

# CHANGING PATTERNS OF ORANGE JUICE CONSUMPTION IN THE SOUTHERN UNITED STATES

by

**Leigh Ann Love**

**James Sterns**

**Thomas Spreen**

**Allen Wysocki<sup>1</sup>**

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**Abstract:** From 2000 through 2004, per capita orange juice purchases decreased by 12.3 percent while the popularity and media coverage of low-carbohydrate dieting exploded. Content analysis was used to count selected Southern region newspaper articles topically related to low-carbohydrate dieting, the Atkins diet, and the South Beach diet. This data was included in a Southern region orange juice demand model, where purchase data served as the independent variable and proxy for consumer demand of orange juice. Results indicated that media coverage of low-carbohydrate diets and dieting was negatively and significantly related to demand for orange juice in the Southern region.

<sup>1</sup> Corresponding Author: Leigh Ann Love, P.O. Box P.O. Box 110240 IFAS, Gainesville, FL 32611. Email: [leigh.love@gmail.com](mailto:leigh.love@gmail.com), Phone: (352) 281-7377.

Leigh Ann Love is a graduate of the University of Florida Food and Resource Economics Master of Science degree program. James Sterns is an Associate Professor, Thomas Spreen is a Professor, and Allen Wysocki is an Assistant professor, all at the University of Florida

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## Introduction

On average, an eight ounces glass of orange juice has 27 grams of carbohydrates. Many low-carbohydrate diets advocate limiting daily carbohydrate intake. Florida orange juice growers hold the low-carbohydrate dieting trend at least partially responsible for recent decreases in United States per capita orange juice consumption. For example, Weinraub reported findings that involved random surveys of 2,600 U.S. households in December 2003, 26 percent of the people surveyed intentionally reduced their orange juice consumption in 2003. Of that 26 percent, 35 percent reported that they did so due to low-carbohydrate dieting. (Weinraub 2003)

In 1972 and 1992, Dr. Robert Atkins published a book detailing the benefits and guidelines for a low-carbohydrate lifestyle. The bestseller status of this book since 1996 has prompted public and media attention towards low-carbohydrate lifestyles developed by Dr. Atkins and other doctors, such as Dr. Arthur Agatston who published a book about low-carbohydrate dieting entitled *The South Beach Diet*. These diets, in many cases, specifically encourage diet adherents to decrease or completely eliminate consumption of fresh fruit and/or fruit juices while dieting. The major objective of this study was to determine if a relationship exists between diet media coverage of low-carbohydrate diets and dieting and consumer demand for orange juice. Using per capita purchase data as a proxy for consumer demand of orange juice, two demand models, representing demand for orange juice in the United States and demand for orange juice in the Southern region, are presented to explain decreases in demand for orange juice. Conclusions about the effect of diet media coverage in newspapers upon demand for orange juice are based on estimates of per capita purchases as related to changes in factors such

as price, diet coverage, existence of field staff, per capita discretionary income, and previous period purchases. The results indicate that diet media coverage does have a negative and significant effect upon purchases of orange juice in both the United States and within the Southern region.

Orange juice is a major agricultural commodity produced in Florida. In 2002, citrus groves represented 8.37 percent of Florida total farm acreage and accounted for 21 percent of Florida farm sales. This study contributes an awareness of the impact that dieting trends, particularly the low-carbohydrate diet, has upon consumption and purchases of food products, specifically orange juice. The Southern region has the highest total purchases (i.e. aggregate demand) of orange juice and includes the state of Florida, where about 95 percent of oranges grown are processed into orange juice. Simply stated, in the South orange juice matters.

## **Literature Review**

Within the field of Agricultural Economics, several studies have been conducted investigating the relationship between media coverage and demand for various food products. Most of these studies concentrate on the demand impacts of how various food safety risks are portrayed in the media, both in the United States and abroad. In these studies, media coverage is considered on two levels, sustained media coverage and heightened media coverage. According to Kalaitzandonakes, Marks, and Vickner (2005), sustained (long term) and heightened (short term) media coverage is dependent upon the length of time an issue is the subject of media coverage.

Kalaitzandonakes, et al (2005) investigated the relationship between GM ingredient labels, sustained GM-related food risk as portrayed in the media, and demand for frozen and canned food items in the Netherlands. They determined that Netherlands consumers did not

significantly change their purchasing behavior towards biotech foods in response to long-term media coverage. This is the only study found thus far that indicates demand was not significantly changed due to media coverage. Additionally, the media attention directed towards the U.S. Starlink corn case was considered by Kalaitzandonakes, et al with regards to heightened media coverage of the issue. Results of the research indicated that acute media coverage did influence consumer purchasing behavior and that those changes in consumer demand affected primarily those branded products that were directly identified by the media. The research, however, indicated that the overall change in consumer demand was temporary and rather small.

