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The Impact of Knowledge and Gender on Young Adults’ Perceptions Regarding Beer and Food Pairings

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Human Environmental Sciences

by

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University of Arkansas
Bachelor of Science in Human Environmental Science in Food, Human Nutrition & Hospitality, 2013

July 2015
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This thesis is approved for recommendation to the Graduate Council.

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Abstract

Food and wine pairings are commonly seen among empirical research. Minimal research exists concerning beer and food pairings, yet food analysts are taking note of higher rates of beer and food pairings occurring. As such, these exploratory studies examine young adults’, experts’ and novices’ knowledge of beer and food pairings along with gender differences and sensory pairing of beer and chocolate. A survey was used to identify both subjective and objective knowledge along with a test to determine appropriateness of expert and novice choices. It was found that males had greater objective knowledge of beer and food pairing than females, while their subjective scores were similar. Industry experts more accurately paired beers with foods than novices. Another survey was used to identify demographics and how much each pairing was liked or disliked. Results demonstrated that males have a higher overall liking of beer and chocolate pairings than females. Despite males liking the pairings more than females, the female sample still rated the pairings in a highly favorable manner. These studies are intended to aid in identifying young adults’ knowledge of beer and food pairings, the differences between expert and novice consumer choices and gender differences between males and females when it comes to sensory pairing of beer and food.
Acknowledgements

Special thanks are extended to my chair and advisor Dr. Rhonda K. Hammond for her devoted intellectual and moral support from start to finish. Her help has been immeasurable and invaluable in my endeavors throughout these past two years. I would not have come this far if not for her wisdom and support.

Also, a special thanks to my committee members Dr. Robert J. Harrington and Dr. Jacquelyn D. Wiersma-Mosley who helped push me through this process and gave me guidance and direction in my research and statistical analyses. Without their assistance, guidance and constant push to complete my thesis this process may have never come to a close.

To my family and friends, I would love to thank you for all your constant support and motivational speeches to help me push through this process and make it to the finish line. I could not have done it without you all.

I would like to give special recognition to Mr. Allen Powell and Mrs. Nancy Simkins, who not only helped me make the decision to pursue a Master’s degree, but aided in walking me through each step of the process. I would have been lost without their guidance and constant reminders.
Dedication

This edition of *The Impact of Knowledge and Gender on Young Adults’ Perceptions Regarding Beer and Food Pairings* is dedicated to my Oma, Teresa Wijfjes, who passed away before I could complete my Master’s Degree. Thank you for being the best grandmother a guy could ask for and I hope this accomplishment makes you proud. I love you.
CHAPTER I

Introduction

The connection between food and alcohol is noted by many disciplines and widely accepted as being imbued with cultural meaning. This has resulted in food and alcohol pairings to be strongly involved in ceremonial rituals as well as celebrations (Pettigrew & Charters, 2006). Food and alcohol pairings are known to enhance the dining experience. Wine has traditionally been associated with food pairings (Donadini, Spigno, Fumi, & Pastori, 2008; Hammond, Velikova, & Dodd, 2013; Harrington, Miszczak, & Ottenbacher, 2008; King & Cliff, 2005; Macionis, & Cambourne, 1998; Pettigrew & Charters, 2006) and research has been done regarding wine and the various health aspects associated with it (Canton, Ball, Ahern, & Hetherington, 2004; Johansen, Friis, Skovenborg, & Grønbæk, 2006). Wine is often identified in a context that it is considered inappropriate to consume without also consuming food (Charters & Pettigrew, 2006). While wine is often thought of for food pairing possibilities, recent interest has been shown in the beer and food-pairing field (Bellamy, 2005; Shriver, 2005).

Young adults (at least 18) account for a large portion of the college population and many fall into the Millennial generation segment (Georgiou, Betts, Hoerr, Keim, Peters, Stewart & Voichick, 1997). The Millennial population is made up of potentially 76 million new customers (Nowak, Thach, & Olsen 2006). This huge market holds the potential to vastly increase revenue streams in multiple industries if targeted accurately. Food and alcohol are fundamental elements in multiple social interactions and Millennials have a desire to have fun, thus it stands to reason that they will be partaking in consumption of both food and alcohol at social events (Hammond, Velikova, & Dodd, 2013).
The Millennial generation has shown interest in learning more about food and wine pairings (Nowak, Thach, & Olsen 2006; Nielson, 2011). While wine and food pairing trends continue to grow, the nature of beer and its interactions with food is much less commonly considered (Pettigrew & Charters, 2006). It is strange to think that two of the most consumed alcoholic beverages hold different perceptions with relationship to food. Wine has been seen as “classy”, more sophisticated than beer or liquor (Ritchie, 2007, p. 537). Little academic research exists on food and beer pairings. Yet multiple books exist, such as Michael Jackson’s book “Ultimate Beer” (BeerBooks, 2014) and brew master Garrett Oliver’s book “The Brewmaster’s Table” (Regan, 2003) indicating a strong interest regarding beer and its ability to pair with a multitude of foods (Regan, 2003). Donadini, Fumi, and Lambri performed a study where they paired multiple beverages (alcoholic and non-alcoholic) with chocolates. They found pleasing combinations of beer and chocolate (2012). This demonstrated that beer does have a unique ability to pair with food. As such, further research is needed to ascertain how beer pairs with more complex food items and not just chocolate.

Previous research has been done to identify the impact of knowledge regarding wine (Barefoot et al., 2002; Dodd, Laverie, Wilcox, & Duhan, 2005; Hammond, Velikova, & Dodd, 2014; Johansen et al., 2006; Pettigrew & Charters, 2006; Taylor et al., 2009). Some even focused on Millennials (Hammond, et al., 2014; Nowak, Thach, & Olsen, 2006). Oliver discussed that many consumers have only tasted the beer that is mass marketed and as such they have not truly tasted beer at all, especially since there are a wide variety of beers that can turn a simple meal into a fantastic gastronomical experience (Regan, 2003). Therefore, further research is needed to identify customers’, particularly young adults/Millennials, knowledge levels of beer and food pairings.
As of 2012 there were over 2,300 craft brewers in business (Brewers Association 2014). According to the Brewers Association craft brewers operate in 344 congressional areas and the majority of Americans reside within 10 miles of a brewery (2014). Delo mentioned that most craft beer consumers tend to be college educated, which leads to a greater economic populace. They are not essentially wealthy, but their education level seems to be play an important role in selecting craft beers (2014). Many microbreweries and brewpubs hope to tap into younger customers because many of the breweries are located within college towns (Delo, 2014). With young adults and Millennials accounting for a large portion of the college population (Greorgiou, Betts, Hoerr, Keim, Peters, Stewart & Voichick, 1997) the need to examine their knowledge of beer and food pairings is essential. Craft beer continues to chip away at the market share of the macro-brewers, as consumers are now turning away from the “Budweisers and Coors Lights” of the world in search of more full-flavored beer (Davis, 2013, p. 3). Craft beer has now been reported to represent about 10.2% of the domestic beer market, but even such a healthy rise in consumer demand will not be enough to support the multitude of new breweries diving into the marketplace (Davis, 2013).

Gender differences amongst young adults/Millennial generation could also play a role in the amount of knowledge that is held on the subject of beer and food pairing. Gallup (2013) discovered a wide gender difference in preferential alcoholic beverage. Presently, 53% of males name beer as their preferred alcoholic beverage while only 20% of females preferred beer (Gallup, 2013). Harrington, Miszczak, and Ottenbacher tested gender during a study on beer type and pizza spiciness and discovered that a female’s choice of beer and pizza pairing varied less than a male’s (2008). Examining the variances between males and females and their knowledge of beer and food pairing could potentially lead to a better understanding of why
certain choices are made during the dining or shopping experience. This could potentially lead to marketing schemes more suited to target and solicit females to become beer drinkers. By increasing the female populace that drinks beer, there stands to reason that the overall sales of beer would be able to rise back up from its current downward trend. The Brewers Association (2014), reported that United States (U.S.) beer sales were down an estimated 1.9% by volume in 2013 and imported beer sales were down an estimated 0.6%, when in the previous year they had been up 1.3%. Increasing the female populace of beer drinkers may be one solution to help increase U.S. beer sales overall.

Knowledge can be put into three categories: subjective, objective knowledge and experiences (Brucks, 1985). There is a conceptual difference between objective and subjective knowledge. Subjective knowledge can be thought of as a person’s degree of confidence in his or her knowledge, as opposed to objective knowledge, which refers only to what a person actually knows. There is a possibility that both of these types of knowledge are related to aspects of the decision making behavior, albeit in different ways (Brucks, 1985). Experiences have to do with consumers’ previous purchases and tastings of a product (Olsen, Thach, & Nowak, 2007). Uncovering what style young adults and the Millennial generation rely on more to make their beer and food pairing choices can help the foodservice industry, and beverage companies increase their ability to market to this generation. The amount of knowledge held has been used to categorize people as either an expert or novice (Johnson & Bastian, 2007). It stands to reason that experts will have different purchasing and consumption patterns than novices. However, further research is needed to identify customers’ knowledge levels of beer and food pairings. Research on the expertise of consumers and their knowledge levels could potentially increase
marketability of the foodservice industry as well as increase the overall gastronomical experience.

The topic of subjective/objective knowledge and experiences of food and beer pairing is important because the information gathered from this research will aid restaurateurs in planning, inventory control, marketing, and overall customer satisfaction. Increased knowledge in this area will aid in improved revenue streams for both dining facilities and beverage alcohol companies, in order to suggest food pairings to go along with their products. Additionally, the foodservice and industry could better understand how young adults/Millennial consumers approach beer and food pairings. Young adults and Millennials may either go on the knowledge they think they know (subjective) or do their research before-hand to gain knowledge (objective) in order to improve the gastronomic experience.

Fuelled by the development of brewpubs, there is now an increased acceptance of food and alcohol consumption (Ritchie, 2007). With the surge in restaurateurs brewing their own beer on location, there are now higher expectations of food pairings recommended by restaurateurs (Kochak, 1999). The topic of beer and food is gaining momentum. Understanding ways the customer exhibits knowledge on the subject matter can help aid restaurateurs in providing a more satisfactory gastronomic experience for their customers. Purposes of the following studies are to: 1) identify young adults’ and Millennials’ knowledge of beer and food pairings, 2) explore the differences between expert and novice consumer choices, and 3) investigate gender differences between males and females when it comes to sensory pairing of beer and food.
CHAPTER II

Young Adults’ and Industry Experts’ Subjective and Objective Knowledge of Beer and Food Pairings

Abstract

Food and wine pairings are commonly seen among empirical research. Little research exists on beer and food pairings, yet food analysts are taking note of higher rates of food and beer pairings occurring. As such, this exploratory study examines expert and novice knowledge of beer and food pairings. A survey was used to identify both subjective and objective knowledge along with a test to determine appropriateness of expert and novice choices. It was found that males had greater objective knowledge of beer and food pairing than females, while their subjective scores were similar, and that industry experts more accurately paired beers with foods than novices.

Introduction

The comradery between food and beverage alcohol is prominent in many disciplines and widely accepted as being instilled with cultural meaning. This has resulted in food and beverage alcohol pairings to be intensely involved in ceremonial rituals as well as celebrations (Pettigrew & Charters, 2006). Food and beverage alcohol pairings are known to augment the dining experience. Wine has traditionally been associated with food pairings (Donadini, Spigno, Fumi, & Pastori, 2008; Hammond, Velikova, & Dodd, 2013; Harrington, Miszczak, & Ottenbacher, 2008; King & Cliff, 2005; Macionis, & Cambourne, 1998; Pettigrew & Charters, 2006). It is perceived as inappropriate to consume wine without also consuming food (Charters & Pettigrew, 2006). Recent research has shown that wine is commonly considered complex since it has the ability to link up with a multitude of food items in various ways, (Donadini et al., 2008;
Hammond et al., 2013, Harrington et al., 2008; Pettigrew & Charters, 2006). With this being the case Hammond et al., (2013) and Lacey, Bruwer, and Li (2009) noted that there is a greater perceived risk involved with purchasing wine in social situations when little knowledge is known about the product, which in turn can make the consumer seek various information sources in order to assuage the level of perceived risk. With various pricing and restaurant markups consumers can perceive more risk involved in purchasing more expensive wines since their knowledge of them is low and they do not want to make a financial investment into a pricier wine that may not meet their taste preferences (Lacey et al., 2009). Lacey et al., (2009) reported that consumers who heavily frequented restaurants and commonly purchased wine while dining had a lower overall perceived risk due to their past experiences with wine.

While wine is often considered for food pairing possibilities, recent interest has been shown in the beer and food-pairing field (Bellamy, 2005; Shriver, 2005). It stands to reason that a degree of perceived risk for purchasing beer in social situations may exist, but previous research (Greenfield & Rogers, 1999) found that the majority of risk perception involved with beer centered on overconsumption and driving circumstances. No research was found to investigate perceived risks dealing with purchasing beer in social situations. The lower price point associated with most beers, compared to wine, makes it a generally more affordable option when pairing with foods thus broadening the opportunity of gastronomic exploration to many.

The Millennial population includes upwards of 76 million new customers (Nowak, Thach, & Olsen 2006). This large market holds the potential to greatly increase revenue streams in multiple industries if targeted accurately. Nowak, Thach and Olsen noted how this generation has been raised in a heavily media-based and brand cognizant world and they are swiftly challenging the advertiser’s wits (2006). Food and beverage alcohol are key elements in
multiple social interactions and Millennials have a desire to have fun (Hammond, Velikova, & Dodd, 2013; Nielson, 2012), thus it can be assumed that they will be partaking in consumption of both food and alcohol at social events.

While wine and food pairing trends continue to grow, the nature of beer and its interactions with food is much less commonly considered (Pettigrew & Charters, 2006). It is strange to think that two of the most consumed alcoholic beverages hold different perceptions in relationships to food. Wine has been seen as “classy”, more sophisticated than beer or liquor (Ritchie, 2007, p. 537). While beer is perceived as a social beverage for just about any occasion (Oliver, 2003). Little academic research exists on food and beer pairings despite multiple books such as “Ultimate Beer” (BeerBooks, 2014) and “The Brewmaster’s Table” (Regan, 2003) indicating a strong interest regarding beer and its ability to pair with a multitude of foods (Regan, 2003).

There are many factors that contribute to variability in good beer and food matches, yet it is still anecdotally reported and a general consensus exists that some beer and food pairings are better than others, just as in wine (Beaumont, 2012; Harrington et al., 2008; Regan, 2003). Most literature on this matter is subjective in nature and lacks a systematic testing design where pairings are generally put forth by experts and not the novice consumer (Donadini et al., 2008).

Previous research has been done to identify the impact of knowledge regarding wine (Barefoot et al., 2002; Dodd, Laverie, Wilcox, & Duhan, 2005; Hammond, Velikova, & Dodd, 2014; Johansen et al., 2006; Pettigrew & Charters, 2006; Taylor et al., 2009). Some even focused on Millennials (Hammond, et al., 2014; Nowak, Thach, & Olsen, 2006). Oliver discussed that many consumers have only tasted the beer that is mass marketed and as such they have not truly tasted beer at all, especially since there are a wide variety of beers that can turn a
simple meal into a fantastic gastronomical experience (Regan, 2003). Therefore, further research is needed to identify customers’, particularly young adults/Millennials, knowledge levels of beer and food pairings.

Knowledge can be put into three categories: subjective, objective knowledge and experiences (Brucks, 1985). There is a conceptual difference between objective and subjective knowledge. Subjective knowledge can be thought of as a person’s degree of confidence in his or her knowledge, as opposed to objective knowledge, which refers only to what a person actually knows. There is a possibility that both of these types of knowledge are related to aspects of the decision making behavior, albeit in different ways (Brucks, 1985). Experiences have to do with consumers’ previous purchases and tastings of a product (Olsen, Thach, & Nowak, 2007). Uncovering what knowledge style young adults and the Millennial generation rely on more to make their beer and food pairing choices can help the foodservice industry, and beverage companies increase their ability to market to this generation. The amount of knowledge held has been used to categorize people as either an expert or novice (Johnson & Bastian, 2007). It could be assumed that experts will have different purchasing and consumption patterns than novices. However, further research is needed to identify customers’ knowledge levels of beer and food pairings. Research on the expertise of consumers and their knowledge levels could potentially increase marketability of the foodservice industry as well as increase the overall gastronomical experience.

The topic of subjective/objective knowledge and experiences of food and beer pairing is important because the information gathered from this research will aid chefs and restaurateurs in planning, inventory control, marketing, and overall customer satisfaction. Increased knowledge in this area could support improved revenue streams for both dining facilities and beverage
alcohol companies, in order to suggest food pairings to go along with their products. Additionally, the foodservice industry will understand how the young adult/Millennial consumer approaches beer and food pairings. Young adults/Millennials may either go on what they think they know (subjective knowledge) or do their research before-hand (objective knowledge) in order to improve the gastronomic experience. The purpose of this study is to identify young adults/Millennials’ knowledge of beer and food pairings as well as the differences between expert and novice consumer choices.

