PROGRESS REPORT - CSANR Organic Cropping Research for the Northwest

TITLE: Organic Apple Price in Response to Crop Size Supplied to the Market

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ABSTRACT:
Price analysis has been conducted based on Washington Growers Clearing House daily data for the past few years. It reveals the organic apple price is from $0.12/lb to $0.17/lb higher than conventional apples in the last two years. The price difference between US extra fancy and WA extra fancy premium range from $0.10/lb to $0.20/lb for any size, and there is another $0.30/lb price difference between the small size apples and the large size ones. Euro packs are sold with highest prices, and the heavy packs lowest.

We are in the process of collecting weekly data from Washington Organic Tree Fruit Growers Association (WashingtonOrganic), which is recommended by growers as more accurate. The data ownership is traced back to Wenatchee Valley Traffic Association, a marketer and shipper association (WVTraffic). A small sample of current data has been obtained and preliminary analysis conducted. Results show some consistency in that there is a $0.2 to $0.4 price premium for large size apples over small size ones except for Fuji when smaller fruits seems to have better prices.. No evidence from this September data exists to show the sale quantity impact on prices.

OBJECTIVES:
1. To organize recent market price data for Washington organic apples including Red Delicious, Golden Delicious, Fuji, Gala and Granny Smith;
2. To estimate the percentage of low grades apples marketed in recent years;
3. To study the relationship between crop size of the lower grade apples and the price response of higher grade apples; and
4. To predict the price boosting in this year (or the future) by a reduction in lower grade supplies.

PROCEDURES:
1. Daily or weekly market price and quantity data are to be collected for recent years. The apple data are packout data in various grade/size/package. Need to organize the data, sort the packages to aggregate data by grade/size only.

2. The relevant grades for organic apples includes US#1 (very low in quantity), US fancy, US extra fancy, WA fancy, WA extra fancy, WA extra fancy #1, WA extra fancy #2, and WA extra fancy premium. The first three are considered low grades and the fourth one, WA fancy is also at the margin. The percentage of these lower grade apples will be calculated for each size in the two years.

3. The inverse demand function approaches will be taken to conduct regression analysis using price as dependent variables and quantities and other impacting factors as explanatory variables. We select three representative sizes for small, 113, medium, 80, and large, 56 in the analysis (or alternatively classify all sizes into small, medium and large categories depending on the data). This makes 15 systems to estimate.

4. Assuming a few scenarios of crop size reduction of the lower grade apples, calculate the price response for higher grade apples.

5. The results will be reported to growers in extension bulletin, growers' magazine, growers' conference and/or other appropriate outlets.

PROGRESS TOWARDS OBJECTIVES:

Based on the original proposal, the major effort for this project will be made during the summer of 2006, as the budget allows some salary compensation for a graduate student as well as the principal investigator in the summer. Therefore, this report only covers some very preliminary work done so far.

1. Data Collection

The first step of this project is to collect and organize data on WA organic apple sales. We obtained the daily data from Washington Growers Clearing House from a previous project. This dataset consists four years of prices and quantities both conventional and organic apples. However, it is argued that the WA Clearing House data is not very accurate because growers may under report those organic fruits that are not sold in decent prices. An alternative data source has been recommended as from Washington Organic Tree Fruit Growers Association (WashingtonOrganic). The data ownership is then traced back to Wenatchee Valley Traffic Association, a marketer and shipper association (WVTraffic). WVTraffic agrees to provide the data, but hasn't delivered yet. The quality of the data will also need to be examined.

A download of two current weeks of data from the WashingtonOrganic website indicate the data organization is quite similar to the Clearing House data we have. These data in PDF format are reentered and organized first. Some preliminary analysis is conducted. The current model takes the form:

$$P_{it} = a_{i0} + a_{i1}DCA_{it} + \sum_{j=1}^{n} b_{ij}Q_{jt} + \sum_{j=1}^{m} c_{ij}DSIZE_{ijt} + \varepsilon_{it}, \quad i = 1,...,n$$

where P_{it} and Q_{it} denote the price and quantity of fresh apples for grade i at time t. There are n grades. *DCA* is the dummy variable for apples from controlled atmosphere storage. *DSize* is the dummy variable for sizes, and there are m sizes. Here we only use medium and large dummies, for m=2, maintaining small size as default. No seasonality is considered yet because the data are

for September of 2005 only. The response of price of higher grades to the quantity of lower grades can be measured by the b coefficients.

