The Impact of Food and Wine Knowledge, Wine Acidity Level, Wine Sweetness Level, and Wine Tannin on perceived Match with Food

HARRINGTON Robert, KOONES Rebeckah, GOZZI Mario, MCCARTHY Michelle

University of Arkansas- US

rharring@uark.edu, rkoone@gmail.com, mgozzi@georgebrown.ca, sommelier.education@sympatico.ca

Experts have generated several “rules” to act as guidelines when pairing wine and food. These rules have strayed from the old suggestion of “red wine with meat, white wine with fish” to take into consideration the many factors influencing a food and wine match such as gastronomy and the important elements of food and wine components, textures and flavors.

The overall goal of this study was to evaluate a variety of sensory relationships in the interaction of wine and food when tasted sequentially and then together. Primarily, the direct effect of certain wine component and texture elements was examined to determine their impact on perception of match. Secondary purposes included exploring if individual differences driven by expertise/experience had an effect on the perception of match, and if the interactions between the wine elements and experience affected the perception of match. Specifically, this study tests the effects of wine sweetness levels, acidity levels, and tannin levels on level of perceived match with cheese, salami and chocolate. Further, we test the direct and moderating effects of level of food and wine expertise on food and wine match perceptions. These relationships drive the hypotheses of this study.

There are numerous publications in the mainstream press exploring food and wine pairing combinations, but the views projected are mainly subjective and merely offer guidelines to follow to achieve successful food and wine matches instead of providing empirical rules for pairing (Harrington, 2008). Also, previously published articles in scholarly publications researching food and wine pairing have generally used trained or expert panelists (Harrington & Hammond, 2005, 2006; Harrington et. al., 2010; King & Cliff, 2005; Madrigal-Galan & Heymann, 2006; Nygren et al., 2001; Nygren et al., 2002, 2003a, 2003b) or a small sample size with the largest sample size being 76 participants (Bastian et al., 2010).

In addition to earlier studies using limited sample size, the variety of foods used in these studies have been restricted. For example, Most food and wine pairing studies have used only cheeses when exploring match perception to presumably provide greatly consistency in regards to acidity, fat and salt levels (e.g., Bastian et al., 2009, 2010; Harrington & Hammond, 2005; Harrington et. al., 2010; King & Cliff, 2005; Madrigal-Galan & Heymann, 2006; Nygren et al., 2002, 2003a, 2003b). Therefore, a key purpose of this study is to determine what key food and wine elements create the perception of an ideal match using a larger sample size (248) consisting of individuals ranging from novices to experts in food and wine pairing.

Further, this study adds other types of foods in addition to cheeses. As Melgaard, Civille and Carr (2007) point out there is an enormous range shown by earlier research for thresholds for different compounds and substantial differences across individuals (p. 16). Therefore, this study utilized a larger sample to increase the validity of its findings for the general population. The sample was a convenience sample of culinary and wine students at a large North American college. The participants ranged in expertise levels and in industry experience outside of this training program. The study was part of a semester long course on food and wine pairing. The resulting sample of 248 participants included 91 females and 157 males. The participants evaluated four wines, four food items and the level of match among the wines and foods.

The instrument was adapted from previous food and drink research (Bastian, et al., 2009; Harrington, et al., 2010). The instrument included five sections and included: 1) tasting instructions, 2) wine and food expertise self-evaluation, 3) value bands and food/wine level descriptions, 4) evaluation of wine sweetness, acidity and tannin levels, and 5) food and wine level of match. The wines included in this study included a Sauvignon Blanc, Chardonnay, Cabernet Sauvignon and Port. These were selected because each represented a distinctly different wine style with implications on food pairing relationships. The foods were evaluated in the following order: 1) chèvre (fresh goat’s milk cheese), 2) brie (soft cow’s milk cheese), 3) spicy Italian salami, and 4) milk chocolate. Wines were evaluated with each food with lightest to fullest style (Sauvignon Blanc, Chardonnay, Cabernet Sauvignon, and Port). Participants were asked to cleanse their palate with water, crackers and were given a short break between pairings. SPSS was used to test all direct and moderating effects of interest utilizing hierarchical regression. Because the line scales used in this are assumed to provide equally spaced numerical values, parametric t-tests and regression are
appropriate for analysis (Meilgaard, et al., 2007: 57). First, paired t-tests were completed to assess if significant differences existed among perceived level of match with each food item across the four wines used in this study. To test the direct effects of wine elements on match perceptions as well as the direct effect of food and wine expertise and extent to which the interaction of food and wine expertise moderates the relationship between wine elements and level of perceived match, we performed moderated hierarchical regression analysis in which the direct effects of wine sweetness, wine acidity, wine tannin and food & wine expertise perceptions were entered first into the regression equation, followed by the 2-way interaction terms (Saks, 1995). For these tests, gender was included as a control variable; earlier studies have indicated a higher percentage of super-tasters are female (Gilbert, 2005) and therefore in this study we controlled for potential gender effects from wine element and food & wine expertise effects.