Van Ravenswaay and Hoehn (1991) investigated the relationship between demand for apples following the Alar scare and sustained media coverage of the food safety issue relating to apple consumption in light of the food scare. Their research indicated a relationship between media coverage and subsequent decrease in demand for apples. Overall, demand for apples decreased by 30% during the six-year study.

Verbeke and Ward (2001) investigated the relationship between meat consumption and sustained media coverage of hormones and BSE (Bovine Spongiform Encephalopathy, otherwise known as Mad Cow Disease) from 1995-1998 in Belgium and the United Kingdom. Their research indicated a reduction in consumer expenditures on beef over 4 years by 2% in Belgium. In addition, demand for beef in the United Kingdom decreased by 40% after the link between BSE and vCJD (Variant Creutzfeldt-Jakob Disease) was reported.

Piggott and Marsh (2004) investigated the impact of heightened media coverage of listeria, salmonella, E coli, and BSE on U.S. demand for beef, chicken, and pork. Their research revealed that consumers reacted to contemporaneous media coverage of such risks only. Although this result held over a twenty-year time period, the research indicates that the overall economic effects from such consumer response were relatively small.

Swartz and Strand (1981) considered the impact of kepone contamination (a potential carcinogen) on demand for oysters in certain U.S. markets. Their research found that the media had a moderate but temporary negative impact on demand for oysters. After consumer reaction to media coverage of kepone contamination wore off, the research indicates that U.S. consumption of oysters returned to previous levels.

Each of these studies has linked consumer demand of food items with some event. Typically the events considered for analysis have focused on food risks as reported by the news media. Therefore, a gap exists in the literature with regards to consumer demand of food items and an event such as a popular dieting trend. This study aims to link the popularity of the low-carbohydrate dieting trend and Southern region consumer purchases of orange juice to determine whether or not a popular dieting trend, as reported by the news media, has a significant and negative impact upon demand.

## **Objectives**

Given decreases in Southern region orange juice consumption since the late 1990s and the high volume of diet and health-related information made available to the consuming public via various channels in the mainstream media, research was conducted to determine if an inverse causal relationship exists between increased media attention towards low-carbohydrate diets and decreased orange juice purchases in the Southern region.

Relationships between diets, purchasing habits, and frequency of diet media coverage as found in Southern region newspapers are examined, and two hypotheses are tested:

1. There is a negative correlation between demand for orange juice and low-carbohydrate diet media coverage.

2. Low-carbohydrate diet media coverage is a statistically significant explanatory variable when modeling Southern region orange juice demand.

To test these two hypotheses, the frequency of newspaper articles written about low-carbohydrate diets were used as a proxy for diet popularity. Southern region orange juice purchases from October 1995 through January 2005 data are used to estimate consumer demand.

### **Data and Methods**

Purchasing data in the form of scanner data was collected for orange juice purchases in the Southern region on a four-week basis from October 1995 through December 2004. These purchase estimates represent volume sales in all ACNielsen retail outlets in the Southern region, including U.S. grocery store chains with sales greater than \$2 million, Wal-Mart stores (excluding Sam's Club), and mass merchandisers and drug stores with sales greater than \$1 million.

Content analysis was used to generate quantified measures of low-carbohydrate diet media coverage from Southern region newspaper sources. Articles were collected from the Houston Chronicle, Atlanta Journal Constitution, and the Miami Herald. These three newspapers represent a total daily circulation of over 1.7 million readers (Audit Bureau of Circulations). Collected media coverage was overlaid to coincide with purchase data periods.

Southern region retail purchases of orange juice from ACNielsen were used as the model's dependent variable. This demand is then modeled as a function of a set of independent variables, including a diet media coverage variable representing the frequency of media articles regarding low-carbohydrate diets and dieting. Other explanatory variables in the demand analysis included real weighted price per gallon of orange juice, existence of field staff working

for the Florida citrus industry, per capita personal disposable income, orange juice purchases from the previous period, and seasonal dummy variables.

$$D_t = f(RP, DC, ST, PCINC, PCGAL_{t-1}, P2...P13)$$

The information displayed in Graph 1 represents the annual cumulative Southern region per capita purchases of orange juice and newspaper articles found from 1997 through 2004.

