

Adding a Juice Line to a Winery

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This article is the third in a series of studies from the University of Arkansas resulting from their ongoing research in the area of economics for smaller wineries. "Packaging Line Considerations for Small Wineries" was published in the 1991 edition of the Wine East Buyers' Guide, and "Economic Considerations for Small-Sized to Medium-Sized Wineries" appeared in the 1992 Wine East Buyers' Guide.

Will it be profitable to add an unfermented juice line to an existing winery in order to generate supplemental income? Research conducted at the University of Arkansas focusing on the economic considerations of small- to medium-sized wineries has been extended to incorporate the necessary components to analyze juice production as an additional product line for wineries.

In a previous article in the 1992 Wine East Buyers' Guide, it was pointed out that the economic position of a winery business is enhanced by continually seeking out and taking advantage of new opportunities. One such opportunity for Eastern wineries is to extend the product line by engaging in juice production and, as a matter of fact, an increasing number of small wineries are considering grape juice production as a supplemental enterprise to maximize facility use as well as boost profits. The purpose of this article is to present initial research and economic analysis to provide assistance in the decision-making process for winery managers considering the potential economic opportunities in juice production.

As with all economic analyses utilizing specific data, results may or may not apply directly to an individual winery. The unique circumstances of the economic and technological environment in which the individual operates must be carefully considered in interpreting and applying the results of this research since each winery will have different demands for juice. Nonetheless, general guidelines can be established to help develop the decision-making framework which can be useful to the managers and operators of wineries considering juice production and marketing.

Model Description

The economic decision-making model utilized in Dillon et al. (1992 Buyers' Guide) was modified to include the considerations necessary for the plan to be involved with juice production. Individuals interested in the specifics of the original base model are referred to this earlier article for a description of the base model and the related secondary sources of data and analysis cited as references (Metz; Kirchner, Price, and Morris; Price, et al.; Ward).

The model contains several additional production and marketing decisions representative of the winery/juice processing industry. These decisions are:

- 1) What types of juice and from what varietals should they be made and sold, if any? How much of each juice type should be produced?
- 2) Should the grapes used for juice production be purchased or should the winery also engage in grape production?
- 3) How much additional vineyard acreage will be required over that required for wine production?
- 4) Which varietals should be used for juice? What percent of juice should be from white varietals and what percent from red varietals?
- 5) What level of investment in juice production facilities and equipment should be made?
- 6) What are the additional net returns that the winery can make by adding juice production facilities?

Further restrictions associated with the production and marketing of juice were also incorporated into the original winery model. Acquisition of additional equipment not usually found in wineries must take place before juice production can commence. Such equipment includes a boiler, heat exchangers, and related items. Furthermore, existing technical constraints in the model are expanded to incorporate the juice production and marketing. Consequently, the additional requirements for grapes, labor, and processing equipment time are reflected. Marketing constraints for juice further complicate the decisionmaking process. As described in the 1992 Buyers' Guide article, the model assures an appropriate blend of products sold by requiring that an individual wine type must lie between a minimum and a maximum percent of total sales volume. Similar constraints are imposed upon the sales of individual juice types. The maximum and minimum percentages allowed are the same as presented in the earlier article, with Concord juice also being included at a minimum of zero percent and a maximum of twenty percent. Thus, the percentages for juice varietals are identical to those allowed for similar wines.

Juice products were projected to be sold in 750 ml (milliliter) bottles as specialized products. The juices produced, therefore, are assumed to be items designed for a limited market as opposed to competing with the mass grape and fruit juice market. As a result, it is assumed that the juice will be sold at \$3.00 per 750 ml bottle at the retail level and \$1.80 per 750 ml bottle at the wholesale level (representing a 40% discount).

Winery Size — Annual Capacity in Gallons	Maximum Quantity of Juice in Gallons
100,000	15,000
80,000	10,000
40,000	5,000
20,000	1,000
10,000	500
5,000	250

Table 1

Expert opinion of individuals within the wine industry that are currently making a juice product coupled with marketing surveys provided the information for this decision. However, the higher prices of the juice would be expected to be accompanied by some degree in limiting the appeal to consumers and subsequently by reducing the quantities demanded. Because the maximum quantities of juice that can therefore be sold were dependent upon total capacity of the winery, the quantities listed on Table 1 were proportioned accordingly. In reference to the same 1992 Buyers' Guide article, projected percentage distributions of sales between retail and wholesale prices were imposed upon juice sales for identical reasons.

