

12-2015

## Portion Size Communication by Means of Package Design

Tami J. Strickland  
*University of Arkansas, Fayetteville*

Follow this and additional works at: <https://scholarworks.uark.edu/etd>



Part of the [Human and Clinical Nutrition Commons](#), and the [Public Relations and Advertising Commons](#)

---

### Citation

Strickland, T. J. (2015). Portion Size Communication by Means of Package Design. *Graduate Theses and Dissertations* Retrieved from <https://scholarworks.uark.edu/etd/1349>

This Thesis is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of ScholarWorks@UARK. For more information, please contact [uarepos@uark.edu](mailto:uarepos@uark.edu).

Portion Size Communication by Means of Package Design

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Science in Agricultural and Extension Education

by

Tami Shuck  
University of Arkansas  
Bachelor of Science in Agriculture, 1985

December 2015  
University of Arkansas

This thesis is approved for recommendation to the Graduate Council.

---

Dr. Jefferson Miller  
Thesis Director

---

Dr. Donna Graham  
Committee Member

---

Dr. Cindy Moore  
Committee Member

---

Dr. Craig Bacon  
Committee Member

## **Abstract**

This qualitative study assessed consumers' current methods of determining portion sizing of chicken products and examined their perceptions of how effectively three package designs communicate portion size. Everett M. Rogers' Diffusion of Innovations (DI) Theory analyzes the characteristics of the consumer of the innovation (adopter) and the impact these characteristics have on adopting new innovations. The innovation in this study will be the prototype packaging. Focusing on Rogers' adopter characteristics and defined proprietary consumer segmentation characteristics, this study will be pivotal for future package design projects targeting nutrition education.

Focus group questions were scrutinized through a pilot study and revised where appropriate. Two semi-structured focus group discussions were conducted with 30 participants in total. Each focus group was audio and visually recorded, then transcribed verbatim. Data were coded and analyzed using constant comparison analysis technique. Results showed that many participants thought that measuring portion size is somewhat important, but sometimes difficult. In general, all three package designs were acknowledged as being helpful in consumers' nutritional literacy and portion control. Two of the package designs were viewed positively in understanding appropriate portion size, but the nutrition information in the form of call-outs/benefits on the front of the packages may have been seen as more helpful than the single serve package design. Some participants felt that there were cost implications due to the structure of one of the packages. The study concludes further package designs could educate consumers about proper portion size consumption and would be instrumental in promoting healthy dietary habits and addressing the obesity issues that are prevalent.

## **Acknowledgements**

I would like to thank my family for their continued support over the last two and a half years. My husband provided encouragement and allowed me to dedicate all of my time to obtaining this goal and my son gave me the incentive to keep pushing forward even in moments of defeat.

I would also like to thank all of my dear friends for being so supportive and charitable about my inability to participate in social activities. They never once took offense at my anxiety-infused behavior and continually provided therapy whenever I needed it. I will be forever grateful.

Special thanks are extended to my graduate committee for investing their time and guidance to help me accomplish this goal. Dr. Donna Graham continually checked in on me and provided much appreciated guidance each semester. Dr. Cindy Moore was kind enough to accept my invitation to join the committee, even though she had many other commitments more pressing than mine. Dr. Craig Bacon has inspired me personally and professionally to have big goals and pursue them with a vengeance. He allowed me to attend graduate school while working for him in Research and Development at Tyson Foods, Inc. and I will be forever grateful to him.

Also, a very special thanks to Dr. Jeff Miller who has inspired me prior to graduate school, during graduate school, and will continue long after graduation. He has given me many moments of support, but has taught me that sometimes the relationships that develop along the way are as important as the final accomplishment. I will continue to enjoy supporting him in agricultural mission initiatives in the future.

## **Dedication**

This edition of the *Portion Size Communication by Means of Package Design* is dedicated to my late father who taught me to believe I could accomplish anything I decided to pursue. He was the inspiration for me to attend graduate school and would be so very proud to see the final accomplishment.

## Table of Contents

I. Introduction .....	1
A. Problem Statement .....	3
B. Context of the Case .....	3
C. Purpose and Objectives .....	5
D. Limitations and Definitions .....	5
II. Review of Literature .....	7
A. Consumer Understanding .....	7
B. Package Design .....	10
C. Portion Size Communication Tools .....	11
D. Summary of Literature .....	16
III. Methodology .....	18
A. Design of the Study .....	18
B. Subjects and Subject Selection .....	19
C. Demographics .....	22
D. Characteristics and Categories of Focus Groups .....	23
E. Prototype Packaging Design .....	27
F. Instrumentation and Data Collection .....	28
D. Data Analysis .....	30
IV. Results/Findings .....	31
A. Research Question One .....	31
B. Research Question Two .....	34
Package Communicates Portion Size .....	36
Package Communicates Snacking Versus Meal .....	38

Package Communicates Health .....	39
Package is Convenient .....	40
Package Communicates Expensive .....	41
Participants' Suggestions .....	43
V. Conclusions and Recommendations .....	44
A. Research Question One .....	44
B. Research Question Two .....	45
Prototype Package #1 .....	47
Prototype Package #2 .....	49
Prototype Package #3 .....	50
Recommendations for Marketing .....	50
Recommendations for Future Research .....	52
VI. References .....	54
VII. Appendices .....	59
A. Appendix A .....	59
B. Appendix B .....	60
C. Appendix C .....	61

## **Tables and Figures**

### **Tables**

1. Rogers' DI Categories With Characteristics
2. Tyson Foods, Inc. Proprietary Consumer Segmentation
3. Participant Demographics
4. Consumer Segmentation Aligned With Rogers' DI Categories
5. Serving Size Importance
6. Recurring/Common Themes
7. Packaging Communicates Portion Size Comments
8. Packaging Communicates Snacking vs. Meal Comments
9. Packaging Communicates Health Comments
10. Packaging Is Convenient Comments
11. Packaging Is Expensive Comments
12. Prototype Package Design Ranking

### **Figures**

1. Consumer Segmentation With General Population Percentages
2. Prototype Package Designs



## CHAPTER 1

### INTRODUCTION

There is concern that the United States is experiencing an obesity epidemic [4], and numerous governmental agencies, clinical associations, and food manufacturers are proactively trying to educate the nation, through effective nutritional communication, about how to properly determine portion size.

