

MARKET DEVELOPMENT FOR BLUEBERRY JUICE BLENDS

C. Price, D; M. Danforth, J. R. Morris and S. Banks

Four fruit juice blends, each with 60% blueberry and 40% from other sources, were evaluated in consumer preference tests for color, flavor, sugar acid balance and "first choice." All blends were ranked in a "like" category by a majority of panelists. The blueberry-concord blend had the best flavor rating and was the only one ranked significantly higher than a blueberry-water blend in the "first choice" ratings.

The Arkansas Blueberry Growers Association, Lowell, Arkansas, successfully marketed a 70% blueberry juice and 30% 'Reliance' grape juice blend in 1991 based on a formulation developed in a University of Arkansas research project [AFR 42(1)]. Additional research provided the basis for reformulating the juice blend in 1992 to contain 60% blueberry juice and 40% 'Concord' grape juice. Laboratory trials, some with formulations containing as little as 10% blueberry juice, confirmed previous findings that a concentration of at least 60% blueberry juice is needed to maintain the characteristic taste of blueberries (data not shown). Four experimental formulations judged as acceptable in laboratory sensory evaluations were selected for consumer preference tests, the results of which are presented here.

Each blend contained 60% blueberry juice and 40% from other sources as follows;

- 1) 26% water, 14% high fructose corn syrup
- 2) 20% Concord grape juice, 15% high fructose corn syrup, 5% water
- 3) 23% water, 17% Thompson Seedless grape juice concentrate
- 4) 40% Reliance grape juice.

Juice from the Reliance grape cultivar was selected because, as in the original blend, its low acid and high level of soluble solids (sugar) complemented the high acid and low sugar in blueberry juice. Both the Concord and Reliance juices were found to maximize the blueberry taste in the final product.

Consumer preference tests of the four blueberry juice blend formulations were conducted on the Wednesday through Saturday weekend of September 2-5, 1992, at a display in a prominent grocery store in Fayetteville, Arkansas. The normal Thursday-Saturday weekend survey was expanded to increase the potential size of the consumer panel and to compensate for the proximity to the Labor Day holiday. Every third person who walked by the display was asked if they would cooperate in a taste test of blueberry juice. There were 381 participants in the four-day taste panel.

Once they agreed but before being presented with juice samples, panel members were told the purpose of the tests, the ingredients in the blends and that they should participate only once. As juice was poured into clear plastic sample cups, the participants were asked to give a ranking of the color, flavor and sugar/acid balance of the four blueberry juice blends. To insure unbiased treatment the juices were known only by a three-digit code to both the enumerators administering the tests and the panel members making the evaluations. After completing their ratings, participants were asked, "If only one of the juices were marketed, which one do you think it should be?"

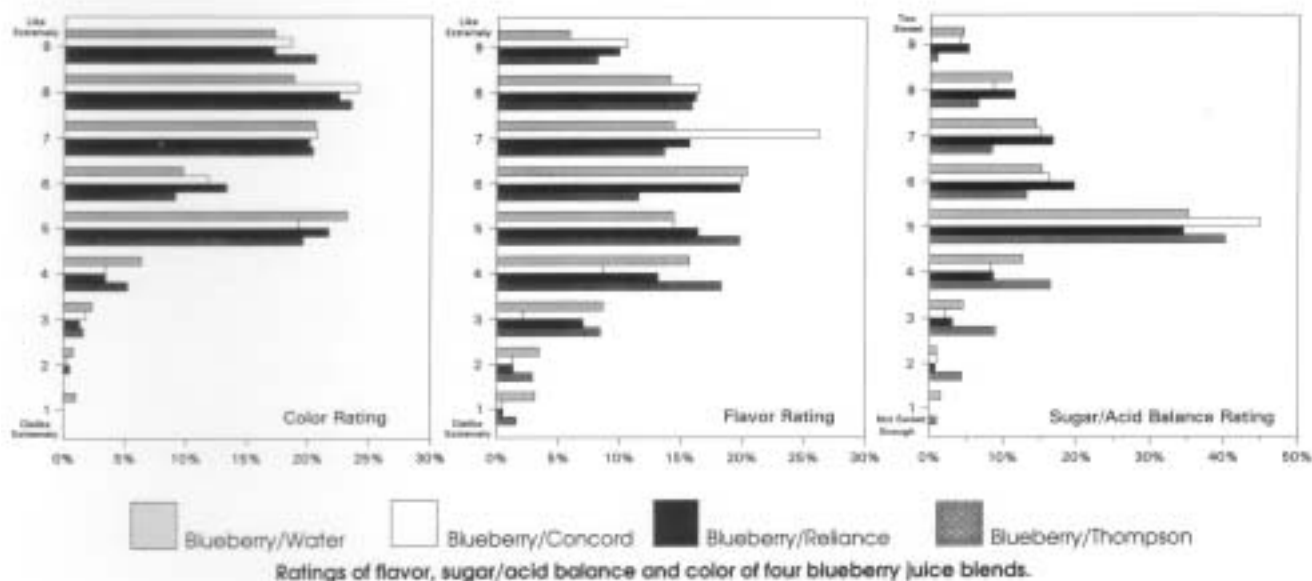
Color, flavor and sugar/acid balance were rated on Likert-Hedonic (or pleasantness) scales in which there are nine discrete rankings. For color and flavor, the points ranged from 1, "dislike extremely," to 9, "like extremely" and 5 was considered a neutral, neither like nor dislike, rating. For sugar/acid balance, a 1 rating was associated with "not sweet enough," 9 with "too sweet" and 5 with an ideal sugar/balance.