Findings of the Study

The additional capital requirements projected by the model for adding a juice line to the winery for the alternative sizes are provided in Table 2. The estimated capital outlay requirements for a juice line range from \$21,000 at the 5,000 and 10,000 gallon capacity up to \$55,000 for the 100,000 gallon winery. Based on calculations derived from a previous study on the economics of small wineries (Dillon, et al., 1992 Buyers' Guide), the juice line equipment would result in a total plant capital outlay (including winemaking equipment) ranging from \$184,545 for a 5,000 gallon size to \$2,278,382 for the 100,000 gallon winery. Requirements for capital per square foot indicated the interesting pattern of size and total costs as follows: \$76.89 at 5,000 gallons, \$76.38 at 10,000 gallons, \$83.35 at 20,000 gallons, and declining in successive steps to \$56.96 at 100,000 gallons.

The estimated gross revenue from wine and juice, total costs, and net returns above costs are given in Table 3. For the discrete units analyzed, the expansion into juice production and marketing was a lucrative enterprise for all plant sizes with the exception of the smallest or 5,000 gallon capacity. At this size with 100% of juice sales projected at the retail price of \$3 per 750 ml bottle, either greater quantities or higher prices for juice would be required to justify economically this added production. The percentages of juice sold at \$3 retail as opposed to the wholesale price of \$1.80 per 750 ml bottle were the same as that projected for each plant size in the earlier article: 100% retail for 5,000 and 10,000 gallon capacities; 65% for

Item	Winery Size (Annual Capacity in Thousand Gallons)					
	100	80	40	20	10	5
Capital Costs in Dollars						
Equipment						
Boiler	30,000	30,000	20,000	20,000	10,000	10,000
Large Heat Exchanger	18,750	13,500	13,500	8,250	8,250	8,250
Small Heat Exchanger	6,250	4,500	4,500	2,750	2,750	2,750
Total Juice Equipment	55,000	48,000	38,000	31,000	21,000	21,000
Total Wine Equipment	1,174,382	1,058,018	620,329	445,105	191,087	89,545
Buildings & Non-vineyard Land	1,049,000	784,000	434,000	224,000	124,000	74,000
TOTAL WINE AND JUICE CAPITAL	2,278,382	1,890,018	1,092,329	700,105	336,087	184,545
Capital per Sq. Ft.	56.96	64.29	70.93	83.35	76.38	76.89
Acres						
Additional Vineyard Acreage	10	6	3	1	0.5	0.25
Total Vineyard Acreage	135	106	53	26	13	6.5

Note: This table includes the cost of total wine equipment and the total cost of buildings and non-vineyard land as listed in Table 4 of the earlier article by Dillon, et al. (1992 Buyers' Guide) to give the total capital requirement for wine and juice combined.

Table 2

Estimated Annual Revenues, Costs and Net Returns by Winery Size						
Item	Winery Size (Annual Capacity in Thousand Gallons)					
	100	80	40	20	10	5
Dollars (\$)						
Wine Revenue	1,747,408.70	1,422,211.23	772,111.81	436,849.43	253,984.15	126,992.08
Juice Revenue	154,799.81	105,100.00	57,000.00	12,899.91	7,500.00	3,749.99
TOTAL GROSS REVENUE	1,902,208.51	1,527,311.23	829,111.81	449,749.34	261,484.15	130,742.07
Total Costs (Variable & Fixed) of Wine Operation	1,526,094.25	1,279,116.14	688,651.53	406,013.87	214,930.83	125,943.68
Total Costs (Variable & Fixed) of Juice Operation	79,591.28	55,704.34	31,315.37	11,590.48	7,100.42	5,901.40
TOTAL COSTS (VARIABLE & FIXED)	1,605,685.53	1,334,820.48	719,966.90	417,604.35	222,031.25	131,845.08
Net Returns from Wine Operation	221,614.45	143,195.09	83,460.28	30,835.65	39,053.32	1,048.40
Net Returns from Juice Operation	74,908.53	49,295.66	25,684.63	1,390.34	399.58	-2,151.41
TOTAL NET RETURNS	296,522.98	192,490.75	109,144.91	32,144.99	39,452.90	-1,103.01
Percent (%)						
Returns to Capital over Interest Expense	13.01	10.18	9.99	4.59	11.74	-0.60

Note: Net returns less total costs reflect all costs including a 12% interest rate (or rate of return on personal investment) and a salary for the owner but excluding taxes on income and inventory.