From the early 1900's the federal government has been involved with the integrity of the nations' food supply. Governmental regulations pertaining to labeling policies of the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA), were primarily concerned with adulteration of food and the need for sanitary conditions in the locations the food was prepared for eventual sale [1]. President Richard Nixon, in 1969, recognized there was national concern for malnutrition in the United States and convened a "White House Conference of Food, Nutrition, and Health" [1]. The recommendations would be pivotal in addressing the nation's dietary concerns and the role the federal government would play in regulating the food supply via governmental regulations. The FDA took the conference recommendations under advisement and promulgated the first nutritional guidelines for food that would not only address the nation's food insecurity, but also ensure any excessive consumption was curbed by the utilization of proper nutrition labeling.

In 1990, President George H.W. Bush signed into law the largest nutrition regulation the nation had seen [1]. The FDA's Nutrition Labeling Education Act (NLEA) was completed and published in Final Rule, and the USDA quickly followed FDA's regulatory lead. The mandatory requirement for full nutrition disclosure was to assist consumers in maintaining healthy dietary

practices and ensure comparability of similar products when making purchases [1]. One area of concentration that the NLEA focused on was serving size. Nationwide Food Consumption Surveys conducted by the USDA were utilized to determine serving size consumption [4]. The serving size was a component of the Nutrition Facts panel that was now mandatory on food packaging by the enactment of the NLEA. The regulatory direction for serving size values was to keep it relative to the consumer and utilize household measures like “one cup,” “one tablespoon,” etc.

Survey data provided by the Centers for Disease Control and the National Institutes of Health have shown that portion size (are actually consuming) versus “serving size” declared in the nutrition information on packaging are totally different [2,3,4]. Larger portions are being consumed, which contributes to obesity issues. Twenty years after the creation of the NLEA, the Food and Drug Administration has published and made available for comment a Proposed Rule which addresses revised serving size requirements, criteria for labeling based on package size, and other issues. The Proposed Rule is titled “*Serving Sizes of Foods that can Reasonably be Consumed at One-Eating Occasion; Dual-Column Labeling; Updating, Modifying, and Establishing Certain Reference Amounts Customarily Consumed; Serving Size for Breath Mints; and Technical Amendments*” [4]. If rulemaking proceeds to Final Rule status, this will change the reported serving sizes and align them to what the nation is truly consuming [3,4]. This change will increase the amount of the stated serving size on the label, and educational efforts will need to be implemented to help consumers understand that the labeled serving is not necessarily the recommended serving [4].

The food industry has contributed to the portion size increase with misunderstood serving size values and larger “value” packages. The media may have also contributed to the

increasingly requested portion sizes by advertising that “supersize” and larger portions mean better dollar value [26]. These larger servings may have contributed to the obesity epidemic in the United States. The CDC data indicated that 68% of the adult U.S. population is overweight or obese [4].

### **Problem Statement**

With the rise of obesity in the U.S., there needs to be a harmonized effort by the food industry and governmental agencies to nutritionally educate the public and bring healthier food choices to consumers. Understanding proper portion size is the first step in gaining nutritional awareness and seems to be a pivotal beginning step in developing innovative interventions to prevent and possibly treat obesity [7,25]. The most accurate way to monitor portion size is to measure with a scale or measuring cup, but this is not realistic for some foods [9]. This study’s intention is to understand consumers’ usual means of portion size measurement for a particular 3 ounce serving of chicken product and identify, by innovative package design, whether single serve portioning packages can assist consumers in recognizing proper portioning.

### **Context of the Case**

The federal government has regulatory oversight to ensure our food supply is safe and consumers understand the effect of food choices on their health. The food industry is a for profit industry that is constantly balancing being proactive in communicating nutrition information and strategizing to get ahead of the closest competitor. Historical research can help in the identification of proactive tools in the nutritional communication of proper portion size consumption for healthy dietary practices. Identifying communication tools will enable the food industry to become a partner with governmental agencies in order to positively affect the

nutritional literacy of consumers. Packaging of smaller portions, nutrition communication on packages indicating how much of the product should be consumed, and the utilization of healthful claims that truly communicate factual information are examples of changes the food industry could make.

Tyson Foods, Inc. continues to be influential in proactively developing healthier products for consumers. Whether consumers want to ensure weight management or ensure proper levels of protein consumption for athletic purposes, nutrition education is key. Identifying educational opportunities to address dietary concerns is critical to the company. Ensuring consumers understand the proper portion size of protein is paramount and a key marketing driver for Tyson. Tyson would like to identify whether consumers recognize the recommended serving size, in one sitting, of 3 ounces of chicken breast and identify nutrition communication through innovative packaging interventions.

The FDA's 2014 Proposed Rule that will change the reported serving sizes, within the nutrition facts label, is an indicator of consumer confusion regarding proper portion size and FDA is undertaking a restructure of the nutritional guidance in a manner that influences consumer behavior [3,4]. Understanding the behavior and motivation of consumers will provide beneficial learnings for industry leaders who want to be instrumental in providing nutritional education that could impact the obesity epidemic. This research will identify whether prepackaged portioning is helpful in weight management and effectively increases consumers' nutritional knowledge of portion size.