**Literature Review**

**Young Adults and Millennials**

Young adults (at least 18 and at max 29) account for a large portion of the college population and many fall into the Millennial generation segment (Gallup, 2013; Greorgiou, Betts, Hoerr, Keim, Peters, Stewart & Voichick, 1997). Having been born between 1977 and 1994 these children of the baby boomers (Williams & Page, 2011) are considered the largest consumer group in United States (U.S.) history with incomes that total around $211 billion (Nowak, Thach, & Olsen, 2006). The population of Millennials greatly out numbers Generation X. The Millennial population contains potentially 76 million new consumers (Williams & Page, 2011, Nowak, Thach, & Olsen, 2006). Nowak, Thach and Olsen reported that this group spends approximately $172 billion a year and save $39 billion per year (2006). Over the course of the next 10 years, Millennial consumers will make up to 40 percent of Americans who are 21 and older (Nielson, 2011).

Nowak, Thach and Olsen stated that the Millennial generation is rapidly exceeding its parental generation. As such, they noted how the newer generations have been raised in a heavily media-based and brand cognizant world and they are swiftly challenging the advertiser’s
wits (2006). It has been put forth that marketers who are not concerned with learning the interests and fixations of the younger generations are likely to hit walls of disbelief and skepticism, thus making their products, such as beverage alcohol, less marketable to this generation. Marketers should strive to examine the characteristics and qualities of young adults and the Millennial generation in order to find new marketing approaches to reach this vast and prosperous segment (Nowak, Thach, & Olsen, 2006; Williams & Page, 2011). Young adults are often targeted in the beverage alcohol market and it has been noted that alcohol marketing and advertising are directly influencing Millennials’ drinking behavior (Williams & Page, 2011). Connolly, Casswell, Jia-Zhand, and Silva (1994) addressed young adults’ awareness of beverage alcohol advertising and their beer consumption and discovered that young men, and their liking for beer, will make them more aware of beer advertising and the beer advertising will strengthen their fondness for beer. It was then shown that the opposite was also true with young women who did not drink beer, the advertising was not likely to coax them to consume beer. Wyllie, Zhang and Casswell collected data on awareness and liking of beverage alcohol advertising. They discovered that drinking behavior, and expecting to drink had positive responses to beer advertisements and in turn amplified the regularity of present drinking and anticipated future drinking (1998). Understanding how to market beer and food pairings is one possible way to appeal to younger generations and assist the foodservice industry in growing its overall consumer base, since younger generations have been shown to respond favorably to advertisements they can relate too (Williams & Page, 2011).

Newer generations tend to live for the moment, and are big spenders (Williams & Page, 2011). Young adults and Millennials’ have shown a tendency to experiment and try new things that will keep them versatile, skipping between varieties of alcoholic beverages. Millennials
have been shown to react quite intensely to real-life examples, they approve of what is honest and genuine. In essence, young adults and Millennials have been shown to greatly care for the experience as a whole (Williams & Page, 2011). Since these newer generations have been shown to want real-life examples and favor these experiences, giving them examples of actual beer and food pairings leads to the assumption that they will indeed be more apt to learning about and trying various beer and food pairings.

Alcoholic beverages are a common drink choice for those who dine out (Zan & Fan 2010). Zan and Fan demonstrated that the more recent generational groups (e.g. Millennials and Generation Z) have been exposed to a lifestyle that includes regularly dining out during their adolescent years when compared to previous generations (e.g. Baby Boomers) (2010). Similarly restaurants can potentially tap into this market better by recognizing ways to promote and advertise to young adults and Millennials in order to develop dining experiences that this generation will value (Hammond, Velikova, & Dodd, 2013, Williams & Page, 2011). Ritchie noted that consumers who regularly dine out and rely upon the server or sommelier to make their beverage choice generally enjoyed “the adventure” of finding out new and unexpected wines (2007, p. 539). Young adults and Millennials have shown to be able to effortlessly grasp new notions and are quite education oriented (Williams & Page, 2011). The assumption that this group holds the potential to be educated on beer and food pairings can then be made. Millennials are an immense and significant generation and alcohol beverage companies need to recognize their taste and buying inclinations in order to take advantage of the styles that can significantly influence their business (Nielson, 2011).

The percentage of Americans who drink alcohol has remained fairly steady, in the 60% range, since the early 1990s (Gallup, 2013). U.S. drinkers' preferences have shifted to the point
that drinkers are now just as likely to say they drink wine as often as beer. Yet beer still ranks as the favored beverage among young adults (Gallup, 2013). Gallup reported that a vast majority of beer drinkers are young adults within the ages of 18 to 29 (2013). So, unless wine or liquor overtakes beer as the preferred alcoholic drink among this group, it doesn't appear that beer's ranking, in terms of preferred beverage, will change (Gallup, 2013). Overall, beer remains the preferred beverage of choice for young adults while wine continues to rank as the top choice of those age 50 and older (Gallup, 2013). Delo mentioned that most craft beer consumers tend to be college educated, which leads to a greater economic populace. They are not essentially wealthy, but their education level seems to be play an important role in selecting craft beers (2014). Many microbreweries and brewpubs hope to tap into younger customers because many of the breweries are located within college towns (Delo, 2014). Since a large portion of young adults and Millennials are in college (Georgiou, 1997; Zapatka, 2009) and still prefer beer (Gallup, 2013), targeting this group, in particular, could potentially provide great benefit to the food and beverage service industry.

Gender

Gender differences between young adults and Millennials could also play a role in how much knowledge is held on the subject of beer and food pairing. Gallup (2013) discovered a wide gender difference in young adults’ preferred alcoholic beverage, going back to the initial survey from 1992. Accordingly, 53% of males (at least 18 years old) name beer as their preferred drink, while 22% said liquor and 20% wine. Among females (at least 18 years old), 52% claimed to drink wine more frequently, while 24% said liquor and 20% beer (2013). Since the sample population of interest is college-aged young adults, due to the large number of craft breweries in college towns (Delo, 2014). Delo (2014) went on to mention that the majority of those
consuming craft beer tend to be college educated. Many Universities tend to have larger female populations than males, but the University where the sample was taken happens to be almost equal, with 49% of the population being male and 51% being female (Institutional Research, 2015). Harrington, Miszczak, and Ottenbacher tested gender in their study on beer type and pizza spiciness and discovered that a female’s selection of beer and pizza pairing changed less than a male’s (2008). Examining the variances between genders and their knowledge of beer and food pairing could potentially lead to a better understanding of why certain choices are made during the dining or shopping experience. Based on this information the following hypothesis was developed:

$H_1$: College-aged young adult males are more likely to be beer drinkers than females.

**Beer and Food Pairing**

Gastronomic identity is a concept that illustrates the effects of environment and culture on fundamental taste components, textures and flavors in food and drink (Harrington, 2008). As with many types of beverages, attractiveness of the beverage fluctuates considerably by culture whether the beverage of choice is wine, beer, coffee or some other supplementary beverage. Traditions of beverage consumption with specific foods have become an important factor of distinguishing cuisines (Harrington et al., 2008). In Bordeaux, the fattiness found in lamb can be paired with the tannic qualities commonly found in the Cabernet Sauvignons of this region. The richness associated with the foie gras works in conjunction with the richness of Sauternes due to the palate-cleansing characteristics inherent in this crisp, sweet wine (Harrington, 2008). An example of a contrasting match would be Port wine and Stilton cheese, since the sweetness of the Port stands out against the salty characteristics of the cheese (Harrington, 2008).

Beer is growing in popularity among restaurateurs. According to Beaumont, in 2008 after Gourmet Magazine co-hosted a five-course beer paired luncheon with a leading American
brewer, pairing beer with food broke out into the spotlight in America. He went on to note how, similar to wine, a beer dinner requires a bit of planning and thought (2008).

As seen in Figure 1, beer is the top beverage consumed (36%) in terms of total quantity in America compared to wine (35%) or distilled spirits (23%). Many food analysts are now suggesting particular beers for consumption with specific foods on the basis of their physical complementarity (Cornell, 2004; Gallup, 2013; Regan, 2003). Over the past 11 years beer and wine trends have fluctuated from high to low. Beer has been seeing a steady decline for almost the last 11 years while wine has increased and only seen slight decreases, before tapering off to maintain a steady 35% (Figure 1).

Figure 1

Despite beers overall popularity, U.S. beer sales were down an estimated 1.9% by volume in 2013 and imported beer sales were down an estimated 0.6%, when in the previous year they had been up 1.3% (Brewers Association, 2014). If these numbers are an indication of the coming years, beer sales overall may continue to drop despite their ranking as the preferred
beverage of choice. Thus, it is important to find ways to increase sales, such as advertising beer and food pairing options.

Due to beers’ wide range of flavors and its carbonation, which cleanses the palate between bites, beer has the ability to link up with multiple food items (Regan, 2003). Wine is no longer the only alcoholic beverage that can play to this aspect of enhancing the dining experience. Bellamy interviewed a hotel food and beverage director, and discovered that most people think wine matches best with food, but in reality they are not aware of how many beers exist that have characteristics that go well with food. Bellamy then went on to take note of what was said by Chef Bourquin, when he commented on how beer pairing is no different than pairing food with wine, one just needs to “taste the beer, identify its characteristics and figure out what food goes with it” (2005, p. 98).

Beer is rarely noted in studies dealing with beverage alcohol and food pairing. Though it has been associated with purchasing fattier food items than someone purchasing wine (Johansen, Friis, Skovenborg, and Grønbæk, 2006). Pettigrew and Charters reported that their subjects related beer consumption to be aligned with “junk” food purchases and consumption (2006, p. 177). Pettigrew and Charters also noted that beer is a flexible beverage and is appropriate for a large array of pairing opportunities (2006). Harrington et al., (2008) conducted research focusing on beer and pizza pairing and reported that participants preferred stout beers with spicy-pizza and lagers with non-spicy pizza. This study helped to identify that beer can be paired with certain foods in a positive and satisfying manner.
Pairing Strategies

With wine, novice and expert consumers identify quality using a variety of cues; smell, sight, taste, price, brand name, awards, ratings, winery’s reputation and recommendations from other wine drinkers (Nowak, Thach, & Olsen, 2006). Beer pairings can be deduced using the same techniques used to discover the full spectrum of a wine. The technique of beverage and food pairing (Mercadini Method) was proposed in Italy by Pietro Mercadini and this method is based upon the idea that food and beverages (originally wine) need to be coordinated according to complementary or contrasting taste and olfactory sensations with the intent of creating a harmonious balance amongst the two components (Donadini et al., 2008).

In a study evaluating ideal every day Italian food and beer pairings with regular and expert consumers of food and beverages, Donadini et al., (2008) noted that beer is a valid alternative to wine since beer and wine share many of the same characteristics and a similar method can be used for guidance for pairing purposes. This leads to the belief that the basics of the Mercadini process, (e.g. food with high greasiness should be matched with a beverage that has good acidity and effervescence to assist in cleansing the palate) (Donadini, G., Pastori, R., Spigno, G., & Fumi, M. D. 2008). This applies to beer and wine as their flavors parallel in a multitude of ways. Donadini et al., noted that ales, porters and barley wines parallel with red wines such as Cabernet and Pinot Noir, while pilsners compare more to a Sauvignon Blanc or a Chardonnay (2008). Despite this, beer is still a bitter beverage and, as a rule, hoppiness in beer equals acidity in wine (Donadini et al., 2008). Bitterness will slice through oil, spices and fats without compromising the flavor of the food. Bitterness can sustain acidity in contrasting food’s fattiness while alcoholicity and astringency contrasts succulence, greasiness, and spiciness.
Experts generally integrate these basics into Mercadini’s method for a more rounded application of this process to the beer field (Donadini et al., 2008).

In interviews conducted by Pettigrew and Charter’s, respondents tended to focus on two aspects of the relationship between wine and food: complementarity and the social setting of having both food and beverage (2006). A number of interviewees openly noted that they consume wine because the expectation that it will be ingested with food reduces the chances of inebriation (Pettigrew & Charters 2006). This denotes that beverage alcohol and food pairing choices are not always made in regards to complementarity. Pettigrew and Charter’s found that many of their interviewees took a longer time to introduce the topic of food when questioned about beer. There was an association that appeared to be more functional and opportunistic when compared to wine and its relationship with food (2006). The interviewees did report certain foods they regularly consume with beer, but they were more convenience and snack foods that are generally thought to prevent hunger or provide a base coating in the stomach to help prevent intoxication, such as varieties of nuts, pizza and chips (Pettigrew & Charters, 2006).

This coincides with Harrington et al.’s study (2008) dealing with spiciness of pizza and beer pairing choices. Pizza was chosen since it is a pivotal food commonly seen consumed alongside beer. Donadini et al., also commented on how beers are considered quite suitable to be consumed with pizza, and beer pairs well with fast food meals and fast casual restaurants (2008). Multiple subjects in Pettigrew and Charters’ study discussed foods they thought would significantly match specific beverages. They generally found that the worse the food tends to be health wise, the better it matched with beer (2006).
Services Marketing Theory

Services marketing theory branches out further from marketing theory (Murray, 1991), which presents the ideals that consumers will search for information about a product from a variety of sources when faced with higher levels of perceived risk or uncertainty. The notion of risk suggests that the majority of individuals make purchase decisions under some level of uncertainty about a particular product (Murray, 1991). Services marketing theory denotes that consumers prefer certain types of knowledge, predominantly experienced based, personal, and subjective information to process service choices in order to diminish the perceived risk of service purchases (Murray, 1991). As such when a customer does not know a type of beverage alcohol that would pair well with their meal in order to improve their overall dining experience, they may feel uncertain as to what to order and simply turn to their subjective knowledge of what they think tastes good as was found in Harrington et al., (2008). If they had a greater knowledge base, they could potentially recall objective knowledge that would allow them to pinpoint a certain beer that would pair exceptionally with the meal. Since beer is reported to be consumed in greater quantity than wine (Gallup, 2013), services marketing theory framework will be used to examine knowledge used by consumers when making beer and food purchases in both restaurants and stores.

Knowledge

In general there are two types of information sources that consumers rely upon, internal and external (Murray, 1991). Internal is linked to scanning the memory for previous purchase experiences. Experiences create knowledge, which in turn leads to the internal search in successive decision situations (Jacoby, Chestnut, and Silberman, 1977; Murray, 1991). External information characterizes a customer’s compelled and cognizant choice to look for original facts
from their surroundings (Berning and Jacoby, 1974; Murray, 1991). Knowledge levels vary among generational segments. Millennials and newer generations have shown an increased interest in the learning process when it comes to wine and food pairing (Nowak, Thach, & Olsen 2006; Williams & Page, 2011). Based on this, it can be inferred that newer generations would have a similar interest. From previous studies (Dodd et al., 2005; Taylor et al., 2008), it can be determined that the more knowledge a person holds, the more likely they are to make wine purchases. Brucks (1985) categorized knowledge of consumers into three categories: subjective knowledge, objective knowledge, and previous experience with a product.

**Subjective knowledge.** The consumer’s alleged level of his or her own knowledge on a topic has been defined as subjective knowledge (Brucks, 1985). As such, subjective knowledge can pose a large influence on the decision-maker’s perception of his or her ability to accurately process information (Dodd, et al., 2005; Hammond et al., 2014; Taylor et al., 2009). Consumers with high subjective knowledge of a product (e.g. beer and food pairings) may feel very confident and rely on themselves to make the purchase decision (Taylor, Dodd, & Barber, 2009).

Park and Lessig (1981) discovered that subjective knowledge levels in a person are a stronger gauge of consumer behavior, since it is based upon the consumer’s perceptions about what he or she *thinks* about a certain product. Brucks (1985) discovered that subjective knowledge was significantly related to the propensity to request merchant opinions on their product purchases rather than characteristic (e.g. labels) information. In turn, Dodd et al. discovered in their study on information used in consumer wine purchasing, that there is a high possibility that the more subjective knowledge a person believes they hold, the less likely they are to ask the waiter, salesperson or family member for their judgment about wines. The authors attributed this to the fact that when a person feels they have a great amount of subjective
knowledge about wine, the person felt confident and felt no need to use merchant opinions (2005). Brucks (1985) pointed out that subjective knowledge is closely related to confidence in one’s decision making abilities in regards to the specific product at hand. This justifies an individual’s ability to make a decision without having to rely on the waiter, salesperson or an acquaintance.

Subjective knowledge has been reported via empirical testing to be of greater importance to defining knowledge due to its influences on the customer’s perception of his or her ability to accurately process information (Schaefer, 1997; Taylor et al., 2009). Differences between measures of subjective and objective knowledge can occur when people do not accurately perceive how much or how little they truly know, assuming that the measures are equally sensitive. When an individual has a high level of subjective knowledge, their confidence is also increased when it comes to the decision making process (Taylor et al., 2009). Taylor et al., discovered that males in general had higher rates of subjective knowledge scores than females (2009).