Table 3

20,000 gallon capacity; 40% for 40,000 gallon; 25% for 80,000 gallon; and 22% for 100,000 gallon capacity. Following these distributions of sales, the model projected that complementing a wine business with juice production was favorable for all but the 5,000 gallon winery where there was a \$2,151 annual decrease in returns from what was attained from wine alone. For the other winery sizes, the model projected that juice production would result in additional net returns ranging from about \$400 for the 10,000 gallon plant up to nearly \$75,000 for the 100,000 gallon plant (Table 3). These results highlight the need for wineries to consider carefully the possibilities of expanding operations to include the production of specialty juice products.

Equipment costs in Table 2 reflect three different sizes of boilers as well as small and large heat exchangers combined in different packages to create five different investment levels for the six winery sizes. Alternate increases in the capital outlay requirements for the boiler followed by large and small heat exchanger units create a steadily increasing capital requirement for investment in the equipment necessary for juice production. These steps lead to the following series of capital needs for purchasing juice processing equipment: \$21,000 for the 5,000 and 10,000 gallon winery; \$31,000 for the 20,000 gallon annual capacity winery; \$38,000 for the 40,000 gallon winery; \$48,000 for the 80,000 gallon winery; and \$55,000 for the 100,000 gallon winery. Despite these amounts, the overall effect on total capital cost required is relatively small as demonstrated in Table 2. As displayed in Table 2 (and as compared to the 1992 Buyers' Guide article), additional vineyard acreage would also be required to accommodate the production of juice.

The greater capacity of juice production and higher limitations on retail juice sales associated with ever increasing winery annual capacities resulted in changes in net returns from adding a juice line to the winery. Notably, the 100,000 gallon winery and juice plant not only displays the highest net returns of \$296,523 but it also displays the greatest returns to capital over interest expense at 13.01%. As compared to the winery only figures given in the 1992 Buyers' Guide article, the addition of a juice line resulted in the upper three capacities actually displaying increases in both net returns and returns to capital over interest expense. However, while the 10,000 and 20,000 gallon winery and juice plants display an increase in the absolute amount of net returns, the returns to capital over interest expenses actually decrease slightly as compared to the model projections for similar size facilities without juice lines. This does not, however, necessarily indicate that the engagement in juice production enterprises is not economically desirable for these levels. It does indicate, nonetheless, that a comparison between the opportunity cost of capital must be made to these rates of return. It seems highly unlikely that an individual winery owner would have potential for higher rates of returns than those indicated, especially given that the interest expense of 12% for capital is already incorporated into the calculations.

Juice Varietal	Winery Size (Annual Capacity in Thousand Gallons)					
	100	80	40	20	10	5
Chardonnay ^b	375	250	125	25	12.5	6.25
Vignoles ^b	1500	1000	500	100	50	25
Vidal & Seyval	3000	2000	1000	200	100	50
Riesling ^b	375	250	125	25	12.5	6.25
Niagara ^a	1500*	1000*	500*	100*	50*	25*
Total White	6750	4500	2250	450	225	112.5
Cabernet ^b	375	250	125	25	12.5	6.25
Cynthiana ^b	375	250	125	25	12.5	6.25
Chambourcin ^a	3000	2000	1000	200	100	50
Chancellor ^a	1500*	1000*	500*	100*	50*	25*
Concord ^a	3000*	2000*	1000*	200*	100*	50*
Total Red	8250	5500	2750	550	275	137.5
Total Juice	15000	10000	5000	1000	500	250

* — Indicates grapes for making this juice type were purchased rather than raised in the winery's own vineyard because it was more economical.
a — Indicates that the juice is sold at the maximum percentage allowed.
b — Indicates that the juice is sold at the minimum percentage allowed.

Table 4

While the 5,000 gallon capacity winery and juice plant experienced a loss of \$1,103, this does not indicate that comparably sized wineries do not have economic potential. It should be remembered that all costs with the exception of income and inventory taxes have been included in the model. Consequently, the market value of family labor and personal investment of capital has been deducted from the revenues generated. Additionally, as indicated in the earlier 1992 Buyers' Guide article, the 5,000 gallon winery would in fact experience slight positive net returns above total costs, albeit relatively small gains. These results do demonstrate that the owner and operator of a small winery may well desire to concentrate his or her efforts upon the perfection of the making and marketing of wines before expanding into the production and sales of juice products.