## **Purpose and Objectives**

The purpose of this study is to proactively communicate portion size to retail consumers through a prototype package design and determine whether the communication increases the consumers' nutritional knowledge and ultimately leads to increased purchases of the product.

This study's objectives are as follows:

1. Describe consumers' current methods of determining portion sizing of chicken products.
2. Examine consumers' perceptions of how effectively three package designs communicate portion size.

## **Limitations and Definitions**

This is a case study involving two purposively selected focus groups. Because the participants were selected based of their consumer characteristics, which represent specific categories of consumers of Tyson products, the findings may provide an initial indication of how these categorized consumers feel. However, as with most qualitative case study efforts, the findings of this case study may not be generalizable to the entire population of Tyson Foods consumers.

- **Serving Size:** A standardized unit of food as measured by a cup or ounce (for example) and used in dietary guidance [1,2,9].
- **Portion Size:** The amount of a single food item you are served or you choose to eat for a snack or meal [2,9].
- **Nutrition Facts Panel:** In the United States, the Nutritional Facts label lists the percentage supplied that is recommended to be met, or to be limited, in one day of human nutrients based on a daily diet of 2,000 kilocalories (kcal). The label was mandated for most food products under the provisions of the 1990 Nutrition Labeling and Education

Act (NLEA), per the recommendations of the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) [1,3,4].

## CHAPTER 2

### REVIEW OF LITERATURE

#### Consumer Understanding

Over the years, governmental agencies and clinical professionals have strived to help consumers understand portion control and healthy eating. The Academy of Nutrition and Dietetics and the American Dietetic Association continue to communicate that “all foods can fit” in healthy eating, if moderation and portion size are observed [6,10]. The difficulty is the consumer rarely understands the difference between stated serving size, within a nutrition facts panel, and a portion size of a particular food. Serving size, which is a requirement of the Nutrition Facts panel on all retail packaging, is determined by surveys completed by consumers on amounts of food they are truly consuming, not necessarily what they should be consuming based on dietary guidelines [7,9]. Most prevention guidelines, such as the 2001 Surgeon General’s *Call to Action* and the U.S. Department of Health and Human Services publication *Dietary Guidelines for Americans*, do not define portion size [7,10]. Portion size is the amount of food offered to consumers in a retail package or in a restaurant environment. Most consumers cannot recognize a 3 ounce portion (USDA’s defined serving size within a Nutrition Facts label) of a chicken breast when purchasing a package that may contain 12 chicken breasts that actually weigh five ounces each. This portion distortion is contributing to overindulgence of food consumption and clinical professionals struggle in their guidance to clients who have a need to control their diets [6].

Characteristics and behaviors that contribute to a higher level of nutritional literacy have been identified through previous research. One especially salient fact is that women with more education and higher socio-economic status tend to have more nutritional literacy

[11,14,16,28,37]. Additionally, children under the age of two tend to self-regulate their caloric intake and are not influenced by portion size [16]. This inherent behavior appears to disappear after the age of three. This could be due to parental influence and social interaction. Also, behavior in association with education paths has shown to be a determiner of literacy. A study was conducted to determine nutrition knowledge of men and women, in six different majors of college students in Iran. There were no differences between genders, but the most knowledgeable major was Physical Education [13]. This research identifies that additional education opportunities can increase learning of important nutrition elements.

According to the Institute of Grocery Distribution (IGD) working group recommendations [12,15], portion size is extremely important information that needs to be communicated to consumers. IGD [12,15] found that habits and experience seemed to determine portion size instead of consumers relying on nutrition information. Respondents in IGD's qualitative study and quantitative survey indicated a lack of trust for the governmental serving size information contained in the nutrition information of packaged food and most consumers rely on the portion information to ensure they are purchasing enough food for meal preparation [12,15]. This is an opportunity to positively affect the level of nutrition knowledge of consumers by proactively communicating portion size and the definition of what that truly means.

Portion size manipulation of food has been researched with astonishing results. Rolls, Morris, and Roe's [17] study of varying portion sizes of macaroni and cheese and the way in which the participants were served produced interesting results. As the portion sizes increased, the participants consumed more of the food. There was no difference in energy intake between the participants serving themselves from a serving bowl or having the macaroni and cheese pre-



sented on a plate. These results show that hunger and fullness were not affected by differing portion sizes and the participants did not notice the difference in portion size [17]. Kral, Roe, and Rolls [18] reported study results of manipulation of a pasta bake served in 2 energy dense versions and 3 portion sizes during lunch. The interaction between energy denseness and portion size was not significant, but as density and portion size increased, the amount of food consumed also increased [18]. The participants recognized the portions were larger than what they would normally consume, but they did not adjust their calorie consumption at breakfast and dinner to compensate for the additional energy intake. These results show that hunger and fullness, yet again, are not affected by portion size.

These studies seem to indicate that visual cues may be relied on by consumers instead of fullness or satiety. Further studies have provided results that seem to support this premise.

Wansink, Painter, and North used an 18-ounce “self-refilling soup bowl” and a 12-ounce regular soup bowl to determine if visual cues resulted in greater portions of soup being consumed [19]. As the participants consumed the soup in the “self-refilling soup bowl,” the level of soup was automatically refilled without the knowledge of the participants. Results reported by Wansink, Painter, and North produced findings that supported the results from previous studies indicating that consumers rely on their eyes, not their stomachs, in the determination of appropriate portion sizes. The results provided reported participants consumed 73% more soup in the self-refilling soup bowl [19], confirming that incorrect determination of portion size can affect the amount of calories consumed and lead to increased weight gain.