Due to the lack of empirical research on the subject of beer and food pairings, suggested pairings come from popular press articles and books and they contain a multitude of contradictions. This leads to the question of how much people think they know (subjective knowledge) versus how much they actually know (objective knowledge) about food and beer pairings. Thus, the following hypothesis was developed:

\[ H_{2a}: \text{Males will have a greater subjective knowledge of beer and food pairings compared to females.} \]

**Objective knowledge.** Objective knowledge can be defined as the actual information and organization of knowledge that one holds in their memory. Objective knowledge has been
categorized as “terminology, product attributes, attributes evaluations, brand facts, purchasing, and decision-making procedures” (Dodd et al., 2005, p. 6). A consumer may perform well on an objective test of knowledge of a product, but also engage deeply in external search if the information in his or her memory is not perceived to be useful. It has been proposed that the greater the level of all types of knowledge a person holds in his or her memory, the more superior his or her level of objective knowledge (Schaefer, 1997; Taylor et al., 2009). Hammond et al. indicated that objective knowledge is acquired from numerous impersonal foundations, such as literature, online sources, and reviews (2013). Past research tends to portray males as being more analytical and logical in their processing orientation while females have been characterized to take a more subjective oriented approach (Broverman, Klaiber, & Kobayashi, 1968). Ackerman, Bowen, Beier, and Kanfer performed knowledge test on college-aged males and females and noted that males scored higher in objective knowledge of general college courses. Though Taylor et al., found both men and women scored equally when it came to testing their objective knowledge on wine (2009), it is expected that males will have greater objective knowledge of beer and food pairing. Thus, the following hypothesis was developed:

H2b: Males will have a greater objective knowledge of beer and food pairings compared to females.

**Experience.** Many consumers make beverage and other product purchases based on a multitude of factors ranging from previous tastings to just wanting to try something new (Olsen et al., 2007). With recent trends in beer and cocktail pairings with food, a host may purchase one beverage, such as a bottle of wine for guests and consume a different beverage him/herself (Hammond et al., 2013). Just because someone has prior experience in a task, such as purchasing alcoholic beverages, does not translate to that person having previous experience in
tasting the alcoholic beverages. This could imply they were basing their purchase off of the fact that they did not want to take the risk to try something new (Hammond et al., 2013; Murray, 1991).

Donadini et al., examined both novice consumers and expert tasters to see the difference between beer and food pairing selections. The experts can be thought of as experienced whereas novice consumers are inexperienced. The authors noted that the experts (experienced) had a greater ability to make a broader and more consistent range of pairings between the dishes and beer (2008). Experience can play a quintessential role in the selection process. For the purpose of this study, experience will be measured by the number of times a participant has consumed beer with food in the past month.

H3a: Young adults/Millennials who consume beer more frequently will have a higher objective knowledge base of beer and food pairings.

H3b: Young adults/Millennials who consume alcohol while dining out more frequently will have a higher objective knowledge base of beer and food pairings.

H4a: Young adults/Millennials who consume beer more frequently will have a larger subjective knowledge base of beer and food pairings.

H4b: Young adults/Millennials who consume alcohol while dining out more frequently will have a higher subjective knowledge base of beer and food pairings.

**Expertise**

Johnson and Bastian (2007) discovered a way to measure wine expertise through subjective and objective knowledge, as well as sensory tests. The combination of these three variables lead to their categorizing participants into experts, intermediates and novices. They discovered an existing difference between knowledge levels and expertise levels (Johnson & Bastian, 2007). A
previous study indicated that it is not adequate to amass knowledge in memory alone, it is also
vital to organize it well to retrieve it efficiently (Valentin, Chollet, Beal and Patris, 2007). This
supports the idea put forth by (Johnson & Bastian, 2007), that both subjective and objective
knowledge are important factors for determining expertise.

Valentin, Chollet, Beal and Patris discovered that “beer experts” surpassed novices in
both identification and the recognition memory task of beers (2007, p. 776). Similarly,
Donadini, Spigno, Fumi, and Pastori used expert tasters and novice consumers to compare
various Italian dishes with an extensive array of beers and found that both novice consumers and
experts found appropriate beer and food choices, despite the fact that they chose differing beer
samples for each dish (2008). Harrington et al., also used expert and novice consumers and
deduced that despite the experts selecting a greater range and variety of pairings, the novice
consumer was still able to make appropriate or pleasing pairings based off their tastes and
preferences (2008). The researchers attributed the differences in choices to the fact that the
novice consumers were less educated and thus paired food according to what they thought tasted
good with the food, as the experts relied more heavily upon their already held knowledge of the
beers and Italian dishes. This study demonstrated a difference in subjective and objective
knowledge despite the fact that the researchers were not examining this aspect of the pairings.

Expertise has been distinguished from mere product familiarity, which falls more to the
novice category. Expertise has been measured through comparative performance criterion and
proposes increased aptitude with the product (Alba & Hutchinson, 2000). This suggests that
those industry professionals who have dedicated themselves to a field such as, beverage alcohol,
will be more proficient than customers who simply familiarize themselves with the product when
purchasing. As such the following hypothesis was developed:
H5: Expert’s beer and food pairing choices will be more appropriate than novice selections.

Recent research indicated that wine experts compared similarly to students who had little wine experience, regarding objective knowledge (Neubling, Behnke, & Hammond, 2014). Thus the following hypotheses were developed:

H6: Novices will compare similarly to experts in subjective beer knowledge.

H7: Experts and novices will compare similarly in objective beer knowledge

Methodology

The purpose of this study is to determine consumers’ levels of subjective and objective knowledge as well as their levels of expertise and the impact these variables have on selecting beer and food pairings. The research design employed a self-administered online (Qualtrics) survey and a non-probability sample incorporating the snowball effect. The population of interest is college-aged (21 and older) young adults/Millennials due to Delo’s statement that the majority of craft beer consumers tend to be college educated, which leads to a greater economic populace (2014).

Novice participants were students attending a large U.S. southwestern university ($N = 246$). Experts were selected from trained industry professionals primarily from the alcohol distribution company, Glazers ($N = 33$). To recruit participants, announcements were made, via word-of-mouth and email for both students and industry professionals. Additional recruitment of college-aged young adults/Millennials was garnered through posting the URL for the survey on a social media network’s web page. The URL facilitated participants passing the survey along to their companions to aid in snowball sampling.

The survey opened with questions addressing demographics such as, if the participant consumes beer, preferred style of beer, highest degree earned, gender and age (Appendix A).
This was followed by average beer consumption, which was measured in accordance with the same ranges used by Stockwell, Donath, Cooper-Stanbury, Chikritzhs, Catalano, and Mateo (2002), (ranging from never, fewer than once a month, once a month, 2-3 times a month, 1-2 times a week, 3-4 times a week, 5-6 times a week, and Everyday). These ranges were deemed appropriate to accurately measure beverage alcohol (beer) consumption patterns. The next question addressed how frequently the participant dines at restaurants and consumes alcohol, again the ranges for this statistic were set by Stockwell et al., (2002) as well as Taveras, Berkey, Rifas-Shiman, Ludwig, Rockett, Field, Colditz, and Gillman, (2005) ranging from never, fewer than once a month, once a month, 2-3 times a month, 1-2 times a week, 3-4 times a week, 5-6 times a week, and Everyday).

Remaining survey questions were developed in a similar manner to Dodd et al., (2005) who based their constructs off of Flynn and Goldsmith (1999). The survey addressed consumers’ level of subjective knowledge using 5 items rated on a 7-point Likert scales with “strongly agree” and “strongly disagree” at each end. Subjective knowledge questions such as ‘compared to most other people, I know less about beer’ (Appendix A) were measured this way. The questions chosen are reflections of Dodd et al., (2005) who used similar questions regarding wine. Objective knowledge was determined by asking 10 multiple-choice questions, 4 answer choices per questions, related to beer knowledge (Dodd et al., 2005, p.9). For instance, ‘what does bottom fermented mean’ (Webb & Beaumont, 2012). The questions designed to test objective knowledge were created in a similar fashion as Dodd et al., (2005). The questions were derived from information provided in popular published beer and food pairing books (Oliver, 2003; Jackson, 1998; Webb & Beaumont, 2012). A sample question such as “What type
of fermentation does a Lager receive” was taken from Jackson’s “Ultimate Beer” (1998, p.19). The survey can be reviewed in Appendix A.

A list of beer and food was developed using tactics similar to Hammond et al., (2013) in order to ascertain the participants’, experts and novice’s, knowledge of beer and food pairings. This portion of the survey followed the objective knowledge questions and began with a set of instructions that told the participants to select the most synergistic matches and how well they matched up or the degree to which they did not match. As used in Hammond et al., (2013) three food items were selected that paired appropriately with the beers. The three food items were then paired with three beers that do not have appropriate matches. Six food items were listed and each one had a beer paired to it with a few flavor notes (Appendix A). The food and beer matches were mixed together in order to refrain from having the first three match and the last three not match or vice versa. This was an attempt to stop participants from picking up on a pattern of organization in the matches and non-matches.

This study also adapts Harrington et al., (2008) methodology by having participants choose from three beers and various food items to determine which beers had the most appropriate match and which are least appropriate. Three of the pairings were proper matches and three were improper matches. The pairings were selected from published books focusing on beer and food pairings (Oliver, 2003; Jackson, 1998; Webb & Beaumont, 2012). An example of a proper pairing: ‘Dry Stout: Dry Bitterness, Smokey, and Rich; paired with Oysters’ (Jackson, 1998, p.143; Appendix A). Accurateness of selections were recorded as suggested by Donadini et al., using a 9-point Likert scale to measure each item pairing. Scaling ranged from 1-“definitely not appropriate” to 9-“extremely harmonic and balanced” (2008, p. 332). Since Donadini et al., had actual sensory testing and flavor profiles for the foods and beers, the Likert
scale ended on 9-“extremely harmonic and balanced” (2008, p.332), for the purpose of the online survey portion of this study, where the participant does not have the ability to physically test the pairing, scaling was altered to end on 9-“definitely appropriate”.

**Results**

A coefficient of 0.70 or above is the typical gauge of reliability for survey instruments (Ary, Jacobs & Razavieh, 2002). The subjective knowledge scale (0.700) and the objective knowledge scale (0.733) both attained reliable measures. The frequency of consumption of beer scale (0.719) and the frequency of dining out and consuming alcohol scale (0.704) also attained reliable measures. The average match between experts and novices attained reliability as well (0.732)

Table 1 demonstrates the breakdown of the 246 young adult/Millennial participants. Males ($n = 81$) accounted for 32.9% of the sample and the other 67.1% were female ($n = 165$). The average age of the respondents was about 23 years. Respondents had high levels of education with 61% having some college education.

**Table 1**

<table>
<thead>
<tr>
<th>Demographics: Age, Gender, and Education Level</th>
<th>n</th>
<th>Percentage</th>
<th>Mean</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>---</td>
<td>---</td>
<td>22.68</td>
<td>4.63</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>32.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>165</td>
<td>67.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School Diploma/GED</td>
<td>24</td>
<td>9.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>150</td>
<td>61%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates/Vocational Degree</td>
<td>17</td>
<td>6.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>34</td>
<td>13.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>12</td>
<td>4.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctoral Degree</td>
<td>5</td>
<td>2.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Degree (JD, MD)</td>
<td>4</td>
<td>1.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 demonstrates the amount of participants who drink beer and the frequency in which they consume beer. It was reported that 71.5% of the respondents did drink beer \((n = 176)\), while 28.5% reported that they did not drink beer \((n = 70)\). The participants who sometimes consume beer \((n = 118)\) represented 48% of the respondents, while those who frequently consumed beer \((n = 78)\) represented 31.7%. The remaining 20.3% were indicative of those who reported never consuming beer \((n = 50)\). The frequency of those who sometimes dine out and consume alcohol \((n = 64)\) accounted for 26% of the respondents. Those who frequently dine out and consume alcohol \((n = 103)\) represented 41.9% of the sample. The remaining 32.1% accounted for those who claimed to never dine out and consume alcohol \((n = 79)\).

**Table 2**

*Frequency of Alcohol Consumption*

<table>
<thead>
<tr>
<th>Consume Beer</th>
<th>Percentage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>71.5%</td>
<td>176</td>
</tr>
<tr>
<td>Male</td>
<td>80.2%</td>
<td>65</td>
</tr>
<tr>
<td>Female</td>
<td>67.3%</td>
<td>111</td>
</tr>
<tr>
<td>No</td>
<td>28.5%</td>
<td>70</td>
</tr>
<tr>
<td>Male</td>
<td>19.2%</td>
<td>16</td>
</tr>
<tr>
<td>Female</td>
<td>32.7%</td>
<td>54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consume beer</th>
<th>Percentage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometimes</td>
<td>48%</td>
<td>118</td>
</tr>
<tr>
<td>Frequently</td>
<td>31.7%</td>
<td>78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dine out and consume alcohol</th>
<th>Percentage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometimes</td>
<td>26%</td>
<td>64</td>
</tr>
<tr>
<td>Frequently</td>
<td>41.9%</td>
<td>103</td>
</tr>
</tbody>
</table>

**H1:** College-aged young adult males are more likely to be beer drinkers than females.

To see if there were any gender associations with drinking beer and not drinking beer between college-aged young adults, a Chi-square test for independence (with Yates Continuity Correction) indicated a significant association between gender and the participant that drinks beer, \(\chi^2 (1, n = 246) = 3.88, p < 0.049\), \(\text{phi} = 0.135\). Within the sample 80.2% of males \((n = 65)\) reported that they drank beer while only 19.2% \((n = 16)\) of them reported not drinking beer. For
females, 67.3% (n = 111) of the sample reported drinking beer and 32.7% (n = 54) reported that they did not drink beer. Demonstrating that the proportion of college-aged young adult males who drink beer is significantly different from the proportions of college-aged young adult females who drink beer. There is an association between drinking beer and gender for this sample population.

H2a: Males will have a greater subjective knowledge of beer and food pairings compared to females.

The results of t-tests indicated that there was not a statistically significant difference between males’ subjective knowledge of beer and food pairings (M = 3.54, S.D. = 0.685) compared to females’ subjective knowledge of beer and food pairings (M = 3.39, S.D. = 0.506) conditions; t = 1.689, p < 0.092. Hence the hypothesis 2a was not supported. Results indicated that males and females do not significantly differ in terms of subjective knowledge.

H2b: Males will have a higher objective knowledge of beer and food pairings compared to females.

The results of the independent sample t-tests indicated that males had a statistically significant greater amount of objective knowledge of beer and food pairings (M = 4.96, S.D. = 2.09) compared to females (M = 3.99, S.D. = 1.92) conditions; t = 3.641, p < 0.000. As such, H1b was supported. The results suggest that males have a greater objective knowledge base compared to females when it comes to the topic of beer and food pairings.

H3a: Young adults/Millennials who consume beer more frequently will have a higher objective knowledge base of beer and food pairings.

The results of the independent sample t-test indicated that there was a statistically significant difference in objective knowledge between young adults/Millennials who consume
beverage alcohol more frequently ($M = 5.12, S.D. = 2.13$) and those who only sometimes consume beer ($M = 4.32, S.D. = 1.88$) conditions; $t = -2.74, p < .007$. Hence hypothesis 3a was supported.

**H3b:** Young adults/Millennials who consume beverage alcohol while dining out more frequently will have a higher objective knowledge base of beer and food pairings.

Results of t-tests indicated that a statistically significant difference in objective knowledge exists between those who dine out and consume beverage alcohol more frequently ($M = 5.17, S.D. = 2.21$) compared to those who only sometimes dine out and consume alcohol ($M = 4.25, S.D. = 1.57$) conditions; $t = -3.12, p < 0.002$. Hypothesis 3b is thus supported due to the statistically significant difference in objective knowledge of beer and food pairings between those who frequently dine out and consume alcohol compared to those who only sometimes dine out and consume alcohol.

**H4a:** Young Adults/Millennials who consume beer more frequently will have a larger subjective knowledge base of beer and food pairings.

The results of t-tests demonstrated that a statistically significant difference existed between those who frequently consume beer ($M = 3.82, S.D. = 0.524$) compared to those who only sometimes consume beer ($M = 3.37, S.D. = 0.456$) conditions; $t = -6.39, p < 0.000$. As a result, hypothesis 4a is supported. Despite the mean values being quite similar, there was still a significant difference between those who frequently consume beer and those who only sometimes consume beer in terms of subjective knowledge. From the standard deviation, one can see that the answers selected were all essentially the same since there is not much deviation from the means. Thus, hypothesis 4a is supported.
**H4b:** Young Adults/Millennials who consume beverage alcohol while dining out more frequently will have a higher subjective knowledge base of beer and food pairings.

Results of t-tests indicated a statistically significant difference between those who frequently dine out and consume alcohol ($M = 3.76, S.D. = 0.515$) compared to those who only sometimes dine out and consume alcohol ($M = 3.41, S.D. = 0.409$) conditions; $t = -4.53, p < 0.000$. Hypothesis 4b is supported despite the mean values being relatively similar. A significant difference between the average scores of subjective knowledge was established between those who dine out more frequently and consume alcohol and those who only sometimes dine out and consume alcohol. Again the standard deviations for H3b are quite low indicating that the answers selected were all generally the same and there was not much deviation from the mean score.

**Table 3**

<table>
<thead>
<tr>
<th>Match Average</th>
<th>df</th>
<th>F</th>
<th>n</th>
<th>Mean</th>
<th>S.D.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>1, 227</td>
<td>104.94</td>
<td>246</td>
<td>5.04</td>
<td>1.405</td>
<td>.000</td>
</tr>
<tr>
<td>Expert</td>
<td>1, 227</td>
<td>33</td>
<td>7.61</td>
<td>0.827</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Match Average</th>
<th>df</th>
<th>F</th>
<th>n</th>
<th>Mean</th>
<th>S.D.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>1, 227</td>
<td>24.25</td>
<td>246</td>
<td>4.57</td>
<td>1.414</td>
<td>.000</td>
</tr>
<tr>
<td>Expert</td>
<td>1, 227</td>
<td>33</td>
<td>3.30</td>
<td>1.103</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**H5:** Experts beer and food pairing choices will be more accurate than novice selections.