The projected sales of juice by varietal category is provided in Table 4. The suitability of a varietal for juice production is not correlated with its suitability for wine production. As a matter of fact, almost all of the highly flavored "foxy" juice grape varieties are not suited for premium wine production. Given the model's application of a uniform selling price for each of the different juice varieties, those juices with the lowest cost for raw product (purchase of grapes) are projected to be produced at the maximum amount permissible as would be expected. Consequently, this represents an almost entire reversal from the maximum sales percentages estimated in earlier research on wine sales (Dillon, et al., 1992 Buyers' Guide). For example, Concord juice is an extremely favorable selection within the winery/ juice plant model followed closely by Chancellor, Chambourcin, and Niagara juices. As a result, the quantities of red juice represent 55 percent of the total amount of juice sold with the remaining 45 percent being white varieties. Vidal and Seyval represented an intermediate amount located at neither the minimum nor the maximum amount allowed. This indicates that these juice types were less favorable than those sold at the maximum amounts permissible but were more lucrative than those sold at the minimum amount allowed. The remaining juice types (Chardonnay, Vignoles, Riesling, Cabernet, and Cynthiana) were projected to be sold at the minimum amount allowed. The percentages of the individual juice varieties remained constant across winery sizes with only the total juice amounts differing. The total amount of juice sold was at the maximum permitted for each plant capacity (Table 4). Break-even juice prices at which the winery will just cover first of all the variable costs, and then the total costs, can be helpful in short-run and subsequently long-run planning in the decision-making process. Table 5 presents the break-even prices for the various juice varieties for different plant capacities. In Table 5, Section I, only variable costs are considered while in Section II total cost considerations are included. For the purposes of this table, variable costs are defined as those costs related to one additional bottle of juice produced for the various varieties and assumes that the winery and juice plant is already in operation. These variable costs include the cost of additional purchase or production and harvest of grapes, necessary utilities, bottles, and related supplies.

As Section I of Table 5 demonstrates, the model projects considerable differences between the break-even prices above variable costs for the various juice varieties. These differences are directly attributable to the fluctuations between cultivars in either the cost of grape production and harvest or the purchase of grapes as the raw product. For example, the low market price for producing or purchasing Concord grapes makes the Concord juice possess an extremely favorable break-even price above variable cost at \$0.60 per 750 ml bottle. This and following illustrations were taken from the 100,000 gallon annual capacity winery (Table

Table 5 Break-even juice Price per 750 ml Bottle above Variable and Total Costs by Varietal and Winery Size

Section I. Break-even above Variable Costs

Winery Size (Annual Capacity in Thousand Gallons)						
Juice Varietal	100	80	40	20	10	5
Chardonnay	1.03	1.03	1.03	1.03	1.03	1.04
Vignoles	0.86	0.86	0.86	0.86	0.87	0.87
Vidal & Seyval	0.80	0.80	0.80	0.80	0.81	0.81
Riesling	0.98	0.98	0.98	0.98	0.99	0.99
Niagara	0.66	0.66	0.66	0.66	0.66	0.67
Cabernet	1.05	1.05	1.05	1.05	1.05	1.06
Chambourcin	0.76	0.76	0.76	0.77	0.77	0.78
Chancellor	0.77	0.77	0.77	0.77	0.78	0.78
Cynthiana	0.88	0.88	0.89	0.89	0.89	0.90
Concord	0.60	0.60	0.60	0.60	0.61	0.62

Section II. Break-even above Total Costs

Winery Size (Annual Capacity in Thousand Gallons)						
Juice Varietal	100	80	40	20	10	5
Chardonnay	1.33	1.38	1.52	2.59	3.11	4.99
Vignoles	1.16	1.21	1.35	2.42	2.94	4.82
Vidal & Seyval	1.10	1.15	1.29	2.36	2.88	4.76
Riesling	1.28	1.33	1.47	2.54	3.06	4.94
Niagara	0.96	1.01	1.15	2.22	2.74	4.62
Cabernet	1.35	1.40	1.54	2.61	3.13	5.01
Chambourcin	1.06	1.12	1.26	2.32	2.84	4.72
Chancellor	1.07	1.12	1.26	2.33	2.85	4.73
Cynthiana	1.19	1.24	1.38	2.44	2.97	4.85
Concord	0.90	0.96	1.09	2.16	2.68	4.56

Note: For the purpose of this table, variable costs include cost of grapes (the lesser of production costs or purchase price), glass, labels, corks, and utility expenses. Total costs are variable costs and juice equipment costs but excluding equipment costs for wine already purchased.

5, Section I). In contrast to the projected Concord raw product price of \$200 per ton, juice made from Cabernet Sauvignon grapes selling for \$850 per ton records the highest break-even price above variable cost at \$1.05 per 750 ml bottle. Because the variable costs differed only slightly between the various sizes of wineries analyzed, there were relatively small variations within each varietal between different winery sizes.