Schwartz and Byrd-Bredbenner [20] conducted an interesting replication study twenty years after the original study published by Guthrie in 1984 to determine the effect of the Nutrition Labeling Education Act (NLEA) had on portion size knowledge compared to the nutrition labeled serving

size. The results of the replication study show consumers still did not completely understand what the labeled serving size indicated. Participants served themselves portions of breakfast, lunch, or dinner food that was presented in buffet form. The weights of food taken by the participants were recorded and compared to what the actual Nutrition Facts panel labeled serving size currently states. On average, participants selected 45% more food at breakfast than the actual serving size and 32% more at lunch and dinner [20]. The distortion of portion size reflected in this 2006 study seems to indicate that consumers still have confusion between labeled serving size and actual portion size of products they consume. Food manufacturers can be proactive in understanding the impact of the FDA's Proposed Rule [4] on serving size declarations and develop a better way to communicate to consumers the information provided in the Nutrition Facts panels for the food they produce.

### **Package Design**

Package design can have positive or negative effects on consumers understanding of portion size. Small packages versus large packages, nutrition claim information, temporary price decreases, brand names, and media advertisements can be helpful or harmful to consumers. Current trends in food manufacturing are to eliminate packaging waste and concentrate on sustainability as it affects our environment. The result would be a decrease in total weight and packaging substrate of the actual package the consumer is purchasing. This is a reverse thought process for our nation. Consumers have been marketed to with the premise that larger "value" packaging, "super-sized" fast food meal selections, and warehouse shopping experiences are more value for each of their dollars [25,26,27]. Consumers tend to purchase and consume more quantities of product when packaged in smaller portioned packages because it appears they aren't consuming as much as a larger package would provide [15,25,26,27,28]. Brand names,

slogans, and nutrition claims can produce what is called a “health halo” [27]. This type of messaging can lead the consumer to believe the product is healthier and can increase consumption. Chandon and Wansink [26] found that consumers estimated lower total calories for granola than M&M’s even though the two products had the exact same calorie count. The perception was that granola was “healthy” and the M&M’s were an indulgent food. The same implication was seen by Chandon and Wansink [26] when consumers compared a sandwich from Subway and a sandwich from McDonald’s. Even though both meals contained the same amount of calories, consumers perceived the Subway meal contained 21% less calories than the McDonald’s meal.

In order to more clearly communicate nutritional facts, the food industry must be proactive in formulating correct nutritional communications when marketing to consumers. Creating a package that indicates the true nutritional value of the food and communicating the attributes involves innovative tools. Understanding the tools that are most helpful to consumers takes thoughtful learning and will be helpful to industry when designing future packaging.

### **Portion Size Communication Tools**

Qualitative and quantitative studies conducted by the Institute of Grocery Distribution (IGD) [12,15], concluded that consumers wanted a simplified explanation of portion size and needed the package to look full in order to feel they were gaining value for their dollar. Text-based messaging and use of pictures to communicate proper portion sizes was well received in these studies [12,15]. Small, et al. [22] completed a literature review of nine studies that utilized different portion size interventions to help adults understand the proper size portions to use for their children. The interventions that proved to be most accurate in these nine studies were in-person training with a nutritionist followed up with visual models of food portions. Computer-

based training did not affect the participants' accuracy for portion size estimation according to Small, et al. [22]. Lillegaard, Overby, and Andersen [30] completed a study with children and adolescents using a food photograph booklet to estimate proper portion sizes of food presented on a plate. The study reported that, based on over 2,000 comparisons, 60% of the comparisons were made correctly [30].

Computer-based training for portion size education is documented in studies by Daggett & Rigdon [31] and Riley, et al. [32]. Both computer based trainings were well accepted by the participants, but differed in results. Daggett & Rigdon [31] designed their study to teach participants the difference between portion size and serving size using photographs, infographics, and text-based information from *USDA's Food Guide Pyramid*. Their results on a posttest documented the participants had a mean score of 95% correct answers. This study used computers, but in a text-based style. Riley, et al. [32] used computer based portion size estimation learning with actual consumption of food in a buffet setting. The interactive Computer Food Portion Tutorial (CFPT) was designed by Riley, et al. to train and allow feedback. The training module provided a drop down menu for 23 different food types and 109 images that were displayed in a 3 x 2 picture matrix with portion sizes displayed below each picture. The food types were displayed on a 9-inch plate with a fork and knife for reference [32]. The participants could drag and drop reference objects, rotate the food object for depth clarity, and increase the size of the image [32]. CFPT training was applied to one group prior to consumption of food and to the second group post-consumption of food, and each group engaged in portion estimation through the feedback module. Riley, et al. found both groups overestimated the actual portion sizes of foods in the computer-based training [32]. Even though

this method was also well-accepted by the participants, the manner in which the pictures of the individual foods were presented could have had a negative impact on portion size estimation.

The study conducted by Silk, et al. [33] sought to evaluate the effectiveness of three different forms of nutrition education communication. The three modalities were a computer game, a website, and a pamphlet all containing the same nutrition information retrieved from *USDA MyPyramid* food guidance system. The authors hypothesized that:

(1) participants will report greater liking of the interactive game; (2) participants will have higher nutrition literacy scores with media used for information purposes (pamphlet, Web site) than from media for which learning is not a primary use (game); and (3) participants in the media used for information purposes (pamphlet, Web site) will retain more nutrition knowledge from Time 1 (post-intervention questionnaire) to Time 2 (questionnaire given less than two weeks after intervention) than from media for which learning is not a primary use (video game) [p. 5].