Table 3 displays the results of a one-way ANOVA which demonstrated a statistically significant difference existed between experts’ Average Match ($M = 7.61, S.D. = 0.827$) compared to novices’ Average Match of beer and food pairings ($M = 5.04, S.D. = 1.405$) conditions; $F = 104.94, p < 0.000$. Next, Non-Match Averages for experts ($M = 3.30, S.D. = 1.103$) were compared to novices’ Non-Match Averages ($M = 4.57, S.D. = 1.414$) conditions, $F = 24.25, p < 0.000$. These results support that this hypothesis was supported. Experts had a higher
Average Match than novices did, which means that the experts ranked the items that were accurate matches higher than the Novices. The experts’ Non-Match score was significantly lower than the novices’ Non-Match score, which means that the experts accurately ranked the Non-Match pairings lower than the Novices. The experts were able to accurately differentiate between the beer and food pairings that were proper and those that were out of place.

Table 4

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>F</th>
<th>n</th>
<th>Mean</th>
<th>S.D.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novice</td>
<td>1, 227</td>
<td>178.72</td>
<td>246</td>
<td>4.31</td>
<td>2.02</td>
<td>.000</td>
</tr>
<tr>
<td>Expert</td>
<td>1, 227</td>
<td></td>
<td>33</td>
<td>9.09</td>
<td>0.95</td>
<td></td>
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<tr>
<td><strong>Subjective</strong></td>
<td></td>
<td></td>
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<tr>
<td>Novice</td>
<td>1, 227</td>
<td>83.12</td>
<td>246</td>
<td>3.44</td>
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<td>.000</td>
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<tr>
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<td>1, 227</td>
<td></td>
<td>33</td>
<td>4.38</td>
<td>0.382</td>
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</tr>
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</table>

**H₆:** Experts and novice students compare similarly in subjective beer knowledge.

Table 4 denotes the results of the one-way ANOVA which displayed a statistically significant difference existing between experts’ subjective knowledge ($M = 4.38$, $S.D. = 0.382$) compared to novices’ subjective knowledge of beer and food pairings ($M = 3.44$, $S.D. = 0.574$) conditions; $F = 83.12$, $p < 0.000$. Experts had a higher subjective knowledge average than novices did, which means that the novices did not think they knew more about beer and food pairing compared to experts.

**H₇:** Experts and novice students with little beer experience will compare similarly in objective beer knowledge.

Table 4 also demonstrates a statistically significant difference existed between experts’ objective knowledge ($M = 9.09$, $S.D. = 0.95$) compared to novices’ objective knowledge ($M = 4.31$, $S.D. = 2.02$) conditions, $F = 178.72$, $p < 0.000$. These results of One-way ANOVA suggest that this claim was not supported. The experts’ objective knowledge score was significantly
higher than the novices’ score, which means that the experts answered more objective knowledge questions correct than novices. The experts were able to accurately produce answers to the factual questions about beer and food pairings.

Conclusions

The results of this study coincide with the notions mentioned in the literature review, supporting what has previously been discovered that more males (53%) prefer drinking beer compared to females (20%), (Gallup, 2013). This study further showed that female consumption (67.3%) has increased. This opens the door to further questions to be addressed that would consider the differences between those who do or do not drink beer and their liking of beer and food pairings.

Hypothesis 2a sought to examine if males would have a greater subjective knowledge of beer and food pairings compared to females. The results were insignificant. The reason for this could be that since subjective knowledge is what a person thinks they know, both males and females could have thought they knew a lot more than they actually did. Also, since the questions were only gauging how much each person felt they knew and were not actually factual questions, each person had the ability to overestimate or underestimate what they actually knew.

Hypothesis 2b sought to ascertain if males would have a higher objective knowledge of beer and food pairings compared to females. Significant results demonstrated that males indeed had a greater objective knowledge of beer and food pairings. These results are contradictory to Taylor et al., (2009) who found males and females scored equally when testing their objective wine knowledge. The results could have appeared this way due to the fact that more males considered themselves to be beer drinkers than females as established by Gallup (2013) reporting 53% of males preferring beer and only 20% of women. Males’ scores may have higher potentially due to the fact that they choose beer as their beverage of choice more often, and by
doing so, they are exposed to more occasions and scenarios where they drink beer and maybe even pair it with food.

Males seem to be learning more factual information about what they are consuming than females, whether that be from a third party or the individual researching before they buy, males seem to have a greater overall objective knowledge about beer and food pairings. Despite the fact that there were twice as many females who participated in this survey, males still dominated the objective knowledge category. Only 67.3% of the females \((n = 111)\) who participated reported to be beer drinkers, while 80.2% of the males \((n = 65)\) reported to be beer drinkers. Since a larger portion of males were beer drinkers than females, this could explain why males’ objective scores were higher than females. Again, with more males being beer drinkers, it stands to reason that they are exposed to beer more often and thus learn more about it than females who are not as keen on beer drinking.

Oliver (2003) noted how interactions with beer help one to understand it better. Hypothesis 3a suggested that millennials who consume beer more frequently will have a greater objective knowledge base of beer and food pairings. There was a significant difference in objective knowledge between those who only sometimes consume beer \((n = 118)\) and those who frequently consume beer \((n = 78)\). This could be because those who frequently consume are exposed to beer more often than those who only sometimes consume beer, thus providing more opportunities to learn about beer and potential food pairings.

Those who frequently consume beer could also be out trying new beers and potential pairings. As such, they could be doing research on new beers or pairing options before hand in order to try new things and have different experiences with their beer consumption. When a person frequently consumes something as opposed to just sometimes consuming it, they are
potentially more inclined to examine more aspects of what they are consuming and thus learn more about what they are frequently putting into their bodies. Which also aligns with Oliver, when he touched on how the more a person is exposed to beer or the more experience they have with it, the more they will potentially come to understand about it and the more they could eventually end up learning about it (2003).

Hypothesis 3b looked into finding out if those who frequently dine out and consume beverage alcohol have a higher objective knowledge of beer and food pairings compared to those who only sometimes dine out and consume beverage alcohol. Results indicated that those who dine out and consume alcohol more frequently ($n = 103$) had a significantly higher objective knowledge score of beer and food pairings compared to those who only sometimes dine out and consume beverage alcohol ($n = 64$). Since they are dining out and also consuming beverage alcohol in the same scenario, they are exposed to greater chances of food and beverage alcohol interactions, which could potentially increase their overall knowledge of beverage alcohol and food pairings. This again demonstrates how the more experience and interaction with a product a person has, the more they come to know about it (Bitnes, Rodbotten, Lea, Ueland, & Martens, 2007). As such, they may have experienced or been exposed to multiple beer and food pairing opportunities. Since the question stated alcohol and not specifically beer, multiple respondents may have been referring to wine or spirits that they consume while they dine out. Even if this is the case, the participant would still be exposed to a beverage alcohol and food pairing.

As noted by Donadini et al., (2008) many wines coincide with specific beers in the way they pair with foods, which means that even if the participants were not referring specifically to beer, they are still exposed to beverage alcohol and food pairings and thus the opportunity to learn how beverage alcohol and food can pair.
They may inquire with the wait staff or seek other forms of information sources as noted in Hammond et al., (2013b) for recommendations of pairings and learn about what pairs well or why certain items pair well, and thus increase their overall objective knowledge. Since these participants frequently dine out and consume alcohol \( (n = 103) \), at least “1-2 times a week”, they may also be researching pairings before-hand in order to already look knowledgeable about the pairing choice they are going to make when they arrive at their destination. This could be to minimize risk, or simply to increase their overall dining experience. Hammond et al., (2013b) noted that when posed with a greater risk, consumers are more likely to seek various information sources in order to lower the perceived risk. Overall, since they are dining out and consuming beverage alcohol more frequently, they have an increased experience with beverage alcohol and food pairings and thus a greater overall knowledge of beer and food pairings compared to someone who only sometimes dine out and consumes alcohol. Since experience has been shown to be a strong proponent in increasing ones’ knowledge base, it stands to reason that the more experience one has the greater their knowledge will become (Murray, 1991). Similarly as displayed in this study those have more experience dining out and consuming beverage alcohol also had higher knowledge scores.

Hypothesis 4a expected young adults/Millennials who consume beer more frequently \( (n = 78) \), at least “1-2 times a week”, will have a higher subjective knowledge base of beer and food pairings compared to one who only sometimes consumes beer \( (n = 118) \), at most “2-3 times a month”. This hypothesis was found to be significant and may be attributed to those who consume beer on a more frequent basis probably think that they know more than they actually do simply because they consume beer more frequently. It stands to reason that the more interaction and experience a person has with a product, beer in this instance, the more they come to believe
they actually know about it (Bitnes, Rodbotten, Lea, Ueland, and Martens, 2007). These participants may not have known anything at all aside from some information about the specific beer that they tend to gravitate toward, but subjective knowledge is what a person thinks they know. These participants’ scores were quite higher than those who only sometimes consume beer. For those who only sometimes consume beer, they may just drink beer and not give it a second thought since they do not drink beer as frequently. For those who frequently consume beer, they potentially give beer more thought and consideration. As such, they ranked themselves higher in subjective knowledge. This coincides with Bitnes, et al., who deduced that the more familiar or experienced a person is with a product, the more they think they know about it since they believe to know more about it (2007).

Hypothesis 4b proposed that young adults/Millennials who consume beverage alcohol while dining out more frequently would have a higher subjective knowledge of beer and food pairings than those who only sometimes consume beverage alcohol while dining out. Results demonstrated that those who consume alcohol and dine out more frequently indeed have a higher subjective knowledge base than those who only sometimes consume alcohol and dine out. This could be because those who frequently dine out and consume beverage alcohol have a greater experience with food and alcohol pairings and as a result they believe themselves to be more profound in the field of beer and food pairing. The participants dining out and consuming alcohol more frequently (41.9%), were potentially exposed to more scenarios of beer and food pairings than those only sometimes dining out and consuming alcohol (26%), thus they think they know more. Similar results were seen in Johnson and Bastian, where they found more experience with wine tends to make people think they are more of an expert on the subject, which leads them to believe they know more about wine than they truly do (2007).
Experts vs Novices

Hypothesis 5 was supported in that experts’ beer and food pairings choices were more accurate than novice selections. This result was expected since industry experts deal with beer and potential food pairings every day while they work. The match average for experts was well above that of novices and demonstrated that when it comes to actually having to pair a beer (with descriptions) with a food item, novices did not know which paired well and which did not.

These results mirrored Donadini et al., (2008) where experts paired Italian beers with Italian dishes in more pleasing ways than the novices. Novice choices seemed to stay on the safe side and their answers averaged in with the choice of “Neither Appropriate nor Inappropriate” (Appendix A). While experts came in around the choice of “Appropriate” (Appendix A).

Results of hypothesis six demonstrated that experts scored higher in subjective knowledge than novices. It was thought that since subjective knowledge is what a person thinks they know and not what they actually know, that the scores might be similar. Johnson and Bastian (2007) noted they could not accurately categorize their participants into novices and experts based solely on one knowledge construct, since subjective scores were too closely related. They had to depend on the addition of the added objective scores to properly differentiate between the two groups. With many popular books out on beer and food pairings and with the recent increase in interest of beer and food pairings (Bellamy, 2005) it seemed reasonable that novices might have had chances to expose themselves more to beer and food pairings and thus increase their knowledge of it. The targeted demographic was in a college town which supports several craft breweries, so it was expected that the participants had the opportunity to frequent craft beer breweries and potentially gain more knowledge (Delo, 2014). Experts were expected to have reasonable scores on subjective knowledge since Johnson and
Bastian classified expertise as having a higher levels of both subjective and objective knowledge of a product (2007). The study further demonstrated this point with expert’s subjective ($M = 4.38$) and objective knowledge scores ($M = 9.09$) being higher than novices.

As for the mismatched pairings, experts accurately pointed them out while novices failed in this. Novices resorted to selecting ambiguous answers, which might indicate they were trying to reduce risks. Novices did not seem to know whether or not the pairings were actual pairings or mismatched pairings, while the experts accurately displayed their knowledge. This could be attributed to the fact that the industry experts became experts by becoming well educated on beverage alcohol and having greater experience with it. This is in line with Solomon, (1990) and Johnson and Bastian, (2007) who also labeled experts based off their professional experience in the beverage alcohol industry and objective and subjective knowledge scores. Since the novices lack this experience and may only have experience in consuming beer and food without understanding why or how specific items can pair in a pleasing way, it is understandable for the experts to more accurately pinpoint the matches and non-matches.

Finally, hypothesis 7 sought to ascertain if experts and novice students with little beer experience compared similarly in objective beer knowledge. Experts greatly out shone the novices. Scoring more than double what the novices scored on the objective test of knowledge, experts greatly displayed their knowledge of their profession. These results are dissimilar to Neubling, Behnke, and Hammond who discovered that their novices and experts presented similar results when dealing with wine (2014). Since beer and food pairings are not as well-known as the traditional wine and food pairings, novices most likely had not been exposed too much information pertaining to this subject and as such had little objective knowledge about beer and food pairings.
Implications

Results demonstrated how novices perceive beer and food pairings compared to trained industry professionals. Restauranteurs and beer companies could take note of this information gap and how novices perceive beer and food pairings. They could implement appropriate advertising methods that would draw the novice into an environment where the pairings are already laid out or demonstrated so they do not have to worry about making the wrong choice. This could ultimately help sales and guest satisfaction which in turn can lead to return business. By utilizing gastronomical experiences, the sales of not only beer companies, but also restaurants could potentially increase, since as noted by Olsen, Thach, and Nowak, previous wine tastings help determine a wine drinkers choice (2006). By having beer and food pairings as tasting examples, many consumers could be influenced into purchasing a wider array of beverages and food items.

It is important to find ways to increase consumers’ objective knowledge on this topic, such as advertising more information. Another way to instill objective knowledge, would be to utilize the wait-staff explaining why the pairing fits so well together, or an employee in a liquor store naming off some fantastic things to consume with a certain beer that would greatly please the palate. These are all ways in which the novice consumer can grow their objective knowledge of beer and food pairing and thus be more willing to buy and try new beers and pairings. Even if they do not retain all of the factual information presented to them, by having a service staff that can speak to beer and food pairings and instill any form of knowledge in consumer, it will greatly affect the chances that the consumer will be willing to try the pairing again or a different pairing. The beer industry should have a vested interest in supporting beer education initiatives.
The more the consumer is exposed to beer and food pairings the more experience they will garner and thus the more they will begin to think they know and eventually it will become objective knowledge that they know for certain. To provide target segments with appropriate products and information, beer producers must tap into the consumers’ knowledge level and type of knowledge of the product and why they choose to purchase or drink beer. This should guide advertisers to the appropriate path of marketing to young adults/Millennial generation. This could also help develop a desire for young adults and the Millennial generation to seek to learn more about beer and food pairings, multiple gastronomically enjoyable experiences can instill one with the desire to seek further information about the experiences and other ways they can attain the same pleasure.

Since females scored lower on objective knowledge than males, they could potentially benefit from factual information regarding beer and food pairings to increase their overall interest and acceptance of beer and food pairings. The more information and experiences females have with beer and food pairings, the more comfortable they may actually become with buying beer and trying it with various foods. Increasing this gender’s involvement alone could potentially impact overall beer sales since such a large majority of females (n = 111) from this study did drink beer (67.3%).

Menu design could also be improved from these results. Now that it is clear that young adults and Millennial consumers do not have a large objective knowledge base of beer and food pairings, setting up the menu with pairing recommendations and a few brief words depicting why the match works, could potentially increase sales of various beers and food items. Knowing this information can help the restaurateur in governing and manipulating their beverage and product mix. There is a considerable opportunity to increase the overall number of foods consumers
perceptively pair with beer due to the limited number of consumers who currently enjoy this merger. The craft beer organization could also be strengthened from learning information on college-aged young adults/Millennials’ knowledge levels of beer and food pairings. Since a majority of craft breweries can be found in or around college towns (Delo, 2014), this information could benefit craft brewers in marketing to college-aged Millennials. They can now focus on marketing in ways to increase objective knowledge of the consumers and provide factual information about pairings that help make drinking their beer even more gastronomically pleasing.

**Limitations/Future Research**

As the sample \( (N = 246) \) was focused on college aged young adults/Millennials from a large Southwestern university, the results are not generalizable to young adults/Millennial populations as a whole, but the results still stand as a good starting point. Future research should aim to incorporate a larger sample size across multiple cities and nationwide. Future research should include, not only questions about knowledge, but actual sensory evaluations of beer and food pairings to ascertain gender differences and sensory cues that appeal to the consumers. Future research should also seek to discover if young adults/Millennial generation are even interested in beer and food pairings and if they desire to expand upon all levels of knowledge they have of beer and food pairings.

Perceived risk should also be evaluated in the future. This will help show researchers and those within the industry if Millennials find the same risks associated with purchasing and pairing beer as they do when purchasing and pairing wines. Risk and uncertainty can play a role in purchase intention and as such, future research should strive to ascertain the levels of risk that young adults and the Millennial generation associates with beer and food pairings. Information
sources used by young adults/Millennials in regards to learning more about beer and food pairings should also be identified. This will enable them to expand further upon these results and why knowledge levels play such an important role on purchasing and consumption intention.