If the operator of a winery expects to propose a similar price structure across the different varieties of juice, attention to the lowest break-even prices can provide insight into the greatest possible profit margins on juice products. Nonetheless, the effects of the availability of alternative juice products for the attraction and satisfaction of customers must be considered. Consequently, under such conditions, the operator of the winery and juice plant may wish to emphasize the production of those juice varieties with the lowest break-even prices while still maintaining an appropriate selection of products. It should be noted that the break-even prices above variable costs become most relevant based on the fact that juice production equipment has already been purchased and put into operation.

For the winery manager who is not yet committed to juice production but is considering the economic potential of such an undertaking, the break-even juice prices above total cost as presented in Section II of Table 5 become important guidelines. These break-even juice prices above total costs include both variable costs and fixed costs associated with the purchase of additional juice line equipment. However, the effects of equipment already purchased for the production of wine are not represented in this table. The addition of juice line equipment is considered under the assumption that the winery is already in operation and has invested in the appropriate wine production facilities.

When juice equipment costs are reflected in the total costs, the breakeven prices are increased by significantly different amounts depending upon the capacity of the winery under consideration. For example, consideration of costs associated with juice equipment would require additional charges of \$0.30; \$0.35; \$0.49; \$1.56; \$2.08; and \$3.95 per 750 ml

bottle to be added to break-even prices under variable costs. Those costs would apply in the order listed to the following respective winery/juice plant capacities: 100,000; 80,000; 40,000; 20,000; 10,000; and 5,000 gallons (Table 5, Section I 11). The model's projection of additional cost per bottle illustrates the high degree of variability for break-even prices above total costs. This range includes estimates varying from a low of \$0.90 for Concord juice produced at the 100,000 gallon winery to \$5.01 per bottle of Cabernet grape juice produced at a 5,000 gallon winery.

The resulting higher costs for smaller size plants are a direct indication of lower sale quantities as compared to the additional amounts of juice that are projected to be marketed by the larger winery/juice plant capacities. These findings demonstrate the importance of the marketing of a sufficient volume of juice in order to justify the purchase of the additional juice line. These results also emphasize the importance of conducting a proper and thorough marketing study in order to determine the demand for each varietal and the resulting potential juice sales and prices the winery can expect. It should be duly noted that these break-even prices above total cost cannot be used as adequate measurements for individuals who are not in the winery business and who do not already possess equipment that is used for either the processing of wine or juice (e.g., receiving and crushing equipment, bottling equipment). The purchase of such required equipment would significantly increase the break-even prices above the total costs represented in Table 5. See the article by Dillon, et al. in the 1992 Buyers' Guide for insight into the initial winery costs.

The general results from this study demonstrate that the addition of juice production and marketing to an existing winery can indeed be an economically favorable venture. The higher capacity wineries were projected to have the greater increases in profits from a juice line because of a decreasing capital requirement per unit. All results reflect the specific data utilized within the study and, therefore, the individual circumstances surrounding a particular situation need to be carefully considered in deciding the merits of adding a juice line to an existing winery. However, the primary indication is that the potential benefits of the production and selling of juice justifies the time and effort involved in conducting an individual, specific decision analysis for each given winery.

Conclusions

While the specific findings of this study may not directly apply to any given individual winery, the investigation of the potential of adding a specialty varietal grape juice line to an existing winery seems to be worthwhile. Juice production enterprises seem to be economically feasible as a supplemental business venture to an existing winery. Specific factors of an individual winery and the goals of the owner and manager will dictate whether or not such a venture should be pursued.

A thorough market analysis by the winery is one of the crucial considerations in evaluating the economic feasibility of the addition of juice production facilities. This study demonstrates that it is vital to have the ability and the market to sell a sufficient volume of juice to justify the purchase of the required juice production equipment. The greater the amount of juice that is sold, the lower the cost of owning and utilizing juice equipment per bottle sold.

Another important point to reflect upon in deciding whether or not to enter the juice business involves the availability of an adequate selection of specialty varietal grape juice products for the consumer. The retail price of \$3 per 750 ml bottle reflected in the model for this study would be keenly dependent upon an adequate supply and selection of different juice varieties. Furthermore, the prices of \$3 retail, \$1.80 wholesale reflect those for specialty juice products of a high quality. Adequate time and attention to the production of such juice is vital in establishing such price structures. Finally, such juice must be properly packaged, labelled, and bottled. Presentation of a specialty juice product should reflect that it is a specialty item. The model of the study does not consider these juice products to be those paralleling mass market juice production and merchandising. Selling the lower volumes of specialty juice products but at higher prices will be required to achieve the profitability projected in this study.

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