This study provided great insight into which type of modality would provide greater value when communicating nutrition information. The results provided by Silk, et al. [33] concluded that participants had greater liking for the website, not the interactive game. The participants also had higher literacy scores after using the pamphlet and website than they did after using the interactive game. This is extremely valuable information for food manufacturers. Text-based and website nutritional communication is a relatively inexpensive way to expand consumer literacy of proper portion size.

Given the increase in portion size and lack of literacy for nutrition, the FDA has listened to consumer advocate groups, assessed research data, and reviewed current nutrition labeling

information in order to compile a Proposed Rule that will affect serving size information and the design of the Nutrition Facts panel in order to help address the nation's obesity issues [3,4,35].

Voluntary inclusion of “front of package” (FOP) labeling has produced results indicating that this type of consumer intervention is very helpful in dietary decision making [34,35,36,37]. Many different versions of “front of package” nutrition labeling are found in the marketplace. Until a regulated agreement can be defined, the multiple FOP labeling efforts contribute to consumer confusion that affects the decision of whether they should consume a particular food product or not. Current “front of package” labeling across countries worldwide do not contain serving size information. This is an opportunity for food manufacturers to explore the communication of portion size through “front of package” design. Text-based information in verbal form or through infographic-type icons could be very helpful in communicating proper portion size to the consumer.

The food industry continues to explore the effects of mobile marketing and social media in product communication. Smartphones, iPads, and laptop computers provide consumers with a plethora of information [46]. The use of Quick Response (QR) codes, in marketing strategies, has gained popularity over the years. For example, McDonald's utilizes QR codes on packaging to further educate its consumers about nutrition aspects of their products [52]. Studies have shown that consumers use QR codes to access social media networks, games, entertainment areas, education websites, and videos [47,48,50]. Consumers also use QR codes to become more familiar with potential purchases of sustainable products [51]. According to Okazaki and Atkinson [49,51], these are the potential consumers who may not trust corporations or manufacturers in their truthfulness. The QR code usage for the food industry could be used to heighten awareness to portion size. Links to infographics, text-based information, website

material, and even videos could potentially touch consumers that currently do not have access to educational material pertaining to nutrition.

Once an intervention tool has been identified, the idea must be accepted by the consumer. According to Everett M. Rogers' Theory of Diffusion of Innovations (DI), an innovation is an idea that is perceived as new by an individual and the process by which an individual decides to adopt a new innovation is based on adopter characteristics [5]. Rogers' adopter characteristics are categorized by the length of time it takes for the individual to gain knowledge of the innovation, form an attitude towards it, and then make a decision to accept or reject the new idea [5]. Understanding these characteristics and correlating them to the four consumer segments will help determine whether the prototype packages increase potential purchase of this type of single serve product. The categorized characteristics can be found in Table 1.

Table 1. Rogers' DI Categories With Characteristics

Category	Characteristics
Innovators	Venturesome, isn't afraid of risk/failure.
Early Adopters	Respected by his or her peers, and is the embodiment of successful, discrete use of new ideas. Decreases uncertainty by adopting idea, then communicates it.
Early Majority	Deliberate, they follow with deliberate willingness in adopting innovations, but seldom lead.
Late Majority	Skeptical, adoption may be both an economic necessity and the result of increasing peer pressures. Uncertainty needs to be removed before they feel it is safe to adopt.
Laggards	Traditional, decisions are often made in terms of what has been done previously.

## Summary of Literature

This literature review of nutritional communications and package designs show promising results that are insightful in advancing consumers' nutrition literacy and providing beneficial information that can effect dietary choices. The Federal Government has proposed changes to the Nutrition Facts panel that is currently in comment status [3,4]. When this rule is published in Final Rule status, industry will begin implementing changes that will communicate more clearly the labeled serving size information for food products.

Review of previous research indicates that currently there are specific areas concern in communicating portion size. Those areas are consumer understanding of portion size of food products as packaged or as served, what the packaged food communicates through package design, and what portion size communication tools work well in nutritional education communication. Rolls, et al.; Kral, et al.; and Wansink, et al. all found in their studies that the larger the portion size of a particular food product the greater the amount of food was consumed by the participants [17,18,19]. The self-regulating cue for halting consumption documented in these studies supports the thought that consumers rely on visual cues, not necessarily fullness. Schwartz and Byrd-Bredbenner's replication study also confirmed that consumers still do not understand the serving size statements for food even twenty years after the implementation of the Nutrition Labeling Education Act [20].

Package design can be very confusing to consumers. Research indicates that value packages create over-consumption of food based on packaged volume, but smaller packages create similar over-consumption issues due to the fact that consumers consume more than one small package thinking it isn't as bad as consuming a larger package [15,25,26,27,28]. Health claims that include words like "reduced", "lower", "X% fat free" may follow regulated



requirements, but the food products could still have levels of fat and calories that could be harmful to those concerned with weight management. This type of package messaging is very confusing to consumers.

The Institute of Grocery Distribution; Small, et al.; Daggett & Rigdon; Riley, et al.; Lillegaard, et al.; and Silk et al. all provided results that show any type of nutrition communication is beneficial to increase consumers' nutritional literacy [12,15,22,30,31,32,33]. The modality that increased portion size literacy the most was text-based in the form of pamphlets, pictures, or website. [12,15,22,30,33]. This information correlates with how consumers embrace Front of Package (FOP) labeling and the helpfulness it provides for making healthier dietary decisions [34,35,36,37]. Besides text-based, front of package informative information, QR codes that are linked to education information have been shown to add value for consumers [47,48,50].