Southern region per capita purchases of orange juice began declining in 2001. From 2001 through 2004, regional orange juice purchases decreased by 30.20% and regional diet coverage in newspapers increased from 1 article in all of 2001 to 129 articles in all of 2004. This indicates that decreases in Southern region orange juice purchases are negatively correlated with diet media coverage by regional newspapers, and that there may be a direct causal link between the two trends.

## **Results**

All variables in the demand equation were significant and had expected signs. Tests for autocorrelation indicated that it was not present. For the given data set, the model explained over 98% of the variation in retail purchases of orange juice. (Table A)

The relationship between purchases and price was negatively related and significant, resulting in a coefficient of -0.02. This indicates that the expected inverse relationship between price and demand exists and that as the price per gallon of orange juice increases, per capita purchases of orange juice in the Southern region decrease.

The relationship between purchases and diet media coverage was negatively related and significant, returning a coefficient of -0.0004. This suggests that diet media coverage in Southern region newspapers does have a negative effect upon per capita purchases of orange juice, as suggested by the first hypothesis. Due to the statistical significance of the diet media coverage

variable and its negative relationship with purchases of orange juice in the Southern region, both hypotheses were not rejected.

The relationship between purchases and the dummy variable representing the existence of field staff was positively related and significant, resulting in a coefficient of 0.008. This suggests that the existence of field staff who worked with retailers and food service in promoting Florida orange juice and helped retailers in the area of merchandising positively and significantly affected purchases of orange juice.

The relationship between purchases and disposable per capita income was found to be insignificant, which suggests that per capita discretionary income has an effect no different than zero upon per capita purchases of orange juice in the Southern region.

Finally, the relationship between purchases in the current time period and purchases from the previous time period, a measurement of habit persistence, were positive and significant, with a coefficient of 0.845. This result indicates that purchases of orange juice are based on habit and consumers in the Southern region who previously purchased orange juice are more likely to purchase orange juice again than those consumers in the Southern region who have not previously purchased orange juice.

Nine of the twelve dummy variables used to represent the four-week scanner data collected were found to be significant; all dummy variable coefficients were negative.

## **Discussion**

This study provides some indirect evidence that media coverage may affect dieting trends since the demand for food products that are affected by those dieting trends and that these shifts in consumer perceptions and therefore demand have the potential to affect industries throughout the agriculture sector. By understanding the effect of diet media coverage upon demand for



orange juice, a better understanding can be obtained and applied to other affected industries by current and future dieting trends.

Although the effect that a dieting trend may have upon a particular industry may not be prevented, it is possible that the findings from this study can help diminish this effect. For example, industries may determine that rather than investing time and money in product development to meet constantly shifting consumer nutritional perceptions and demands, resources may best be directed towards public relation efforts to lessen the effect that even temporary shifts in consumer nutritional perceptions.

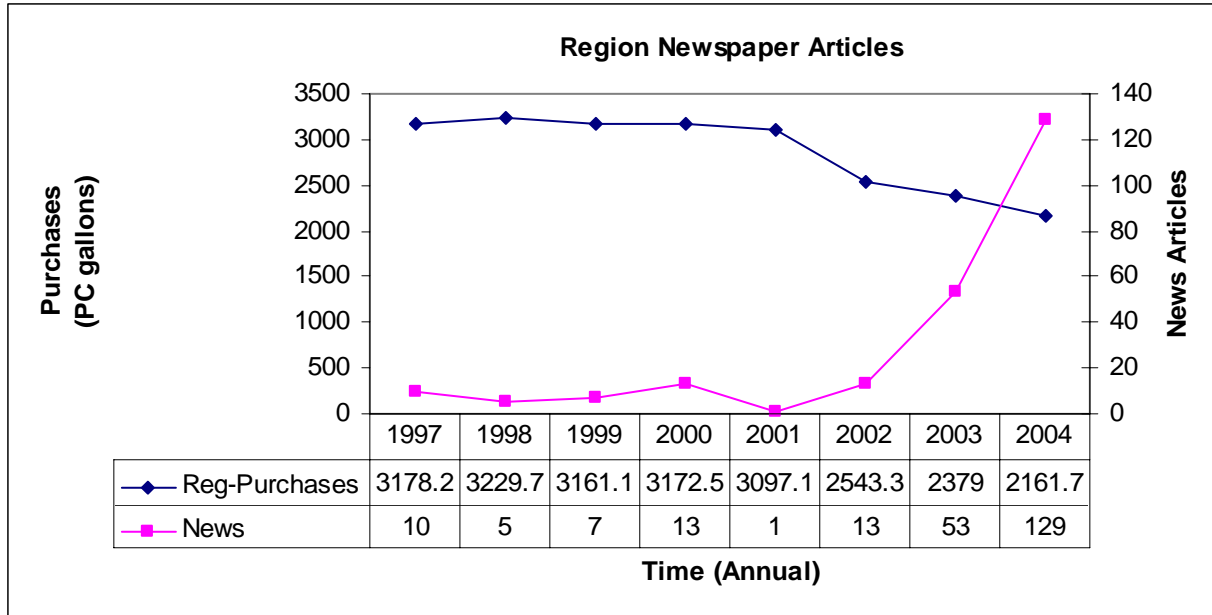
A second issue to consider is whether media coverage mirrors, or creates, a cultural phenomenon, such as the low-carbohydrate dieting trend. Diet media coverage in this study was considered as a proxy of the media setting an agenda about weight loss and dieting.

