.85	1.62	4.23
1980-90DUM	16.39	3.06	5.36
1991-04DUM	25.55	4.42	5.78

The adjusted R2 is 0.92, not particularly good for time series analysis, but not bad given the model was "stressed" by unusual price values (relative to supply) in some years. In 1997, the price predicted by the model is $8.50 less than the actual price and in 1989, the estimated price is $7.20 more than actual. But by most measures of statistical reliability, the model does a good job of capturing the factors affecting grower cranberry prices.

Season-Average Grower Cranberry Price: Actual v. Model Estimate



Leading Scientists Review Latest Research on Cranberry's Ability to Help Maintain Health

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as well as a Professor of Medicine and Public Health at UCLA.

Researchers studying the compositional issues of the cranberry as they relate to health benefits shared work being conducted at all levels, from basic chemistry to clinical studies, in order to better evaluate this unique berry. Studies reviewed at the conference included:

- **Inhibition of *E. coli*** - University of Maine research into the antimicrobial effect of cranberry concentrate found the concentrate significantly inhibits the growth of *E. coli* O157:H7 as well as other types of bacteria found in food and in the body. This preliminary research may be of interest regarding food safety given the growing concern and need to control foodborne pathogens, particularly through natural antimicrobial compounds and natural preservatives.

- **Boosting effect of flu vaccine** - A pilot clinical study to be conducted by the University of California, Davis, starting this month will investigate the immune system-boosting potential of cranberry juice by evaluating how elderly subjects respond to influenza vaccine. Data on the amount of antioxidants found in different fruits clearly indicate that cranberries have the highest content per serving of polyphenols, making them the best candidate to potentially counteract aging of the immune system. Scientists hypothesize that a specific nutritional supplement, potentially cranberry, for the elderly may produce a stronger immune system.
- **National Institutes of Health (NIH)** - Updates on several of the 12 studies being funded by the NIH, including nine from the Center for Complementary and Alternative Medicine's (NCCAM) landmark multi-million dollar research initiative. The body of research being conducted is primarily to examine the unique activity of cranberry in preventing adhesion of certain disease-causing bacteria to cells and tissues in the body. Once completed, the data will include the largest clinical trial of Cranberry Juice Cocktail (CJC) on preventing urinary tract infection (UTI) in otherwise healthy women.
- **Anti-aging properties** - The latest research into the anti-aging properties of cranberry, including a cross-species study supported by the Intramural Research Program of the NIH, National Institute on Aging and the Cranberry Institute.

- **Inhibiting gum disease** - A study examining the periodontal health benefits of cranberry to further bolster existing research which

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2007 Upcoming Events:

January 16,17	Wisconsin State Cranberry Growers Association Winter Meeting and Trade Show Stevens Point, WI
January 25	American Cranberry Growers' Association Annual Meeting New Jersey location TBA
February 11,12	Cranberry Marketing Committee Winter Meeting, Ritz Carlton Arlington, VA
March 8,9	Cape Cod Cranberry Growers' Association Annual Meeting Plymouth, MA

Latest Research...

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supports that cranberry components offer promising applications for the development of novel adjunctive treatment for periodontal disease – the single largest cause of tooth loss in older Americans.

- **Heart health and cancer inhibition** - On-going research including mechanisms of action of cranberry phytochemicals on several cancers and cardiovascular disease, cranberry polyphenols as effective anti-inflammatory compounds, the effects of cranberry consumption on cholesterol levels and the cranberry juice effect on reducing the symptoms of acute UTI as well as their prevention.

Martin Starr, PhD, Science Advisor to the Cranberry Institute, commented, "We convened the Third Biennial Health Research Conference so that scientists exploring cranberry's potential effect in many parts of the body could share their latest work, from clinical studies to preliminary exploratory research. These findings continue to grow more rich and dense as researchers go both deeper and broader in examining cranberry's amazing structural complexity and its unique bacterial anti-adhesion and antioxidant benefits," he concluded.

About the Cranberry Institute

The Cranberry Institute is a non-profit organization founded in 1951 to promote education and research. Dedicated to supporting research and increasing awareness about the health benefits of the cranberry, it also supports and funds topics related to environmental stewardship. The Cranberry Institute's website is www.cranberryinstitute.org. **For further information**, please contact Linn Parrish at 781-259-1810.

2006 Harvest Scenes

Cranberries being harvested for the 2006 cranberry crop at Canneberges Becancour in Quebec. The Quebec Growers Association reported that Quebec Growers produced 862,000 barrels on 3287 acres.

Cranberries being pumped from the marsh to the truck in the 2006 Wisconsin Harvest

A larger 2006 Massachusetts crop meant the receiving pools stayed full for the entire harvest.

Regulatory Update from the Cranberry Institute

Guthion use on cranberries was phased out as of September 30, 2006. No future use of Guthion on cranberries is allowed in the US. The tolerance remains but is expected to be revoked at some point in the future.

EPA Registration Review is the next round of post-FQPA reviews of existing pesticide registrations. The list of compounds and the review schedule is available from the Cranberry Institute, or contacting your Clement Pappas Grower Relations representative. Cranberry compounds under review, by year, include: '07- no compounds; '08- Acephate, Diazinon, Aliette, Quinclorac, Clethodim; 09- Chlorpyrifos, Phosmet, Imidacloprid; '10- Carbaryl, Glyphosate.

Methoxyfenozide: ESA label revision for Wisconsin has been underway at EPA for the past year. As of November 17, 2006, EPA has notified the CI that the risk assessment has been completed, and summary documents with proposed revision options to the 1-mile buffer zone (to habitat of the Karner Blue butterfly food source) will be forwarded to the CI. A meeting with EPA staff is a likely future step in response to the label revision options.

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