Identifying behaviors and characteristics that affect consumers' decisions to adopt a new innovation is significant to determining the specific intervention that communicates portion size and will be very helpful and useful for consumers to manage their weight, maintain physical endurance goals, and address obesity issues.

## CHAPTER 3

### METHODOLOGY

#### Design of the Study

This study employed focus group methodology. According to McMillan and Schumacher [55], there are nine key characteristics of qualitative research that are present in most studies. Of the nine, three were very important in this research. The first characteristic is “Direct Data Collection,” which involves the researcher as the interviewer or observer and the information is collected directly from the source or participant [55]. Secondly, “Rich Narrative Descriptions” characteristic provides detailed narratives of behavior, and thirdly “Participant Perspectives” characteristic will provide data from the participants’ perspective and not the researcher [55].

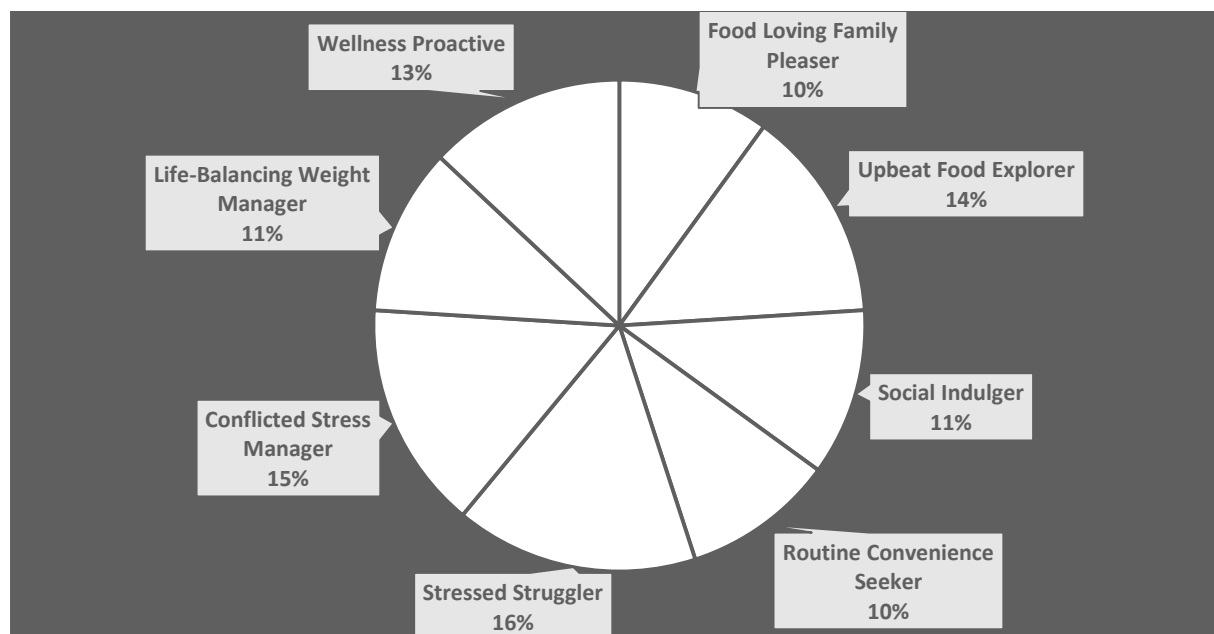
Focus group methodology was also chosen by the researcher to investigate portion size confusion in an intimate setting in order to extract meaningful information. According to Onwuegbuzie, et al., focus groups are beneficial in the following ways: 1) They are fast, efficient, and economical; 2) The environment is social; 3) They are safe and tend to be cohesive towards the participants; 4) the interaction between participants can define problems and provide solutions [53]. According to Morgan, focus groups can provide insight into complex behaviors and motivations, participants’ experiences, and their beliefs [56]. This focus group study sought to describe and explain the participants’ behaviors based on the Tyson Foods, Inc. proprietary consumer segmentation characteristics and also Rogers’ DI adopter characteristics.

Understanding how participants currently determine portion size of chicken products and the communication effect of the three prototype packages in a focus group setting allowed valuable gathering of data that may influence the design of retail packaging for Tyson in the

future. According to Morgan, focus groups are advantageous when investigating behaviors and motivation due to the curiosity of participants in understanding how others handle the same issues [56].

### **Subjects and Subject Selection**

According to Blackston, Nabel, and Blattberg, attitude should be included with behavior to define consumer-brand relationships [57]. Tyson Foods utilizes a proprietary consumer segmentation, which clusters consumers into eight distinct groups based on their overall attitudes toward life and food, as identified in a large-scale, in-house, quantitative study. A representative sample of U.S. consumers, aged 13-75, took a twenty-five minute online survey that asked a variety of questions in regards to attitude toward life and food. A multivariate cluster analysis was used to determine common characteristics of participants. Eight segments were identified, named, and assigned a general population percentage. These attitudes are then married with consumption behavior, and overlaid with demographics, to successfully direct relevant marketing communication to the right consumer. This method is also an imperative to innovation at Tyson Foods; concepts, and corresponding products are developed with deep consumer attitudinal understanding and corresponding unmet needs in mind. The eight consumer segments with percentages can be seen in Figure 1. (R. Schwartz, personal communication, October 26, 2015).



*Figure 1.* Eight consumer segments with general population percentages.

Tyson further developed a proprietary survey that is used internally to recruit participants for this type of research. The survey consists of 24 proprietary questions that are rated by the participant on a 5-point Likert scale (strongly agree  $\leftarrow$ - $\rightarrow$  strongly disagree), then scored by means of a Top Two Box Agreement. This electronic survey was sent via Survey Monkey to approximately 350 Tyson employees. Scores were compiled and participants were categorized, via a Tyson Foods, Inc. proprietary algorithm, into the defined 8 consumer segments. Attitudinal characteristics, and demographic skews are found in Table 2.