References


Appendix A

Millennials' Knowledge of Beer and Food Pairings

You are invited to complete a survey about: Millennials’ Knowledge of Beer and Food Pairings: Subjective vs Objective

Introduction/Description: As part of my research project, I am conducting a study to investigate the millennials’ knowledge of beer and food pairings, as well as, the differences between expert and novice consumer choices. I will sincerely appreciate a few minutes of your time to participate in this study.

Risks and Benefits: The benefit received from your participation in this study benefits society by increasing marketers’ ability to accurately market to the millennial generation. There are no anticipated risks to participating in the study.

Voluntary Participation: Your participation in the research is completely voluntary. If you choose to participate and complete the enclosed questionnaires, you may leave any items blank that you do not want to answer. You may withdraw from the survey at any time without consequence to you. It should take you about ten to fifteen minutes to complete the questionnaire.

Confidentiality: All responses will be anonymous. All data collected will be kept confidential to the extent allowed by law and University policy. All data will be combined and only group summaries will be included in the survey reports. No data will be reported in a manner that would allow a reader to associate any responses to individual respondents. Results from the research will be reported as aggregate data. If you have any questions or concerns about this study you may contact Dylan Martinez or Rhonda Hammond through any of the means below. For questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University’s Compliance Coordinator, at (479) 575-2208 or by e-mail at irb@uark.edu. By filling out and submitting the survey you are consenting to participate. You acknowledge that you read the description, including the purpose of the study, the procedures to be used, the potential risks and side effects, the anonymity of all responses, as well as the option to withdraw from the study at any time. The survey will take you about 10-15 minutes to complete. Thank you in advance for taking the time to participate in this research. Please click the agree button on the survey to indicate that you have read this information and that you give your consent to participate.

Principal Investigator: Dylan Martinez
Faculty Advisor: Dr. Rhonda Hammond

Agree
Disagree

The Following Questions are designed to gauge one’s background with beer. Please select the choice that best answers each question.

---

49
Appendix A

Do you drink beer?

- Yes
- No

What is your preferred style of beer?

____________________________

Gender?

- Male
- Female

What is your current age?

____________________

What is the highest level of education you have completed?

- Less than High School
- High School Diploma / GED
- Some College
- Associate / Vocational Degree
- Bachelor's Degree
- Master's Degree
- Doctoral Degree
- Professional Degree (JD, MD)
Appendix A

How frequently do you consume beer?

- Never
- Fewer than once a month
- Once a month
- 2-3 times a month
- 1-2 times a week
- 3-4 times a week
- 5-6 times a week
- Everyday

How frequently do you dine at restaurants and consume alcohol?

- Never
- Fewer than once a month
- Once a month
- 2-3 times a month
- 1-2 times a week
- 3-4 times a week
- 5-6 times a week
- Everyday

The following questions are designed to test your levels of both subjective and objective knowledge. For each of the following questions please select the answer that best applies. The answers to the objective portion will be provided upon completion of the questionnaire.

I know pretty much about beer.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree
Appendix A

I do not feel very knowledgeable about beer.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree

Among my circle of friends, I am one of the "experts" on beer.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree

Compared to most other people, I know less about beer.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree

I feel I know what types of beers pair well with different foods.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree
Appendix A

Beer is principally made from what 4 components?

- Hops, Malted grains, wheat, water
- Wheat, flour, water, hops
- Malted grains, water, hops, yeast
- Honey, yeast, hops, water

What does IBU stand for?

- Interdisciplinary Beer Units
- International Beverage Units
- Internal Beer Understanding
- International Bittering Units

What type of fermentation does a "Lager" receive?

- Top-fermentation
- Mid-fermentation
- Bottom-fermentation
- Wild-fermentation

What ingredient can give beer a bitter flavor?

- Barley
- Yeast
- Malt
- Hops

What is the ideal serving temperature of a Bock?

- 50°F
- 48°F
- 45°F
- 55°F
Appendix A

What type of beer is referred to as the "nuttiest" of all beers?

- Indian Pale Ales (IPA)
- Bocks
- Lambics
- Brown Ales

Typically, fermentation takes __ to __ days, or at most a week, in the case of top-fermented beers.

- 1,2
- 2,3
- 3,4
- 4,5

What types of beers are most similar to red wines such as Cabernet and Pinot Noir?

- Pilsners & Porters
- Lambics & Ales
- Ales & Porters
- Bocks & Indian Pale Ales

What type of beer is most similar to white wines such as Sauvignon or Chardonnay?

- Ale
- Pilsner
- Stout
- Bock

During the beermaking process, where are the hops added?

- The Mash
- The Open Fermenter
- The Brew Kettle
- The Lagering Vessels
Appendix A

The following section is comprised of synergistic and non-synergistic beer and food pairings put forth by renowned beer experts. Please select how appropriate each match is in your opinion. On the left a beer is listed with a description and on the right a food item is listed.

How familiar are you with Stouts?

- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar

How familiar are you with Pilsners?

- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar
Appendix A

How familiar are you with Pale Ales?

- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar

Dry Stout: Dry Bitterness, Smokey, Rich

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Oysters

Dry Stout: Dry Bitterness, Smokey, Rich

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Trout
Appendix A

Pilsner: Dry, Light Bodied, Flowery Bouquet                             Roast Beef

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Pilsner: Dry, Light Bodied, Flowery Bouquet                             Trout

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Pale Ale: Dry, Maltiness, Nutty                                      Oysters

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate
Appendix A

Pale Ale: Dry, Maltiness, Nutty

☐ Definitely Not Appropriate
☐ Inappropriate
☐ Moderately Inappropriate
☐ Somewhat Inappropriate
☐ Neither Appropriate nor Inappropriate
☐ Somewhat Appropriate
☐ Moderately Appropriate
☐ Appropriate
☐ Definitely Appropriate

Thank you for your cooperation with this survey. We sincerely appreciate your time and effort.
March 9, 2015

MEMORANDUM

TO: Dylan Martinez
    Rhonda Hammond

FROM: Win Walker
    IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 15-02-525

Protocol Title: Millennials' Knowledge of Beer and Food Pairings: Subjective vs Objective

Review Type: ☑ EXEMPT ☐ EXPEDITED ☐ FULL IRB

Approved Project Period: Start Date: 03/09/2015, Expiration Date: 03/08/2016

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form Continuing Review for IRB Approved Projects, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (https://vprc.uark.edu/units/rscp/index.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 450 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval prior to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.
CHAPTER III

Beer and Food Pairing: Impact of Gender on Sensory Analysis

Abstract

While food and wine pairings are commonly seen among empirical research, there exists minimal research examining beer and food pairings. Food analysts are taking note of higher rates of food and beer pairings occurring. As such this exploratory study examines gender differences and sensory pairing of beer and chocolate. A survey was used to identify demographics and how much each pairing was liked or disliked. This study intended to aid in increasing the gastronomic identity of beer and food pairings and for industry marketing of food and beverages. Results demonstrated that males have a higher overall liking of beer and chocolate pairings than females. Despite males liking the pairings more than females, the female sample still rated the pairings in a highly favorable manner.

Introduction

The association between food and alcohol is depicted in many disciplines and generally accepted as being infused with cultural meaning. This has resulted in food and alcohol pairings to be intensely involved in ceremonial rituals as well as celebrations (Pettigrew & Charters, 2006). Food and alcohol pairings are known to augment the dining experience. Wine has traditionally been associated with food pairings (Donadini, Spigno, Fumi, & Pastori, 2008; Hammond, Velikova, & Dodd, 2013; Harrington, Miszczak, & Ottenbacher, 2008; King & Cliff, 2005; Macionis, & Cambourne, 1998; Pettigrew & Charters, 2006) and research has been done concerning wine and the various health aspects associated with it (Canton, Ball, Ahern, & Hetherington, 2004; Johansen, Friis, Skovenborg, & Grønbæk, 2006). Wine has sometimes
been identified in a context that it is considered inappropriate to consume without also consuming food (Donadini et al., 2008; Charters & Pettigrew, 2006).

Wine is often thought of for food pairing possibilities, but new interest has been shown in the field of beer and food-pairing (Bellamy, 2005; Shriver, 2005).

Despite wine and beer being two of the most consumed alcoholic beverages, various perceptions are held dealing with their connections to food. Wine has commonly been seen as a classier and more sophisticated than beer or liquor (Ritchie, 2007). There exists little academic research concerning beer and food pairings. Despite this fact, numerous books exist that discuss beer and its ability to pair with various food items, “Ultimate Beer” (BeerBooks, 2014) and “The Brewmaster’s Table” (Regan, 2003) being two examples. The existence of these books indicates a stout interest regarding beer and its capacity to pair with an assortment of foods (Regan, 2003).

Spicier food like buffalo-wings and/or Mexican dishes pair well with lighter lagers, the idea is that the flavor in the hops will help cut through the spices in the food and allow the beer to shine through in a pleasing manner (Smirnoff, 2015). Similarly beer and desserts can pair up in a pleasing manner as well. The notes of chocolate found in stout beers generally pair well with any rich dessert, while lighter fruit based lagers and ales can also prove as a nice balance or contrast between beer and richer desserts (Smirnoff, 2015). Pairing beers with foods has been noted as being a trial and error process and it is generally focused around finding unique combinations that may not be noted in literature yet. When it comes to informing and educating the consumer, the wine industry is many years ahead of the beer industry (Brewers Association, 2014; Smirnoff, 2015).

Donadini, Fumi, and Lambri performed a study where multiple beverages (alcoholic and non-alcoholic) were paired with varying cocoa levels of chocolate. They found pleasing
combinations of beer and chocolate (2012). This demonstrated that beer does have a unique ability to pair with food.

With the majority of beer drinkers being men (53%) and females falling to the low end of the spectrum (20%), it is important to understand ways to increase female consumption of beer (Gallup, 2013). By examining gender differences in the sensory testing of beer and chocolate combinations, there is a chance to see if beer combined with a food item in a gastronomically pleasing way can potentially increase female consumption of beer. This study aimed to identify differences between males and females regarding beer and food pairings.

**Literature Review**

While wine and food pairing trends continue to grow, the nature of beer and its dealings with food is not as commonly considered (Pettigrew & Charters, 2006). Existing academic research concerning beer and food pairings is small in number (Donadini et al., 2008; Donadini et al., 2012; Harrington et al., 2008). However many books exist, “Ultimate Beer” (BeerBooks, 2014) and “The Brewmaster’s Table”, demonstrating a strong interest concerning beer and its ability to pair with a multitude of foods (Regan, 2003). Customs of beverage consumption with particular foods have become a significant factor of distinguishing cuisines. Beer and pizza is a commonly thought of pairing since beer has been considered “liquid bread” the joining of these two items is quite wondrous. The “doughiness” of the pizza base and the flavors of the toppings can be matched by a lager or ale with the spiciness and chewiness of a succulent amber malt (Jackson, 1998, p. 162).

Beer is the dominant beverage consumed (36%) in terms of total quantity in America, numerous food analysts are now proposing certain beers for consumption with specific foods on the basis of their physical complementarity (Cornell, 2004; Gallup, 2013; Regan, 2003). Despite
beer being the dominant beverage overall in terms of alcoholic consumption, United States
(U.S.) beer sales dropped an estimated 1.9% by volume in 2013 when they had previously been
up 1.3% (Brewers Association, 2014). If these numbers are an indicator for the years ahead,
overall beer sales may continue to decline. It is now essential to obtain ways to increase sales.
Advertising beer and food pairing options that would provide a pleasing gastronomic experience
for consumers may be one way to help raise sales.

Gender

Variations in gender potentially play a part in the amount of knowledge that is held on the topic
of beer and food pairing. Gallup (2013) discovered vast differences in alcoholic beverage type
preferred by males and females. As of now, 53% of males name beer as their alcoholic beverage
of preference, while 22% say liquor and 20% wine. As for females, 52% prefer to drink wine
more frequently, while 24% say liquor and 20% beer (Gallup, 2013). Harrington, Miszczak, and
Ottenbacher tested gender in a study dealing with beer type and pizza spiciness and discovered
that a female’s selection of beer and pizza pairing changed less than a male’s (2008). The
researchers also noted how females tended to prefer lighter beers as their initial preference until
spiciness was introduced, then the females perceived level of match showed its greatest change
and it seemed they perceived the value of matching intensity levels based on food selection
(2008). Examining the variances between genders and preference of beer and food pairing could
potentially lead to a better understanding of why certain choices are made during the dining or
shopping experience. Thus the following hypothesis was created:

H1: Who is more likely to be beer drinkers, males or females?
Beer and Food Pairing

The procedure of beverage and food pairing was established in Italy by Pietro Mercandini. Mercandini’s method is based upon the notion that food and beverages need to be matched according to complementary or contrasting taste and olfactory perceptions with the indication of generating a harmonious balance between the two components (Donadini, Spigno, Fumi, & Pastori, 2008). Donadini et al., (2008) took note of beer and how it is an operational alternative to wine since beer and wine share many parallel characteristics and a similar way of pairing can be recognized. The researchers then noted that ales, porters and barley wines parallel with red wines such as Cabernet and Pinot Noir, while pilsners compare more to a Sauvignon Blanc or a Chardonnay. Even so, beer is generally a bitter beverage and, as a rule, hoppiness in beer equates to acidity in wine (Donadini et al., 2008). Bitterness will cut through oil, spices and fats without negating the flavor of the food and bitterness can sustain acidity in contrasting food fatness or alcoholicity and astringency in contrasting succulence, greasiness, and spiciness. Experts generally integrate these basics into Mercadini’s method for a more rounded application of this process to the beer field (Donadini et al., 2008). Ultimately leading to the belief that the basics of the Mercandini pairing process can be applied to not only wine, but also beer.

Beer contains a vast range of flavors and aromas and also houses carbonation, which cleanses the palate between bites, thus, giving beer the capability to pair with numerous food items (Regan, 2003). Wine is no longer the only alcoholic beverage that can play a role in modifying the dining experience to become more gastronomically pleasing. Pettigrew and Charters noted that beer is a flexible beverage and is suitable for an enormous assortment of consumption scenarios (2006). As such, a few studies have been done to demonstrate beers ability to link up with a multitude of food items. Harrington et al., performed research
implementing beer and pizza pairing. The researchers found that participants preferred ales with spicy-pizza and lagers with non-spicy pizza since they tended to compliment the pizza better than the stout. The researchers also noted how males tended to prefer the beer and pizza matches more than females (2008). Similarly, a Donadini et al., formed an expert and novice tasting panel and had them match various beers with numerous Italian dishes. Both the novices and the experts were able to find pleasing matches for each dish and beer, despite the experts having more variety than the novices (2008). This study identified and reinforced that beer can be paired with certain foods in a pleasing and appetizing manner.

Gastronomic identity is a prevalent concept that illustrates the effects of the environment (geography and climate) and culture (history and ethnic influences) on fundamental taste components, textures and flavors in food and drink (Harrington, 2008). The concept of gastronomic identity is continuously growing and has displayed great consequences for successful wine and culinary tourism and the introduction of history as a value-added feature of these tourism products (Harrington, 2008; Harrington, Miszczak, & Ottenbachers, 2008).

Recently, Donadini, Fumi, & Lambri (2012) examined chocolate and beverage pairings. The researchers tested multiple beverages, alcoholic and non-alcoholic, including three styles of beers, (wheat beer, Danish stout, and Belgian stout). Since chocolate has a long detailed history of pairings in various dishes, rituals and ceremonies, the researchers thought it would be a viable choice to test how different beverages pair with chocolate (Donadini, Fumi, & Lambri, 2012).

Chocolatiers in Italy have been creating a variety of pralines (chocolate shell with a sometimes liquid filling, generally made of various combinations of nuts, almonds, sugar, syrup) with flavored creams or liquids inside that range from rum, espresso, champagne, grappa and whiskey (Donadini, Fumi & Lambri, 2012). Donadini, Fumi, and Lambri chose chocolates with
three different cocoa contents (30%, 70%, and 90%). They performed their experiment with 80 participants total, 40 males and 40 females, yet they did not examine differences between genders. Overall though, they did show that not many beverages went well with the 90% cocoa and they attributed that to the intense bitterness that accompanied it. However, they found multiple favorable matches between the 30% and 70% cocoa with an assortment of beverages. In particular they discovered that the Belgian stout was well preferred when paired with the 70% cocoa chocolate sample (2012). Donadini et al., (2012) indicated that beers can pair with chocolate. Thus furthering the question: What other types of beer can pair with various chocolates in a gastronomically pleasing way? It has been shown that beer can be linked with food in a satisfying way. There is now a need to identify if males or females are the ones contributing more to these findings. Since males are the dominant consumers of beer (53%) and females are on the lower end of the spectrum (20%) of beer consumption, it stands to reason that males have a greater appreciation for beer and chocolate pairings than females (Gallup, 2013). Although females have shown to be more frequent consumers of chocolate than males. About 89% of females have reported to consume chocolate while only 85% of males reported consuming chocolate (NCA & The Futures Company, 2012). Of those percentages, 57% of females claim to be daily chocolate consumers while only 43% of males claimed to be daily consumers. This could potentially shift the balance females consume chocolate more than males, but with the combination of the beer and the low female response to consuming beer (20%) males could still have a greater liking of the beer and chocolate pairings (Gallup, 2013; NCA & The Futures Company, 2012). Thus the following hypothesis was developed:
H₂: Males will have a greater liking of beer and chocolate pairings than females.