**Results.** Paired t-tests provided numerous significant differences in perceived match levels among wines and food items. Overall, the highest level of perceived match for each food and wine pairing were 1) chêrve and Sauvignon Blanc, 2) brie and Chardonnay, 3) spicy salami and Cabernet Sauvignon, and 4) milk chocolate and Port. The tests using regression provided several significant direct effects between level of match and key wine elements.

For the chêrve relationships, sweetness levels in Sauvignon Blanc (SB) and Chardonnay had positive relationships with level of match. Also, SB acidity level had a positive relationship with level of match with the chêrve. For the brie match tests, sweetness in the Chardonnay provided a significant and positive relationship with perceived match. For the match with spicy salami, gender had a significant relationship in the brie-SB match level along with a negative relationship with SB acidity and match with the brie. In addition for the spicy salami match tests, perceived tannin level had a significant and positive relationship for both Cabernet Sauvignon and Port tests. With the milk chocolate, sweetness and tannin levels in the Chardonnay had positive relationships with the level of match.

The level of food and wine expertise (FWE) or knowledge and a significant direct relationship for perceived match of wine with the chêrve, brie, spicy salami and milk chocolate. For both the chêrve-Chardonnay and spicy salami-Chardonnay match level, FWE had a significant and positive relationship with level of perceived match. For the brie match tests, FWE had a significant and positive relationship for level of perceived match with both SB and Chardonnay. For the level of match between Port and milk chocolate, FWE had a significant and positive relationship with perceived match.

In the tests using moderated regression, two significant interactions were apparent: 1) the interaction between SB sweetness and FWE on the average level of match with spicy salami, and 2) the interaction between Port acidity and FWE on the average level of match with milk chocolate. To interpret these interactions, wine element levels and FWE levels were separated into low and high groupings. Once categorized, these were plotted on a graph with low and high wine element groups on the X axis and average level of perceived match on the Y axis. A separate line was plotted for each FWE group (low and high). Based on this graphical depiction, the following interpretations were possible.

For the interaction between SB sweetness and FWE on the average level of match with spicy salami, the high FWE group perceived no difference in level of match between the SB and spicy salami based on an assessment of SB sweetness level. But, the low FWE group rated the match substantially higher when low expertise group members perceived SB sweetness levels to be higher. For the interaction between Port acidity and FWE on the average level of match with milk chocolate, the high FWE group rated the chocolate-Port match higher regardless of Port acidity ratings. The significant difference in this interaction appears to be that, when members of the low FWE group rated the acidity in the Port at higher levels, the average match level was greatly reduced.

**Conclusions and Implications.** The overall goal of this research was to evaluate the direct and interacting effects of wine acidity, sweetness and tannin levels on level of match with a variety of foods. The study selected particular wine styles and food items to expand food and wine tests not published in the past. A second purpose was to assess the direct and interacting effects of individual differences in the form of food and wine expertise. Further, this study used a larger sample that included participants with a range of food and wine experience or expertise to ensure that findings are more generalizable to the general population and to test the impact of these differences.

Overall, the highest perceived food and wine match levels for each wine and food item are in line with earlier studies and those proposed in popular texts. FWE, wine acidity, wine sweetness and tannin levels had significant relationships with match perceptions with food items. FWE had both direct and interacting effects on perceived levels of match among wine styles and food items used in this study.

Implications from this study highlight the importance of key wine elements and food and wine expertise levels associated with perceptions of match with a variety of foods. For practitioners in the wine and foodservice industries, an understanding of key wine elements impact on perceived match as well as an understanding of the relationship between consumer food and wine expertise on perceived match is needed to maximize the consumer food and wine experience.

©www.vdqs.net/2012Coimbra