Table 2. Tyson Foods, Inc. Proprietary Consumer Segmentation

Consumer Segment	Life/Food Attitude	Characteristics	Demographic Skew
Food Loving Family Pleaser	Food Aficionados	Basic home-cooked food and eat with their families.	Gen-Xers with Families Social Activity per Week: 39% Exercise For Fitness per Week: 20%
Upbeat Food Explorer	Food Aficionados	"Foodies" are adventurous in life, cooking, and eating.	Millennial, Men Social Activity per Week: 64% Exercise For Fitness per Week: 54%
Social Indulger	Carefree	Eating is important but they have others prepare food for them.	Teen/Millennial, Single, Male Social Activity per Week: 55% Exercise For Fitness per Week: 30%
Routine Convenience Seeker	Carefree	Food is fuel that supports their OTG lifestyle. Takeout & quick-cooking foods are the basis of their meals & snacks.	Single, Male Social Activity per Week: 46% Exercise For Fitness per Week: 36%
Stressed Struggler	Struggling	Life is stressful and they lack the energy to tackle life's challenges.	Female, Married, Gen-Xers Social Activity per Week: 46% Exercise For Fitness per Week: 20%
Conflicted Stressed Manager	Struggling	Struggling to maintain a healthy weight and try to eat better, but don't always succeed.	Female, Married, Baby Boomers Social Activity per Week: 57% Exercise For Fitness per Week: 35%
Life-Balancing Weight Manager	Disciplined	Mindful of health and nutrition, but struggle with weight issues and guilt about eating.	Boomer & Boomer+ Social Activity per Week: 55% Exercise For Fitness per Week: 59%
Wellness Proactive	Disciplined	Are food lovers but are proactive and disciplined in managing their food and nutrition choices	Married, Slightly Older Social Activity per Week: 61% Exercise For Fitness per Week: 66%

The researcher used purposeful sampling in order to select participants that have an interest in health and nutrition based on Tyson's consumer segmentation. Purposeful sampling assures the receipt of needed information, but is less representative of an identified population [55]. Four of the eight consumer segments were selected by the researcher based on the attitudinal and behavioral characteristics of the Life-Balancing Weight Manager, Wellness Proactive, Stressed Struggler and Conflicted Stressed Manager segments that focus on healthy dietary choices or struggles. These four segments are concerned with healthy dietary choices, and exercise and may understand or see a benefit from pre-portioned chicken packaged to emphasize portion control. The researcher and senior sensory scientist reviewed the survey responders to identify the four segments of concentration. Two optional meeting planners were sent to all potential participants, and actual participants were determined by meeting planner acceptance timing sequence.

### **Demographics**

The participants' demographics, as defined by Tyson's proprietary consumer segmentation, are provided in Table 3. In total, 30 participants participated in the focus group discussions. The researcher elected to have greater than fifty percent of the participants from the health conscious segments and the remainder of the participants behaviorally struggle with their dietary habits. Gender was not critical to the study. The focus groups' composition yielded 18 female and 12 male participants with the consumer segmentation of 10% Stressed Strugglers, 27% Conflicted Stress Managers, 30% Life-Balancing Weight Managers, and 33% Wellness Proactives.

Table 3. Participant Demographics

	Participant #	Gender	Consumer Segment
Group 1	1	M	Conflicted Stressed Manager
	2	M	Conflicted Stressed Manager
	3	F	Life-Balancing Weight Manager
	4	F	Life-Balancing Weight Manager
	5	F	Conflicted Stressed Manager
	6	F	Wellness Proactive
	7	F	Wellness Proactive
	8	M	Wellness Proactive
	9	F	Wellness Proactive
	10	M	Life-Balancing Weight Manager
	11	F	Life-Balancing Weight Manager
	12	F	Conflicted Stressed Manager
	13	M	Conflicted Stressed Manager
	14	F	Conflicted Stressed Manager
	15	F	Wellness Proactive
	16	M	Life-Balancing Weight Manager
Group 2	1	F	Wellness Proactive
	2	F	Life-Balancing Weight Manager
	3	M	Wellness Proactive
	4	F	Life-Balancing Weight Manager
	5	M	Wellness Proactive
	6	F	Wellness Proactive
	7	F	Wellness Proactive
	8	F	Life-Balancing Weight Manager
	9	F	Life-Balancing Weight Manager
	10	F	Stressed Struggler
	11	F	Stressed Struggler
	12	F	Conflicted Stressed Manager
	13	M	Conflicted Stressed Manager
	14	F	Stressed Struggler

### Characteristics and Categories of Focus Groups

Once the focus group participants were identified based on the consumer segmentation, the researcher aligned Roger's DI adopter characteristics to these segments. Aligning the proprietary consumer segments with Rogers' DI Knowledge characteristic categories will be

helpful in understanding the emerging themes and participant responses [5]. Tyson proprietary segmentation is attitudinal integration and categorizes individuals based on their similar needs and contemplative patterns (R. Schwartz, personal communication, October 26, 2015). Rogers DI categories group individuals based on their innovativeness or similar degree of behavioral change [5]. Utilizing the two frameworks, in order to select a packaging innovation that is helpful in communicating portion size and understanding the rate of adoption for specific consumers, will help determine how well the prototype packaging communicates portion size. Correlating the two frameworks' characteristics may provide insight into the deliberate management of dietary habits versus the angst of trying to maintain a healthy diet. The four consumer segmented groups used in this study are either struggling with their eating habits (Stressed Strugglers and Conflicted Stressed Managers) or are very disciplined with eating (Life-Balancing Weight Manager and Wellness Proactive). Some of the consumer segmented characteristics for the disciplined groups are comparable to Rogers' DI adopter characteristics for the early adopter categories [5]. These groups tend to have a slightly higher socioeconomic status, higher level of education, a greater degree of social mobility, and a less fatalism and greater self-efficacy. But according to Rogers, the early adopters are the groups who normally need the innovation the least (page 205).