Findings from this research can be used to ascertain strategies focused on catering to the consumer’s desires and needs. The combination between the beer and the chocolate will help demonstrate gastronomic pairing, further relaying the message of gastronomic identity and its impact on guest satisfaction and overall return business. Ultimately leading toward potentially discovering how to increase the female population of beer consumers and assist in increases beers overall sales.

Methodology

The purpose of this study was to ascertain level of liking between males and females when it comes to beer and chocolate pairings. Exploratory, quantitative research was conducted using sensory testing. Data collection was conducted in person in two separate instances using a survey while the participants tasted various beers and chocolate creations. The research design employed a sensory test using a survey and random sample. The sample population of interest was males and females attending a 1) large charity event (n = 23) and 2) a University hosted tailgate (n = 106) with a total of a 129 participants between the two events. Of those participants 63 were male and 66 were female. Those who drank beer accounted for 75.2% while those who did not drink beer accounted for 24.8%. A sweet shop was set up at a charity event that hosted the beer and chocolate truffle pairing and invited the guests to fill out a short survey upon completion of each tasting. A stand was set up at a University tailgate that contained the beer and chocolate truffle pairing and all those in attendance were invited to partake in the pairings and invited to fill out a survey upon completion.

An information letter was provided (Appendix C) and consent was implied by the participant’s willingness to participate in the tasting. Sensory evaluations consisting of beer and
chocolate pairings were held to compare appropriateness of the beer and chocolate match between males and females in a similar fashion as Donadini et al., (2008). The chocolate creations were created using recipes generated for a previous charity event (See Appendix A). The chocolate truffles were created in a university food prep kitchen by the researchers and a food preparation class. The researchers and students firmly adhered to the recipes in order to assure equivalent chocolates were prepared. Table 1 denotes the final products and their respected pairings.

Table 1
Beer and Chocolate Pairings

<table>
<thead>
<tr>
<th>Chocolate</th>
<th>Beer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dark Chocolate Truffle “Explosion”:</strong></td>
<td><strong>Dos Equis Ambar:</strong></td>
</tr>
<tr>
<td>bittersweet chocolate, unsweetened cocoa</td>
<td><em>Earthy tones with subtle hints of caramel and burnt sugar, full-flavored style with smooth, easy and crisp style</em></td>
</tr>
<tr>
<td>powder, pop rocks, habaneros</td>
<td></td>
</tr>
<tr>
<td><strong>Dark Chocolate Truffle with Pretzels and</strong></td>
<td><strong>Newcastle Brown Ale:</strong></td>
</tr>
<tr>
<td>Cranberry:</td>
<td>Nutty aroma with hints of caramel, slightly sweet and smooth sensations, silky and less bitter finish</td>
</tr>
<tr>
<td>bittersweet chocolate, chopped pretzels and</td>
<td></td>
</tr>
<tr>
<td>dried cranberries, unsweetened cocoa powder,</td>
<td></td>
</tr>
<tr>
<td>sea salt</td>
<td></td>
</tr>
<tr>
<td><strong>White Chocolate, Pumpkin, Spice and Pecan</strong></td>
<td><strong>Heineken Dark:</strong></td>
</tr>
<tr>
<td>Truffle: canned pumpkin, pumpkin pie spice,</td>
<td>Toffee and chocolate aromas and flavors; medium-bodied and finish of roasted almonds and cherry</td>
</tr>
<tr>
<td>chopped pecans, ground graham crackers,</td>
<td></td>
</tr>
<tr>
<td>white chocolate</td>
<td></td>
</tr>
<tr>
<td><strong>White Chocolate, Expresso and Toffee</strong></td>
<td><strong>Heineken Dark:</strong></td>
</tr>
<tr>
<td>Truffle: coffee extract, chopped toffee,</td>
<td>Toffee and chocolate aromas and flavors; medium-bodied and finish of roasted almonds and cherry</td>
</tr>
<tr>
<td>white chocolate</td>
<td></td>
</tr>
</tbody>
</table>

Best match of beer and chocolate was determined by a pretest involving a university food and wine pairing class. A pretest instrument (Appendix B) was used following a 9-point Likert scale with questions addressing the likeability and complexity of each beer and chocolate pairing was used in a food and wine pairing class to determine best match (Medel, Viala, Meillon, Urbano, & Schlich, 2009; Mellion, Viala, Medel, Urbano, Guillot, & Schlich, 2010). Three beers (Heineken Dark, Newcastle Brown Ale, and Dos Equis Ambar) were paired with four differing chocolate truffles and participants were asked to rate the appropriateness of the
selections. Three beers were selected in accordance with a previous study examining beer and pizza spiciness done by Harrington et al., (2008) and the beers are being donated by Heineken. The resulting top matches from this test determined the actual beer and type of chocolate, which was used to create each truffle, during the actual sensory data collection (Table 1).

The survey addressed demographics such as gender, if they drank beer, and how frequently a week the participants consume beer (Appendix C). The frequency of consumption was measured using the same ranges as Stockwell, Donath, Cooper-Stanbury, Chikritzhs, Catalano, and Mateo, (ranging from never, fewer than once a month, once a month, 2-3 times a month, 1-2 times a week, 3-4 times a week, 5-6 times a week, and Everyday). The researchers deduced that these ranges would be appropriate to accurately measure alcohol consumption patterns (2002). This was followed by a question addressing how much each participant likes or dislikes the beer and chocolate pairing. The answers were recorded on a 9-point Likert scale, measuring likeability of the match (Donadini et al., 2008). Scaling ranged from 1-“Dislike extremely” to 9-“like extremely” (Appendix C). This was followed by a question addressing how well the different sensations and aromas go together and how well the perceived balance of flavor and aroma intensity between the beer and chocolate pairing resonates with the participant (Appendix C).

Each beer was presented with the suggested corresponding chocolate and the participant tasted the chocolate then the beer together and had the option to answer a short survey regarding the level of match for the pairing. This process was repeated with the other three chocolate pairings.
Results

There was a total of 129 participants that took part in the beer and chocolate truffle pairing.

Table 2 denotes the gender breakdown of the participants along with how many people drink beer and how many do not drink beer. Over half of the participants were female (51.2%) while just under half were male (48.8%). The majority of the participants drank beer (75.2%) while less than one fourth (24.8%) did not drink beer.

Table 2

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>63</td>
<td>48.8%</td>
</tr>
<tr>
<td>Female</td>
<td>66</td>
<td>51.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drinks Beer</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>97</td>
<td>75.2%</td>
</tr>
<tr>
<td>Male</td>
<td>55</td>
<td>87.3%</td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>63.6%</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>24.8%</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>12.7%</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

H1: Who is more likely to be beer drinkers, males or females?

A Chi-square test for independence (with Yates Continuity Correction) was performed and it indicated a statistically significant association between gender and if the participant drank beer, $\chi^2 (1, n = 129) = 8.45, p < 0.004, \phi = 0.274$. Within the sample, 87.3% of men claimed to drink beer, while only 12.7% claimed to not drink beer. For females within the sample 63.6% reported that they drink beer, while 36.4% reported not drinking beer. There is an association between drinking beer and gender for this sample.

H2: Males will have a greater liking of beer and chocolate pairings than females.
The results indicated that males had a statistically significant higher overall higher liking for beer and chocolate pairings ($M = 7.62, S.D. = 1.44$) compared to females liking of beer and chocolate pairings ($M = 7.06, S.D. = 1.72$) conditions; $t = 1.989, p < .049$.

Due to the limited number of cases for this study ($N = 129$), the question asking how much each participant liked the beer and chocolate pairing were combined into a new variable that accounted for beer and chocolate pairings in general and not just the individual pairings. The individual pairings were not found to be statistically significant between males and females. Males liking of the Dos Equis Ambar and the Explosion truffle ($M = 7.88, S.D. = 0.62$) was not significantly different compared to females liking of the beer and chocolate pairing ($M = 7.64, S.D. = 1.40$) conditions; $t = 0.637, p < 0.528$. The New Castle and Cranberry chocolate pairing yielded similar results for males ($M = 6.67, S.D. = 2.02$) compared to females ($M = 6.23, S.D. = 1.48$) conditions; $t = 0.641, p < 0.527$). The pairing of Heineken Dark and Expresso truffle again yielded insignificant results. Males liking of the pairing had a greater mean value ($M = 8.11, S.D. = 1.02$) compared to females liking ($M = 7.19, S.D. = 1.76$) conditions; $t = 1.90, p < 0.067$, but was still statistically not significant. This relationship was the closest to attaining a significant value, but ultimately fell short. This is most likely due to the limited number of cases acquired for this study. The final pairing also fell short of finding a significant difference as the Heineken Dark and Pumpkin Spice truffle liking for men ($M = 7.78, S.D. = 1.309$) compared to females liking of the pairing ($M = 6.81, S.D. = 2.04$) conditions; $t = 1.62, p < .118$, was found to be insignificant. Since the participants only tried one of the beer and truffle pairings and not all 3 this could have led to a similar liking since they did not have anything to compare their first or second tasting too.
Conclusions

Based on Gallup (2013), 53% of males named beer as their preferred alcoholic beverage compared to only 20% of females. There was no surprise when 87.3% of male respondents claimed to be beer drinkers, however an astonishing 63.6% of females from the sample also claimed to be beer drinkers. With over half of the sample of females claiming to be beer drinkers, it stands to reason that this played a role in their level of liking of the beer and chocolate pairing, since hypothesis one demonstrated that females only slightly ranked lower than males in their liking of the beer and chocolate pairings.

Results of hypothesis two demonstrated that the overall means were not that far apart despite being found statistically significantly different. Similarly Harrington et al., noticed that women tended to gravitate toward the lighter beers and only matched pizza with lighter beers as opposed to males who matched pizzas with a broader range of beer styles. The researchers noted how women did not stray from the lighter style beers, yet still found matches that were pleasing to them (2008). This study did not examine type or style of beer preference, but simply how well each beer provided matched with the designated food item to each participant. Despite beer type and style not being examined, the males and females still found the combinations to be gastronomically pleasing overall. As such, males and females do have a closely related level of liking of beer and chocolate pairings.

The closely related means could potentially indicate that with the addition of chocolate to beer, females are more receptive to consume beer. Especially since among daily chocolate eaters, 57% claim to be female (NCA & The Futures Company, 2012). With such constant exposure to chocolate it could stand to reason that females might be more receptive to partake in various alcoholic beverage pairings, such as beer, with their chocolate. Since females averaged
around the score of “Liked moderately” (Appendix C), it stands to reason that with the combination of beer and chocolate, was an enjoyable experience for them and now they may be more receptive in the future to try beer again with other various food pairings. This can help aid in marketing to females, now that it has been shown that they do enjoy beer paired with chocolate.

**Implications**

These findings can be used to address strategies focused on catering to consumer needs and wants. Artisan and industrial brewers should take note of these results and attempt to modify their marketing strategies to incorporate how well their beers pair with various dishes. Pairing a beer with food can be thought of as a viable way in which to solicit more female consumers in an effort to increase overall sales of beer.

**Limitations and Future Research**

Due to the limited number of cases and incomplete data sets for each respondent, future research should strive to ensure each participant completes a survey per pairing. The survey design was set up for only one pairing to be recorded at a time and since the participants are anonymous, even if they did fill out more than one survey there would be no way to track which person filled out which survey to combine them in the data set.

The sampling method was also a limitation. The window of the tastings was also limited since there were only two events in which participants could partake of the pairings. During these windows, the participants were not required to complete the survey, nor were they intentionally attending the events for the specific beer and chocolate pairings.

A suggestion for future research would be to hold the tastings in closed room or lab scenarios where the researcher can present each beer and chocolate pairing to the participants.
and have them taste the pairing and complete a survey per pairing. Also, since there appears to be a significant association between gender and those who drink beer, future research should investigate whether or not if a participant drinks beer affected their liking of the beer and chocolate pairing. Their level of liking of just the beer should be measured before the pairing process. The preferred type and style of beer should also be addressed. Donadini et al., (2012a) pointed out that match selection was determined by both individual preferences, and features of the food and beverage when the consumers expressed a hedonic response to a match amongst different categories of chocolates and beverages. With this in mind, it is important to further examine aspects of not only the match between the chocolate and beer, but also how well each participant like each individual chocolate and beverage.

With the limited amount of responses and incomplete data sets per participant, examining this aspect was not plausible for this study. Future research should also strive to examine various aspects of the pairing (taste, mouthfeel, smell, astringency, etc.) that each participant liked or did not like in order to fully grasp the gastronomical effect the paring of beer with food has on each participant. How receptive the participants would be to trying other various beer and food pairings in the future should also be addressed.

References


Appendix A

Dark Chocolate Truffle “Explosion”
This recipe tantalizes your tongue, not only with chocolaty goodness, but also with the addition of pop rocks candy and candied habanero peppers.

Recommended beer pairing:

Yield: 25-30

Ingredients:
1 ¾ cups bittersweet chocolate chips or pieces
1/3 cups unsweetened cocoa powder
1/3 cup heavy whipping cream
6 tbsp. unsalted butter, cut into small pieces
2 oz. Pop Rocks (candy)
2 each Habaneros, seeds and membrane removed, finely minced
3 Tbls. sugar, granulated
4 Tbls. water

Preparation:

1. Combine sugar and water in a small saucepan. Add finely minced Habaneros; simmer until 80-90% of liquid is evaporated and sugar is absorbed into the pepper. Set aside.
2. In a small saucepan, bring the cream to a simmer. Add the butter and stir until melted. Add the chocolate chips/pieces. Stir until completely melted and smooth. Remove from heat and pour the chocolate mixture into a shallow bowl. Allow to reach room temperature.
3. Fold in Pop Rocks and candied Habanero. Cover and refrigerate the mixture until firm (at least 2 hours).
4. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the cocoa powder. Enjoy immediately or refrigerate in an airtight container for up to 2 weeks.
Appendix A

White Chocolate, Expresso and Toffee Truffle

This white chocolate truffle combines layers of flavors with an infusion of expresso and rolled in ground toffee. These flavors work well with seasonal fall beers and make a surprisingly in flavorful and sweet sensation interaction.

Recommended beer pairing:

Yield: 20-22 truffles

Ingredients:

- 6 oz. white chocolate chips or chopped white chocolate
- 5 Tbls. unsalted butter, diced
- 2 Tbls. plus 1 tsp. heavy cream
- pinch salt
- 2 tsp. Cold expresso or coffee extract
- 1/2 cup finely chopped toffee

Preparation:

1. Place the chocolate chips, cream, butter, and salt in a medium microwave-safe bowl and microwave in 30 second intervals until melted, 1-2 minutes. Because white chocolate is prone to overheating, it’s a good idea to stop heating it before all the chips are melted, and simply stir until the residual heat melts all the chocolate.
2. Stir in the expresso until well-mixed. Cover the top with plastic wrap and refrigerate until firm enough to scoop, about 2 hours.
3. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the shredded ground toffee to coat.
4. Store truffles in an airtight container in the refrigerator for up to a week. It is best to keep them under refrigerator until about 20 minutes before service.
White Chocolate, Pumpkin, Spice and Pecan Truffle

This white chocolate truffle brings up thoughts of pumpkin pie with seasonal spices, the addition of pecans and a ground graham cracker coating to mimic pie crust. The infusion of pumpkin and pumpkin spice into beer is a popular seasonal combination – why not allow your food and beer to interact with these real flavors on the palate and transform the experience!

Recommended beer pairing:

Yield: 20-22 truffles

Ingredients:

- 6 oz. white chocolate chips or chopped white chocolate
- 5 Tbls. unsalted butter, diced
- 1 Tbls. heavy cream
- pinch salt
- 2 Tbls. Canned pumpkin
- 1 tsp. Pumpkin pie spice
- 2 Tbls. chopped pecans
- 1/2 cup finely ground graham crackers

Preparation:

1. Place the chocolate chips, cream, butter, and salt in a medium microwave-safe bowl and microwave in 30 second intervals until melted, 1-2 minutes. Because white chocolate is prone to overheating, it’s a good idea to stop heating it before all the chips are melted, and simply stir until the residual heat melts all the chocolate.
2. Stir in the pumpkin, spice and pecans until well-mixed. Cover the top with plastic wrap and refrigerate until firm enough to scoop, about 2 hours.
3. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the shredded ground graham crackers to coat.
4. Store truffles in an airtight container in the refrigerator for up to a week. It is best to keep them under refrigerator until about 20 minutes before service.
Appendix A

**Dark Chocolate Truffle with Pretzels and Cranberry**

Pretzels and beer are a natural pairing. This recipe tantalizes your tongue by combining dark chocolate, pretzels and dried cranberries. The final product is then rolled in cocoa powder and sea salt. The combination of pretzels, cranberries and sea salt creates a sweet-salty combination (think popcorn and M&M at the movies) and with the addition of cranberry pairs well with beers that have a slight tangy character.