**Consumer preference mean ratings
by juice characteristic. Arkansas blueberry
juice blends taste test, University of Arkansas, 1992.**

Juice	Color	Flavor	Sugar/Acid	First
			Balance	Choice
		Mean*		% **
Blueberry-Concord	6.92 a	6.45 a	5.73 b	31.1
Blueberry-Thompson	6.95 a	5.69 c	5.02 a	24.8
Blueberry-Reliance	6.82 a	6.06 b	5.91 c	23.2
Blueberry-Water	6.59 b	5.59 c	5.64 b	20.9

*Ratings of each characteristic were from 1 to 9. For color and flavor a higher number is more favorable; for sugar/acid balance, a score of '5' is ideal. Repeated measure ANOVA models for differences between juices were significant at P < .05. Ratings followed by different letters were significantly different.

**X² test for difference in distribution = 8.64, P < .05.



Results. Percentages of the sample rankings for flavor, color and sugar/acid balance shown in the graphs reveal that a majority of the panel members rated flavor and color for all the juices in one of the "like" rankings above the midpoint. More than 40% of the panel rated the sugar/acid balance for all juices as near the 5.0 "just right" scale.

One-way analysis of variance (ANOVA) models were used to test for significant differences in mean juice ratings. Those statistical models used a repeated measures design to correct for lack of independence between ratings from a given respondent. On first choice purchasing expectation, respondents could select only one of the four so the Chi-square test was used to compare the expected equal distribution with that which was observed.

Color. The dark color of blueberry juice predominated in all blends, resulting in only slight visible variations. Still, ratings of color were significantly associated with type of juice. The color of the Blueberry-Water blend was rated significantly less desirable than that of the other three blends, which did not differ significantly from each other. Mean ratings are presented in the table.

Flavor. The flavor of the Blueberry Concord was most preferred followed by Blueberry-Reliance, Blueberry-Thompson and Blueberry-Water (see table).

Sugar/Acid Balance. The sugar/acid balance ratings were in three significantly different groupings even though the range was only from 5.02 to 5.91. The Thompson blend was rated closest to the midpoint of S associated with "just right" (see table).

First Choice. With no predisposition favoring any blend, each blend would be expected to receive 25% of the first choice ratings. However, Chi-square test results show that preferences for which juice to market are not equally distributed among the four juices. The rating of 31.1% in this category for the Blueberry-Concord blend was significantly higher than the 20.9% for the Blueberry-Water blend.

Conclusions. A majority of the panel members ranked the flavor and color of all four blends in one of the "like" rankings above the midpoint with mean juice ratings of about 7 for color and 6 for flavor. More than 40% rated the sugar/acid balance for all juices near "just right" with the Blueberry-Thompson blend closest to "just right." The Blueberry-Concord blend had the highest ranking for flavor and was ranked significantly higher than the Blueberry-Water blend for "first choice" if only one were to be marketed.

Although the incidence was not recorded, some consumers expressed reluctance to taste the juices when it was explained that some blends contained high fructose corn syrup as a sweetener. Combinations which contain only juices and no additional sweetener may prove to be preferable.

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