Alternatively, frequency of diet media coverage may only reflect societal norms. This reflection of societal norms, however, would be slightly distorted, since it is uncertain as to whether each media article is truly representative of the overall population. Further research would be necessary to resolve this issue.

Finally, this study uses content analysis for measuring information and that information's potential impact upon market demand and evolving consumer demand, tastes and preferences. Further research is necessary to determine if this method is sufficient for measuring the impact that information has upon demand for agricultural products.

## TABLES AND GRAPHS

**Graph 1: Southern Region Orange Juice Purchases and Newspaper Articles, Annual (1997 through 2004).**



**Table A: Estimated Model Results of Southern Region Per Capita Orange Juice Demand**

Variable	Variable Description	Coefficients	t-Statistic	Std. Error
Intercept		0.09448	4.759	.020
PREVGAL	Dependent Variable (t-1)	0.845	23.737	.036
REALP	Real Price	-0.02230	-3.648	.006
REGART	Newspaper Diet Media Coverage	-0.0004044	-2.418	.000
FieldStaff	Field Staff	0.008009	4.097	.002
RPDINC	Disposable Income	-0.0000008931	-1.625	.000
SDM2	Period 2 Dummy Variable	-0.001637	-6.705	.002
SDM3	Period 3 Dummy Variable	-0.0006971	-2.924	.002
SDM4	Period 4 Dummy Variable	-0.001612	-6.391	.003
SDM5	Period 5 Dummy Variable	-0.001296	-4.870	.003
SDM6	Period 6 Dummy Variable	-0.001097	-3.934	.003
SDM7	Period 7 Dummy Variable	-0.001024	-3.460	.003
SDM8	Period 8 Dummy Variable	-0.0004641	-1.597	.003
SDM9	Period 9 Dummy Variable	-0.00005802	-.224	.003
SDM10	Period 10 Dummy Variable	-0.0008221	-3.206	.003
SDM11	Period 11 Dummy Variable	-0.0006655	-2.628	.003
SDM12	Period 12 Dummy Variable	-0.0003434	-1.406	.002
SDM13	Period 13 Dummy Variable	-0.001175	-4.739	.002
Total R <sup>2</sup>	0.984			
Regress R <sup>2</sup>	0.980			

## REFERENCES

- Audit Bureau of Circulations. 2004. "Top 150 Newspapers." Accessed February 1, 2005.  
<http://www.accessabc.com/reader/top150.htm>
- Kalaitzandonakes, Nicholas and Leonie A. Marks. 1999. "Public Opinion of AgBiotech in the US and UK: A Content Analysis Approach." Paper presented at AAEE annual meeting, Nashville TN, July 1999.
- Kalaitzandonakes, Nicholas, Leonie A. Marks, and S.S. Vickner. Forthcoming. "Media Coverage of Biotech Food and Influence on Consumer Choice." *American Journal of Agricultural Economics*, in press.
- Piggott, N. E. and T.L. Marsh. 2004. "Does Food Safety Information Impact US Meat Demand?" *American Journal of Agricultural Economics* 86:154-174.
- Swartz, D.G., and I.E. Strand. 1981. "Avoidance Costs Associated with Imperfect Information: The Case of Kepone." *Land Economics* 57(2):139-150.
- van Ravenswaay, E.V., and J.P. Hoehn. 1991. "The Impact of Health Risk Information on Food Demand: A Case Study of Alar and Apples." In: J. Caswell (Ed.) *Economics of Food Safety*, St. Louis, Missouri: Elsevier Applied Science, 155-174.
- Verbeke, W. and Ward, R., 2001. "A Fresh Meat Almost Ideal Demand System Incorporating Negative TV Press and Advertising Impact." *Agricultural Economics* 25(2/3):359-374.
- Weinraub, Judith. 2004. "Orange Juice Feels Squeeze from Low-Carb Craze." *The Miami Herald*, 20 June 2004.