*Recommended beer pairing:*

**Yield 25-30**

**Ingredients:**

- 1 ¾ cups bittersweet chocolate chips or pieces
- 1/3 cup heavy whipping cream
- 6 tbsp. unsalted butter, cut into small pieces
- ¼ cup chopped pretzels
- 2 Tbls. chopped, dried cranberries
- 1/3 cups unsweetened cocoa powder mixed with 1 Tbls. sea salt

**Preparation:**

1. In a small saucepan, bring the cream to a simmer. Add the butter and stir until melted. Add the chocolate chips/pieces. Stir until completely melted and smooth. Remove from heat and pour the chocolate mixture into a shallow bowl. Allow to reach room temperature.
2. Fold in pretzels and cranberries. Cover and refrigerate the mixture until firm (at least 2 hours).
3. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the cocoa powder-sea salt mixture to coat. Enjoy immediately or refrigerate in an airtight container for up to 2 weeks.
Appendix B

CHOCOLATE: ____________________________

1. How SWEET is the CHOCOLATE?

<table>
<thead>
<tr>
<th>Extremely weak</th>
<th>Very weak</th>
<th>Moderately weak</th>
<th>Slightly weak</th>
<th>Neither weak nor strong</th>
<th>Slightly strong</th>
<th>Moderately strong</th>
<th>Very strong</th>
<th>Extremely strong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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2. How MUCH do you LIKE or DISLIKE the CHOCOLATE?

<table>
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<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
<th>Like extremely</th>
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BEER #1:

3. How MUCH do you LIKE or DISLIKE the BEER?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
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<th>Like extremely</th>
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4. How MUCH do you LIKE or DISLIKE the CHOCOLATE AND BEER combination?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
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5. How MANY SENSATIONS and AROMAS do you perceive in this PAIRING?

<table>
<thead>
<tr>
<th>Extremely simple</th>
<th>Very simple</th>
<th>Moderately simple</th>
<th>Slightly simple</th>
<th>Neither simple nor complex</th>
<th>Slightly complex</th>
<th>Moderately complex</th>
<th>Very complex</th>
<th>Extremely complex</th>
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6. How well does the different SENSATIONS and AROMAS go together?

<table>
<thead>
<tr>
<th>Extremely bad</th>
<th>Very bad</th>
<th>Moderately bad</th>
<th>Slightly bad</th>
<th>Neither good nor bad</th>
<th>Slightly well</th>
<th>Moderately well</th>
<th>Very Well</th>
<th>Extremely well</th>
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7. How do you perceive the BALANCE of FLAVOR and AROMA INTENSITY between the beer and chocolate in this pairing?

<table>
<thead>
<tr>
<th>Chocolate dominates extremely</th>
<th>Chocolate dominates moderately</th>
<th>Chocolate dominates slightly</th>
<th>Just about balanced</th>
<th>Beer dominates slightly</th>
<th>Beer dominates moderately</th>
<th>Beer dominates extremely</th>
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Name: ____________________________
Appendix B

**BEER #2:**

8. **How MUCH do you LIKE or DISLIKE the BEER?**
   - Dislike extremely
   - Dislike very much
   - Dislike moderately
   - Dislike slightly
   - Neither dislike nor like
   - Like slightly
   - Like moderately
   - Like very much
   - Like extremely

9. **How MUCH do you LIKE or DISLIKE the CHOCOLATE AND BEER combination?**
   - Dislike extremely
   - Dislike very much
   - Dislike moderately
   - Dislike slightly
   - Neither dislike nor like
   - Like slightly
   - Like moderately
   - Like very much
   - Like extremely

10. **How MANY SENSATIONS and AROMAS do you perceive in this PAIRING?**
    - Extremely simple
    - Very simple
    - Moderately simple
    - Slightly simple
    - Neither simple nor complex
    - Slightly complex
    - Moderately complex
    - Very complex
    - Extremely complex

11. **How well does the different SENSATIONS and AROMAS go together?**
    - Extremely bad
    - Very bad
    - Moderately bad
    - Slightly bad
    - Neither good nor bad
    - Slightly well
    - Moderately well
    - Very well
    - Extremely well

12. **How do you perceive the BALANCE of FLAVOR and AROMA INTENSITY between the beer and chocolate in this pairing?**
    - Chocolate dominates extremely
    - Chocolate dominates moderately
    - Chocolate dominates slightly
    - Just about balanced
    - Beer dominates slightly
    - Beer dominates moderately
    - Beer dominates extremely
    - Beer dominates moderately
    - Beer dominates slightly
    - Just about balanced
    - Neither beer nor chocolate dominates
    - Chocolate dominates
    - Beer dominates
    - Neither dominates

# Appendix B

## BEER #3:

13. How **MUCH** do you **LIKE** or **DISLIKE** the **BEER**?  

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
<th>Like extremely</th>
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</tbody>
</table>

14. How **MUCH** do you **LIKE** or **DISLIKE** the **CHOCOLATE AND BEER** combination?  

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
<th>Like extremely</th>
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</table>

15. How **MANY SENSATIONS** and **AROMAS** do you perceive in this **PAIRING**?  

<table>
<thead>
<tr>
<th>Extremely simple</th>
<th>Very simple</th>
<th>Moderately simple</th>
<th>Slightly simple</th>
<th>Neither simple nor complex</th>
<th>Slightly complex</th>
<th>Moderately complex</th>
<th>Very complex</th>
<th>Extremely complex</th>
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16. How well does the different **SENSATIONS** and **AROMAS** go together?  

<table>
<thead>
<tr>
<th>Extremely bad</th>
<th>Very bad</th>
<th>Moderately bad</th>
<th>Slightly bad</th>
<th>Neither good nor bad</th>
<th>Slightly well</th>
<th>Moderately well</th>
<th>Very well</th>
<th>Extremely well</th>
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</table>

17. How do you perceive the **BALANCE** of **FLAVOR** and **AROMA INTENSITY** between the beer and chocolate in this pairing?  

<table>
<thead>
<tr>
<th>Chocolate dominates extremely</th>
<th>Chocolate dominates moderately</th>
<th>Chocolate dominates slightly</th>
<th>Just about balanced</th>
<th>Beer dominates slightly</th>
<th>Beer dominates moderately</th>
<th>Beer dominates extremely</th>
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Appendix C

Cover

The students and faculty have enjoyed being part of the Jones Center “Big Night” gala this evening. Our student participation provides a service-learning opportunity as well as an opportunity for experiential learning during the event.

The Hospitality & Restaurant Management Program at the University of Arkansas, Fayetteville is committed to excellence in our programs, students, and graduates. The Program offers bachelor and masters level degree programs in hospitality and restaurant management and is part of the Dale Bumper’s College of Agricultural, Food and Life Sciences. The Program’s mission is to develop pioneering leaderships in the hospitality field with emphasis on the “art of hospitality”. More information on the Hospitality & Restaurant Management Program is available on our website at http://hesc.uark.edu/2622.php

We hope you have enjoyed tonight’s gala and hope you had the opportunity to sample some of the chocolate desserts designed and prepared by our students. Enclosed are some recipes for some of the chocolate truffles, lollipops and bonbons served at the Big Night.

Sincerely,

Dr. Robert Harrington
Coordinator Food, Human Nutrition and Hospitality
Professor and 21st Century Endowed Chair in Hospitality
# Appendix C

## THE BIG NIGHT: BEER AND CHOCOLATE PAIRING

Are you a **beer** drinker?

<table>
<thead>
<tr>
<th>NO</th>
<th>Never</th>
<th>Heineken</th>
<th>Never</th>
</tr>
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<tbody>
<tr>
<td>YES</td>
<td>Fewer than once per month</td>
<td>Dark</td>
<td>Dark Choc</td>
</tr>
<tr>
<td></td>
<td>Once per month</td>
<td>Dark Choc 'Explosion'</td>
<td>Dark Choc</td>
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<tr>
<td></td>
<td>2-3 times per month</td>
<td>Newcastle</td>
<td>White Choc</td>
</tr>
<tr>
<td>Gender</td>
<td>1-2 times per week</td>
<td>Dos Equis</td>
<td>White Choc</td>
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<td></td>
<td>3-4 times per week</td>
<td>Ambar</td>
<td>Pumpkin</td>
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<td></td>
<td>5-6 times per week</td>
<td>Everyday</td>
<td>Everyday</td>
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How much do you like or dislike the **chocolate** and **beer** combination?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
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How well do the different SENSATIONS and AROMAS go together?

<table>
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<tr>
<th>Extremely bad</th>
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How do you perceive the BALANCE of FLAVOR and AROMA INTENSITY between the beer and chocolate in this pairing?

<table>
<thead>
<tr>
<th>Chocolate dominates extremely</th>
<th>Chocolate dominates moderately</th>
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<th>Beer dominates slightly</th>
<th>Beer dominates moderately</th>
<th>Beer dominates extremely</th>
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85
MEMORANDUM

TO: Robert Harrington
   Dylan Martinez
   Lydia Peritt

FROM: Ro Windwalker
      IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 14-10-191

Protocol Title: The Impact of Beer and Food Education on Perceptions of Beer and Food Match

Review Type: ☑ EXEMPT ☐ EXPEDITED ☐ FULL IRB

Approved Project Period: Start Date: 10/29/2014, Expiration Date: 10/28/2015

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form Continuing Review for IRB Approved Projects, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (https://vpred.uark.edu/units/rsc/index.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 210 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval prior to implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.
CHAPTER IV

Conclusions

Overall the results of the two studies aided in demonstrating young adults/Millennials knowledge levels (subjective, objective and experience), along with how each gender reacted to the sensory pairing of beer and food. Previously it was discovered that 53% of males recognized beer as their preferred beverage and only 20% of females turned to beer as their preferred beverage (Gallup, 2013). The percentage of males from study one’s sample who drink beer was 80.2% and the percentage of females who drink beer was 67.3% reflecting an increase in overall consumption. Males and females both appear to be shifting toward beer as their preferred beverage or at least consuming it more often. As demonstrated in the first study, males have a higher objective knowledge, which can be because more males were considered beer drinkers than females and as such they have more experience with beer. These results correlated with Taylor et al., who also found males outscoring females in objective wine knowledge (2009). This potentially means they have sought more information concerning beer and its potential food pairings or a third party has given them this knowledge during a prior experience in an effort to increase their beer and food knowledge. With females having less objective knowledge it is important for retailers to accurately describe why pairings work well together in order for females to also gain a greater objective knowledge and, in turn, hopefully contribute to increasing the overall sale of beer.

Study one also demonstrated how objective knowledge was significantly greater in those who frequently consume beer and also in those who consume alcohol and dine out more frequently. This furthers the point that the more experience an individual has with a certain product, the more objective knowledge they hold for it. Oliver pointed out that the more a
person interacts with beer and the more experience with beer they have, the more they will come to understand about beer and the more they will eventually learn (2003). With this being the case, retailers and restauranteurs should seek to capitalize on spreading objective knowledge of beer and food pairings in an effort to garner more sales and guests. By increasing the objective knowledge an individual holds, it reduces their uncertainty with buying a specific item and as such they may be more willing to try beer and food pairings and implement them in their regular consumption patterns.

The same can be said about subjective knowledge. Those who consume beer more frequently and those who consume alcohol and dine out more frequently, also had greater amounts of subjective knowledge compared to those who only sometimes. Even if they do not have any factual information, just thinking they know what they are talking about helps open them up to trying beer and food combinations. Bitnes et al., pointed out that familiarization and experience with products assist individuals in their ability to recall information about the product and makes them believe they know more than they might actually know since they believe they have a greater understanding of it after all their time associating with it (2007). The results of this study demonstrated that the more experience individuals had, the more they thought they knew and the more they actually knew. It is important to take note of these consumers and accurately target them. When a guest orders a beer and food combination, it could imply that they are combining these for a specific reason. This is an opportunity for the waiter or retailer to put forth some alternative factual information about other pairings and thus increase the consumers’ knowledge all the while helping spur on sales. It is important for the wait staff or retailers to have accurate information on the beers and potential pairings in order to help increase
potential sales and increase the overall gastronomic experience for the customer, which in turn could lead to repeat business.

For industry experts and novices it was deduced that experts outshone novices in both subjective and objective knowledge. These results coincided with Johnson and Bastian who classified experts as those with large amounts of subjective and objective knowledge of a subject (2007). Solomon (1990) also classified experts based off their professional involvement in their respected industry, and objective and subjective knowledge scores. These results allowed the researcher to reason that since novices’ subjective and objective knowledge of beer and food pairings are so low compared to industry experts, it is important to implement ways in which to increase their knowledge, whether that be through advertisements, in person information or by hosting various tasting venues where they can increase their experience with tasting appropriate beer and food matches. This research did not examine the sources where participants generally garner their information as such the researchers can only speculate at what sources would be most effective to improve knowledge levels. The research did demonstrate that there is a need to increase the knowledge levels of young adults and Millennials.

Industry experts seem to have quite a bit of knowledge so they may go into a restaurant or store and purchase their beer and food with their ideal pairing already in mind before they even sit down or pick up their beer. Experts were accurately able to identify the matches and non-matches listed for beer and food pairings, unlike the novices who could not accurately tell which paired properly and which did not. These results were similar to Donadini et al., who showed experts accurately pairing beers with a multitude of food items, while the novices could only select a few appropriate pairs (2008). Young adults/Millennials, seem to be lacking in knowledge on beer and food pairings, so there is more uncertainty and risk involved for them as
they may shy away from attempting a pairing. Professional wait staff and retailers should strive to increase the knowledge of young adults/Millennial novices when they are making purchase/consumption decisions. By doing so it will enable young adults/Millennial novices to more confidently purchase and enjoy their potential pairings.

Designing menus in a way that elicits objective knowledge about beer and food pairings, restauranteurs could potentially increase their overall sales of specific beers and food items that may or may not have been selling well in the past. Stating factual information on the menus regarding the pairings will reduce the risk that young adults/Millennials may perceive with beer and food pairings and thus increase their confidence in buying or trying the pairing due to their increased knowledge level.

The results from study two dealing with the sensory pairing of beer and chocolate enabled the researchers to deduce that despite males having a greater liking, females also had a reasonably similar liking of the beer and chocolate pairings. Despite the fact that males indicated a stronger preference than females toward beer, females actually responded well to the beer and chocolate pairings. The overall result could have been gastronomically pleasing to them. Surprisingly, with over half the female respondents reporting to drink beer (63.6%) and their overall mean score being on the higher end of liking beer and chocolate pairings, chocolate could have added a halo effect since it has been reported that about 57% of women claim to be daily chocolate eaters (NCA & The Futures Company, 2012). This information can help restauranteurs in preparing gastronomically pleasing pairings of beer and chocolates in order to elicit not only male consumers, but female as well. By getting females more involved in beer and chocolate pairings, there may be a chance to increase their liking of not only the pairings, but
also their liking of drinking beer and food. If the population of females who drink beer can be increased, it stands to reason that overall beer sales could potentially improve.

Overall knowledge (subjective, objective, and experience) plays an important role in being able to accurately ascertain proper beer and food matches. By increasing knowledge levels and understanding that young adults and the Millennial generation are lacking in knowledge on this topic, retailers and producers should take advantage of educational opportunities to improve their customers knowledge levels and thus increase their confidence in purchasing and trying beer and food pairings.
References


doi: 10.1080/15378020.2013.850381


Appendix A

Millennials' Knowledge of Beer and Food Pairings

You are invited to complete a survey about: Millennials’ Knowledge of Beer and Food Pairings: Subjective vs Objective  
Introduction/Description: As part of my research project, I am conducting a study to investigate the millennials’ knowledge of beer and food pairings, as well as, the differences between expert and novice consumer choices. I will sincerely appreciate a few minutes of your time to participate in this study. 
Risks and Benefits: The benefit received from your participation in this study benefits society by increasing marketers’ ability to accurately market to the millennial generation. There are no anticipated risks to participating in the study. 
Voluntary Participation: Your participation in the research is completely voluntary. If you choose to participate and complete the enclosed questionnaires, you may leave any items blank that you do not want to answer. You may withdraw from the survey at any time without consequence to you. It should take you about ten to fifteen minutes to complete the questionnaire. 
Confidentiality: All responses will be anonymous. All data collected will be kept confidential to the extent allowed by law and University policy. All data will be combined and only group summaries will be included in the survey reports. No data will be reported in a manner that would allow a reader to associate any responses to individual respondents. Results from the research will be reported as aggregate data. If you have any questions or concerns about this study you may contact Dylan Martinez or Rhonda Hammond through any of the means below. For questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University’s Compliance Coordinator, at (479) 575-2208 or by e-mail at irb@uark.edu. By filling out and submitting the survey you are consenting to participate. You acknowledge that you read the description, including the purpose of the study, the procedures to be used, the potential risks and side effects, the anonymity of all responses, as well as the option to withdraw from the study at any time. The survey will take you about 10-15 minutes to complete. Thank you in advance for taking the time to participate in this research. Please click the agree button on the survey to indicate that you have read this information and that you give your consent to participate.

Principal Investigator: Dylan Martinez  Dcm005@uark.edu  
Faculty Advisor: Dr. Rhonda Hammond  rkhammon@uark.edu  479-575-5132

☐ Agree 
☐ Disagree

The Following Questions are designed to gauge one’s background with beer. Please select the choice that best answers each question.
Appendix A

Do you drink beer?

☐ Yes
☐ No

What is your preferred style of beer?