From the very limited data of recent two weeks (Sept. 5 and 19, 2005), there is no record of lower grades, and no evidence of marketing lower grades impact on higher grade prices. Washington extra fancy premium is reported most followed by Washington Extra fancy #1. Results are reported in Table 1 in the Appendix.

Across all varieties and grade, large fruits consistently have higher prices than medium fruits and both have higher prices than small fruits, expect for Fuji. For the early mature varieties with both CA and regular storage, there is no difference in prices between the two types of storages because the apples haven't been stored for long at this time.

There is no consistent pattern in relations between prices and quantities. That is to say, selling more or less apples to the market doesn't cause market price to fall or rise. This is true for both same grade or cross grades. Of course this result is from the two weeks sales only. A slight positive correlation exists between quantity and price for Golden Delicious and Fuji. We will analyze this effect very carefully once the full dataset is available.

2. Analysis based on Clearing House data

We can use the Clearing House daily data (for both conventional and organic) to explore the feasibility of the proposed analysis.

Separate regressions for each variety are modeled to accommodate the unique characteristics inherent within each variety and to avoid over generalization of model parameters. The model was further delineated by year to reduce the number of observations, and to capture the inclusive production and marketing interactions unique amongst seasons. The empirical model is:

$$P_t = \alpha + \sum \beta_i DSIZE_{it} + \sum \gamma_j GRADE_{jt} + \sum \theta ORG_t + \sum \delta DCA_t + \sum \phi_l PACK_{lt} + \sum \eta_k MONTH_{kt} + \varepsilon_t$$

where dummy variables *DSIZE* represents the number of apples packed in a standard 42 pound carton, including large (48 and 56), 64, 72, 80, 88, 100, 113, 125, 138, and small (150 through 216); *GRADE* consists of US Extra Fancy (USXF), Washington Fancy (WAFCY), Washington Extra Fancy 2 (WXF#2), Washington Extra Fancy 1 (WXF#1), and Washington Extra Fancy Premiums (WXFP); *ORG* corresponds to the organic attribute; *DCA* represents the controlled atmosphere CA storage. There is an overlap during December through March. There are very few CA observations prior to the overlap period and REG observations after the overlap period, and they are removed to eliminate outliers.

In response to pressures from the retail industry, innovative packing methods continue to evolve. The dummy variables *PACK* considered for this analysis were tray pack (TP), heavy pack (HP), euro pack (EU), cell pack (CP), three pound bags (3BG), and five pound bags (5BG). TP are the traditional 42 pound cartons. A HP container is slightly larger at 46 pounds, with EU and CP packs equivalent to 27 pounds and 40 pounds respectively. Size categories between packs are also different. Size equivalencies amongst packs were standardized using the TP 48

through 216 continuum. Apples packed in 3BG and 5BG represent any apple with a diameter greater than or equal to two and one half inches, and are included in the small size category.

Monthly dummy variables, *MONTH*, are introduced to account for seasonality and market adjustments across time. For conventionally grown Red Delicious, Golden Delicious, Granny Smith, and Fuji varieties, a typical season begins in late September and continues through August the following year. Galas are harvested earlier in the season and tend to have a shorter storage life, so a typical season runs from August to May. The marketing season for organically grown varieties is also generally shorter, as regulatory standards prohibit the use of chemicals to prolong shelf life.

Selected variable estimations are reported in the Table 2 in Appendix for the last two years only. The organic price premiums range from $0.12/lb Red Delicious to $0.17/lb Fuji. The higher grades and larger sizes have higher prices than their counterparts, the price differences are about $0.20/lb and $0.30/lb. The fruits from CA storage are sold with higher price than regular stored fruits. There is strong seasonality. The heavy pack box has lower price than the regular tray pack, and all other packages have higher prices even the bagged apples.

OUTPUTS: MA thesis. Joseph Sherburn, *Assessment of Organic Apple Production in Washington State*, Department of Agricultural Economics and Rural Sociology, University of Idaho.