____________________________

Gender?

☐ Male
☐ Female

What is your current age?

____________________

What is the highest level of education you have completed?

☐ Less than High School
☐ High School Diploma / GED
☐ Some College
☐ Associate / Vocational Degree
☐ Bachelor's Degree
☐ Master's Degree
☐ Doctoral Degree
☐ Professional Degree (JD, MD)
Appendix A

How frequently do you consume beer?

- Never
- Fewer than once a month
- Once a month
- 2-3 times a month
- 1-2 time a week
- 3-4 times a week
- 5-6 times a week
- Everyday

How frequently do you dine at restaurants and consume alcohol?

- Never
- Fewer than once a month
- Once a month
- 2-3 times a month
- 1-2 times a week
- 3-4 times a week
- 5-6 times a week
- Everyday

The following questions are designed to test your levels of both subjective and objective knowledge. For each of the following questions please select the answer that best applies. The answers to the objective portion will be provided upon completion of the questionnaire.

I know pretty much about beer.

- Strongly Disagree
- Disagree
- Slightly Disagree
- Neither Agree nor Disagree
- Slightly Agree
- Agree
- Strongly Agree
Appendix A

I do not feel very knowledgeable about beer.

○ Strongly Disagree
○ Disagree
○ Slightly Disagree
○ Neither Agree nor Disagree
○ Slightly Agree
○ Agree
○ Strongly Agree

Among my circle of friends, I am one of the "experts" on beer.

○ Strongly Disagree
○ Disagree
○ Slightly Disagree
○ Neither Agree nor Disagree
○ Slightly Agree
○ Agree
○ Strongly Agree

Compared to most other people, I know less about beer.

○ Strongly Disagree
○ Disagree
○ Slightly Disagree
○ Neither Agree nor Disagree
○ Slightly Agree
○ Agree
○ Strongly Agree

I feel I know what types of beers pair well with different foods.

○ Strongly Disagree
○ Disagree
○ Slightly Disagree
○ Neither Agree nor Disagree
○ Slightly Agree
○ Agree
○ Strongly Agree
Appendix A

Beer is principally made from what 4 components?

- Hops, Malted grains, wheat, water
- Wheat, flour, water, hops
- Malted grains, water, hops, yeast
- Honey, yeast, hops, water

What does IBU stand for?

- Interdisciplinary Beer Units
- International Beverage Units
- Internal Beer Understanding
- International Bittering Units

What type of fermentation does a "Lager" receive?

- Top-fermentation
- Mid-fermentation
- Bottom-fermentation
- Wild-fermentation

What ingredient can give beer a bitter flavor?

- Barley
- Yeast
- Malt
- Hops

What is the ideal serving temperature of a Bock?

- 50°F
- 48°F
- 45°F
- 55°F
Appendix A

What type of beer is referred to as the "nuttiest" of all beers?

- Indian Pale Ales (IPA)
- Bocks
- Lambics
- Brown Ales

Typically, fermentation takes __ to __ days, or at most a week, in the case of top-fermented beers.

- 1,2
- 2,3
- 3,4
- 4,5

What types of beers are most similar to red wines such as Cabernet and Pinot Noir?

- Pilsners & Porters
- Lambics & Ales
- Ales & Porters
- Bocks & Indian Pale Ales

What type of beer is most similar to white wines such as Sauvignon or Chardonnay?

- Ale
- Pilsner
- Stout
- Bock

During the beermaking process, where are the hops added?

- The Mash
- The Open Fermenter
- The Brew Kettle
- The Lagering Vessels
Appendix A

The following section is comprised of synergistic and non-synergistic beer and food pairings put forth by renowned beer experts. Please select how appropriate each match is in your opinion. On the left a beer is listed with a description and on the right a food item is listed.

How familiar are you with Stouts?
- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar

How familiar are you with Pilsners?
- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar
Appendix A

How familiar are you with Pale Ales?

- Extremely Unfamiliar
- Unfamiliar
- Moderately Unfamiliar
- Somewhat Unfamiliar
- Neither Familiar nor Unfamiliar
- Somewhat Familiar
- Moderately Familiar
- Familiar
- Extremely Familiar

Dry Stout: Dry Bitterness, Smokey, Rich

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Oysters

Dry Stout: Dry Bitterness, Smokey, Rich

- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Trout
Appendix A

Pilsner: Dry, Light Bodied, Flowery Bouquet
- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Roast Beef

Pilsner: Dry, Light Bodied, Flowery Bouquet
- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Trout

Pale Ale: Dry, Maltiness, Nutty
- Definitely Not Appropriate
- Inappropriate
- Moderately Inappropriate
- Somewhat Inappropriate
- Neither Appropriate nor Inappropriate
- Somewhat Appropriate
- Moderately Appropriate
- Appropriate
- Definitely Appropriate

Oysters
Appendix A

Pale Ale: Dry, Maltiness, Nutty

Roast Beef

☐ Definitely Not Appropriate
☐ Inappropriate
☐ Moderately Inappropriate
☐ Somewhat Inappropriate
☐ Neither Appropriate nor Inappropriate
☐ Somewhat Appropriate
☐ Moderately Appropriate
☐ Appropriate
☐ Definitely Appropriate

Thank you for your cooperation with this survey. We sincerely appreciate your time and effort.
Appendix B

Dark Chocolate Truffle “Explosion”
This recipe tantalizes your tongue, not only with chocolaty goodness, but also with the addition of pop rocks candy and candied habanero peppers.

Recommended beer pairing:

Yield: 25-30

Ingredients:
1 ¾ cups bittersweet chocolate chips or pieces
1/3 cups unsweetened cocoa powder
1/3 cup heavy whipping cream
6 tbsp. unsalted butter, cut into small pieces
2 oz. Pop Rocks (candy)
2 each Habaneros, seeds and membrane removed, finely minced
3 Tbls. sugar, granulated
4 Tbls. water

Preparation:

1. Combine sugar and water in a small saucepan. Add finely minced Habaneros; simmer until 80-90% of liquid is evaporated and sugar is absorbed into the pepper. Set aside.
2. In a small saucepan, bring the cream to a simmer. Add the butter and stir until melted. Add the chocolate chips/pieces. Stir until completely melted and smooth. Remove from heat and pour the chocolate mixture into a shallow bowl. Allow to reach room temperature.
3. Fold in Pop Rocks and candied Habanero. Cover and refrigerate the mixture until firm (at least 2 hours).
4. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the cocoa powder. Enjoy immediately or refrigerate in an airtight container for up to 2 weeks.
White Chocolate, Expresso and Toffee Truffle

This white chocolate truffle combines layers of flavors with an infusion of expresso and rolled in ground toffee. These flavors work well with seasonal fall beers and make a surprisingly in flavorful and sweet sensation interaction.

**Recommended beer pairing:**

**Yield: 20-22 truffles**

**Ingredients:**

- 6 oz. white chocolate chips or chopped white chocolate
- 5 Tbls. unsalted butter, diced
- 2 Tbls. plus 1 tsp. heavy cream
- pinch salt
- 2 tsp. Cold expresso or coffee extract
- 1/2 cup finely chopped toffee

**Preparation:**

5. Place the chocolate chips, cream, butter, and salt in a medium microwave-safe bowl and microwave in 30 second intervals until melted, 1-2 minutes. Because white chocolate is prone to overheating, it’s a good idea to stop heating it before all the chips are melted, and simply stir until the residual heat melts all the chocolate.

6. Stir in the expresso until well-mixed. Cover the top with plastic wrap and refrigerate until firm enough to scoop, about 2 hours.

7. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the shredded ground toffee to coat.

8. Store truffles in an airtight container in the refrigerator for up to a week. It is best to keep them under refrigerator until about 20 minutes before service.
Appendix B

**White Chocolate, Pumpkin, Spice and Pecan Truffle**

This white chocolate truffle brings up thoughts of pumpkin pie with seasonal spices, the addition of pecans and a ground graham cracker coating to mimic pie crust. The infusion of pumpkin and pumpkin spice into beer is a popular seasonal combination – why not allow your food and beer to interact with these real flavors on the palate and transform the experience!

*Recommended beer pairing:*

**Yield: 20-22 truffles**

**Ingredients:**

- 6 oz. white chocolate chips or chopped white chocolate
- 5 Tbls. unsalted butter, diced
- 1 Tbls. heavy cream
- pinch salt
- 2 Tbls. Canned pumpkin
- 1 tsp. Pumpkin pie spice
- 2 Tbls. chopped pecans
- 1/2 cup finely ground graham crackers

**Preparation:**

5. Place the chocolate chips, cream, butter, and salt in a medium microwave-safe bowl and microwave in 30 second intervals until melted, 1-2 minutes. Because white chocolate is prone to overheating, it’s a good idea to stop heating it before all the chips are melted, and simply stir until the residual heat melts all the chocolate.

6. Stir in the pumpkin, spice and pecans until well-mixed. Cover the top with plastic wrap and refrigerate until firm enough to scoop, about 2 hours.

7. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the shredded ground graham crackers to coat.

8. Store truffles in an airtight container in the refrigerator for up to a week. It is best to keep them under refrigerator until about 20 minutes before service.
Appendix B

Dark Chocolate Truffle with Pretzels and Cranberry

Pretzels and beer are a natural pairing. This recipe tantalizes your tongue by combining dark chocolate, pretzels and dried cranberries. The final product is then rolled in cocoa powder and sea salt. The combination of pretzels, cranberries and sea salt creates a sweet-salty combination (think popcorn and M&M at the movies) and with the addition of cranberry pairs well with beers that have a slight tangy character.

Recommended beer pairing:

Yield 25-30

Ingredients:

- 1 ¾ cups bittersweet chocolate chips or pieces
- 1/3 cup heavy whipping cream
- 6 tbsp. unsalted butter, cut into small pieces
- ¼ cup chopped pretzels
- 2 Tbls. chopped, dried cranberries
- 1/3 cups unsweetened cocoa powder mixed with 1 Tbls. sea salt

Preparation:

4. In a small saucepan, bring the cream to a simmer. Add the butter and stir until melted. Add the chocolate chips/pieces. Stir until completely melted and smooth. Remove from heat and pour the chocolate mixture into a shallow bowl. Allow to reach room temperature.
5. Fold in pretzels and cranberries. Cover and refrigerate the mixture until firm (at least 2 hours).
6. Using a melon baller or small spoon, roll the mixture into 1-inch balls. Roll each ball in the cocoa powder-sea salt mixture to coat. Enjoy immediately or refrigerate in an airtight container for up to 2 weeks.
Appendix C

CHOCOLATE:    Name:__________________________

18. How SWEET is the CHOCOLATE?
Extremely weak Very weak Moderately weak Slightly weak Neither weak nor strong Slightly strong Moderately strong Very strong Extremely strong

19. How MUCH do you LIKE or DISLIKE the CHOCOLATE?
Dislike extremely Dislike very much Dislike moderately Dislike slightly Neither dislike nor like Like slightly Like moderately Like very much Like extremely

BEER #1:

20. How MUCH do you LIKE or DISLIKE the BEER?
Dislike extremely Dislike very much Dislike moderately Dislike slightly Neither dislike nor like Like slightly Like moderately Like very much Like extremely

21. How MUCH do you LIKE or DISLIKE the CHOCOLATE AND BEER combination?
Dislike extremely Dislike very much Dislike moderately Dislike slightly Neither dislike nor like Like slightly Like moderately Like very much Like extremely

22. How MANY SENSATIONS and AROMAS do you perceive in this PAIRING?
Extremely simple Very simple Moderately simple Slightly simple Neither simple nor complex Slightly complex Moderately complex Very complex Extremely complex

23. How well does the different SENSATIONS and AROMAS go together?
Extremely bad Very bad Moderately bad Slightly bad Neither good nor bad Slightly well Moderately well Very Well Extremely Well

24. How do you perceive the BALANCE of FLAVOR and AROMA INTENSITY between the beer and chocolate in this pairing?
Choclate dominates extremely Chocolate dominates moderately Chocolate dominates slightly Just about balanced Beer dominates slightly Beer dominates moderately Beer dominates extremely

110
Appendix C

**BEER #2:**

25. How **MUCH** do you **LIKE** or **DISLIKE** the **BEER**?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
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26. How **MUCH** do you **LIKE** or **DISLIKE** the **CHOCOLATE AND BEER** combination?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
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27. How **MANY SENSATIONS** and **AROMAS** do you perceive in this **PAIRING**?

<table>
<thead>
<tr>
<th>Extremely simple</th>
<th>Very simple</th>
<th>Moderately simple</th>
<th>Slightly simple</th>
<th>Neither simple nor complex</th>
<th>Slightly complex</th>
<th>Moderately complex</th>
<th>Very complex</th>
<th>Extremely complex</th>
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28. How well does the different **SENSATIONS** and **AROMAS** go together?

<table>
<thead>
<tr>
<th>Extremely bad</th>
<th>Very bad</th>
<th>Moderately bad</th>
<th>Slightly bad</th>
<th>Neither good nor bad</th>
<th>Slightly well</th>
<th>Moderately well</th>
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29. How do you perceive the **BALANCE** of **FLAVOR** and **AROMA INTENSITY** between the beer and chocolate in this pairing?

<table>
<thead>
<tr>
<th>Chocolate dominates extremely</th>
<th>Chocolate dominates moderately</th>
<th>Chocolate dominates slightly</th>
<th>Just about balanced</th>
<th>Beer dominates slightly</th>
<th>Beer dominates moderately</th>
<th>Beer dominates extremely</th>
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Appendix C

BEER #3:

30. How **MUCH** do you **LIKE** or **DISLIKE** the **BEER**?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
<th>Like extremely</th>
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31. How **MUCH** do you **LIKE** or **DISLIKE** the **CHOCOLATE AND BEER** combination?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
<th>Like very much</th>
<th>Like extremely</th>
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32. How **MANY SENSATIONS** and **AROMAS** do you perceive in this **PAIRING**?

<table>
<thead>
<tr>
<th>Extremely simple</th>
<th>Very simple</th>
<th>Moderately simple</th>
<th>Slightly simple</th>
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33. How well does the different **SENSATIONS** and **AROMAS** go together?

<table>
<thead>
<tr>
<th>Extremely bad</th>
<th>Very bad</th>
<th>Moderately bad</th>
<th>Slightly bad</th>
<th>Neither good nor bad</th>
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</table>

34. How do you perceive the **BALANCE** of **FLAVOR** and **AROMA INTENSITY** between the beer and chocolate in this pairing?

<table>
<thead>
<tr>
<th>Chocolate dominates extremely</th>
<th>Chocolate dominates moderately</th>
<th>Chocolate dominates slightly</th>
<th>Just about balanced</th>
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Appendix D

Cover

The students and faculty have enjoyed being part of the Jones Center “Big Night” gala this evening. Our student participation provides a service-learning opportunity as well as an opportunity for experiential learning during the event.

The Hospitality & Restaurant Management Program at the University of Arkansas, Fayetteville is committed to excellence in our programs, students, and graduates. The Program offers bachelor and masters level degree programs in hospitality and restaurant management and is part of the Dale Bumper’s College of Agricultural, Food and Life Sciences. The Program’s mission is to develop pioneering leaderships in the hospitality field with emphasis on the “art of hospitality”. More information on the Hospitality & Restaurant Management Program is available on our website at http://hesc.uark.edu/2622.php

We hope you have enjoyed tonight’s gala and hope you had the opportunity to sample some of the chocolate desserts designed and prepared by our students. Enclosed are some recipes for some of the chocolate truffles, lollipops and bonbons served at the Big Night.

Sincerely,

Dr. Robert Harrington
Coordinator Food, Human Nutrition and Hospitality
Professor and 21st Century Endowed Chair in Hospitality
Appendix D

<table>
<thead>
<tr>
<th>Are you a BEER drinker?</th>
<th>How frequently do you consume BEER?</th>
<th>How frequently do you consume CHOCOLATE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Never</td>
<td>Dark</td>
</tr>
<tr>
<td>YES</td>
<td>Fewer than once per month</td>
<td>Cranberry</td>
</tr>
<tr>
<td></td>
<td>Once per month</td>
<td>'Explosion'</td>
</tr>
<tr>
<td></td>
<td>2-3 times per month</td>
<td>White Choc</td>
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<tr>
<td></td>
<td>1-2 times per week</td>
<td>Expresso</td>
</tr>
<tr>
<td>Gender</td>
<td>3-4 times per week</td>
<td>White Choc Pumpkin</td>
</tr>
<tr>
<td>Male</td>
<td>Everyday</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5-6 times per week</td>
<td></td>
</tr>
</tbody>
</table>

**THE BIG NIGHT: BEER AND CHOCOLATE PAIRING**

How MUCH do you LIKE or DISLIKE the CHOCOLATE AND BEER combination?

<table>
<thead>
<tr>
<th>Dislike extremely</th>
<th>Dislike very much</th>
<th>Dislike moderately</th>
<th>Dislike slightly</th>
<th>Neither dislike nor like</th>
<th>Like slightly</th>
<th>Like moderately</th>
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</tr>
</thead>
</table>

How well does the different SENSATIONS and AROMAS go together?

<table>
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<tr>
<th>Extremely bad</th>
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How do you perceive the BALANCE of FLAVOR and AROMA INTENSITY between the beer and chocolate in this pairing?

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