IMPACT: Not available yet

INSTITUTION: WSU

STATE: WA

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Appendix

Table 1 Regression Results from the Current Two Weeks of WVtraffic Data

	Red Delicious		Golden Delicious		Fuji		Granny Smith	Gala	
	Premium	#1	Premium	#1	Premium	#1	Premium	Premium	#1
Constant	0.357***	0.376***	0.344***	0.434***	0.441***	0.296*	0.483***	0.427***	0.744***
CA	0.068	-0.024	0.0492				-0.0173		
WAXF Prem	9.76E-5	-0.00062	6.09E-5	1.21E-5	0.000548	0.00037	3.05E-5	-1E-6	-8E-5***
WAXF #1	0.00025	0.00091*	0.00042***	0.00011	8.05E-5	0.00071**	-0.00106	1.07E-5	-2E-5
WAXF #2			0.00033	0.00073			3.84E-5		
USXF			0.00036**	7.25E-5	0.0125**	0.00117		0.000177	-0.00022
Medium Size	0.198**	0.173	0.196***	0.160***	0.517***	0.522***	0.257***	0.216***	0.044
Large Size	0.243***	0.597	0.250***	0.222***	0.367**	0.468***	0.283***	0.408***	-0.003
Number of Observations	22	13	46	26	20	22	46	90	58
R Square	0.647	0.619	0.752	0.756	0.562	0.673	0.747	0.678	0.795

*, ** and *** indicate significant levels at 10%, 5% and 1%.

Table 2 Clearing House Data Estimation for 2002/2003

	2002/2003					2003/2004				
	Red	**Golden**	**Gala**	**Fuji**	**Granny**	**Red**	**Golden**	**Gala**	**Fuji**	**Granny**
Intercept	0.352	0.418	0.474	0.547	0.439	0.328	0.382	0.494	0.561	0.439
ORG	0.124	0.129	0.135	0.167	0.141	0.157	0.159	0.148	0.170	0.103
ExLarge	0.021	0.004	0.023	0.006	-0.047	0.005	0.000	0.047	0.017	-0.024
80	0.004	0.026	0.035	0.012	-0.001	0.003	0.017	0.035	0.020	0.001
113	-0.023	-0.072	-0.152	-0.128	-0.074	-0.016	-0.0556	-0.170	-0.130	-0.047
ExSmall	-0.047	-0.112	-0.223	-0.204	-0.1686	-0.050	-0.147	-0.234	-0.247	-0.152
AUG	N/A	N/A	0.070	N/A	N/A	N/A	N/A	0.055	N/A	N/A
SEP	0.037	0.044	0.021	0.112	0.050	0.029	0.022	0.018	0.081	0.058
JAN	-0.061	-0.049	0.027	-0.084	-0.042	0.017	0.041	0.064	-0.053	0.057
APR	-0.080	-0.069	0.043	-0.098	-0.001	0.036	0.092	0.062	-0.015	0.080
JUL	-0.084	-0.088	N/A	0.151	0.185	0.050	0.128	N/A	-0.017	0.014
AUG	-0.075	-0.045	N/A	0.161	0.265	0.046	0.131	N/A	-0.052	-0.005
USXF	-0.066	-0.088	-0.121	-0.132	-0.121	-0.078	-0.090	-0.145	-0.163	-0.114
WAFCY	-0.051	-0.090	-0.134	-0.119	-0.121	-0.073	-0.105	-0.155	-0.152	-0.104
WXF#2	-0.027	-0.037	-0.052	-0.013	-0.028	-0.034	-0.010	-0.055	-0.011	-0.037
WXFP	0.037	0.028	0.033	0.052	0.056	0.041	0.027	0.029	0.052	0.027
CA	0.019	0.022	0.010	0.008	0.022	0.016	0.021	0.023	0.017	0.010
HP	-0.014	N/A	-0.036	0.014	-0.089	-0.011	N/A	-0.029	0.017	-0.072
3lb Bag	0.059	0.064	0.073	0.053	0.118	0.059	0.110	0.072	0.083	0.154
EU·64	0.141	0.104	0.113	0.081	0.143	0.121	0.104	0.105	0.095	0.114
CP·64	N/A	0.149	N/A	N/A	N/A	N/A	0.146	N/A	N/A	N/A
R-Sq	0.794	0.788	0.8277	0.756	0.760	0.791	0.826	0.827	0.760	0.697