The researcher correlated the consumer segmentation characteristics with Rogers' DI adopter characteristics by evaluating attitude, behavior, and demographic traits in the following manner [5].

- Wellness Proactives and Innovators have the highest level of income, are formally educated, are adventurous in their adoption of innovative ideas, have connections with change agents (scientists, health professionals, etc.), are opinion leaders,



have a favorable attitude toward change, view themselves as successful, and are often in prestigious occupations. Healthy eating and exercise are a disciplined part of their daily habits.

- Life-Balancing Weight Manager and Early Adopters have a higher level of income, but not as high as the Wellness Proactives/Innovators. They are formally educated, structured in their adoption of innovative ideas, highly social and connected to others, believe they control their destiny, and need to be seen as current and fashionable. They strive to exercise and eat healthy, but feel guilty if they don't and may not be satisfied with their view of themselves.
- Conflicted Stress Managers and Early/Late Majority have slightly lower income levels, may not be formally educated, are not actively progressing in their careers, are not as connected to others in social networks, do not embrace change well, deal with uncertainty by watching others first, do not view themselves as healthy, nor is diet and exercise part of their daily structure.
- Stressed Struggler and Laggards have a lower income level, are not formally educated, lack the energy to maintain social connections, deal with uncertainty by consuming the same food and beverages weekly, use food as an emotional crutch, and do not include healthy eating or exercise in their daily activities.

This alignment of proprietary consumer segmented characteristics with Rogers' DI characteristics can be found in Table 4 [5].

Table 4. Consumer Segmentation Aligned With Rogers' DI Categories

Consumer Segment	Characteristics	Demographic Skew	Category	Characteristics
Wellness Proactive	Are food lovers and adventurous, but are proactive and disciplined in managing their food and nutrition choices	Married, Slightly Older Social Activity per Week: 61% Exercise For Fitness per Week: 66%	Innovators	Venturesome, isn't afraid of risk/failure.
Life-Balancing Weight Manager	Mindful of health and nutrition, but struggle with weight issues and guilt about eating.	Boomer & Boomer+ Social Activity per Week: 55% Exercise For Fitness per Week: 59%	Early Adopters	Respected by his or her peers, and is the embodiment of successful, discrete use of new ideas. Decreases uncertainty by adopting idea, then communicates it.
Conflicted Stressed Manager	Struggling to maintain a healthy weight and try to eat better, but don't always succeed.	Female, Married, Baby Boomers Social Activity per Week: 57% Exercise For Fitness per Week: 35%	Early Majority  Late Majority	Deliberate, they follow with deliberate willingness in adopting innovations, but seldom lead.  Skeptical, adoption may be both an economic necessity and the result of increasing peer pressures. Uncertainty needs to be removed before they feel it is safe to adopt.
Stressed Struggler	Life is stressful and they lack the energy to tackle life's challenges.	Female, Married, Gen-Xers Social Activity per Week: 46% Exercise For Fitness per Week: 20%	Laggards	Traditional, decisions are often made in terms of what has been done previously.

Prior to contacting the participants or conducting the focus group discussions, the Institutional Review Board at the University of Arkansas approved this study (Approval #15-02-537 found in Appendix A). All participants were sent an invitation by email to participate in the focus group sessions. The email was sent by a senior sensory scientist, who acted as the focus group moderator, and all participants' names and email addresses were secured in a secured file only accessed by the senior sensory scientist and researcher. A meeting planner was sent by email for the assigned focus group session and participants were told they would be reviewing prototype package designs that communicate portion size. Participants were required to complete an informed consent form prior to participating in the focus group sessions (Appendix B).

### **Prototype Packaging Design**

Three prototype package designs were sketched, graphically designed, and 3-dimensionally constructed with input from the researcher and the Director of Packaging Innovation & Development (PID) at Tyson Foods, Inc. The researcher and Director of PID brainstormed brand names and creatively came up with "Right Fit". The Tyson Foods, Inc. legal department completed a trademark search for the brand name used for package design and authorized the use of the brand. The researcher selected three prototype packages to be used during the focus group sessions. These three designs were selected for the simplicity of the portion size communication and innovative design. These package designs can be seen in Figure 1.



Figure 1. Prototype package designs. From left to right: Prototype Package #1, Prototype Package #2, and Prototype Package #3.

### Instrumentation and Data Collection

The focus group sessions were conducted in a sound-proof room with a two-way mirror dividing the focus group room and an observation room. The sessions were audio and video recorded. The Tyson Foods senior sensory scientist moderated the focus group sessions. The senior sensory scientist is a professional moderator and has the identifiable experience referenced by Krueger in conducting comfortable, focused sessions that yield valuable data [58]. The introductory conversation included Krueger's recommended pattern for establishing positive intent that included a welcome to the group, an overview of the focus group topic, ground rules for an active discussion, and an opening question [58].

The focus group moderator followed a semi-structured questioning route developed by the researcher and approved by a panel of academic and industry experts. According to Krueger, this type of discussion guide helps sequence and bring the questions into focus [59]. The moderator guide was developed to elicit discussion related directly to the objectives of the study and was piloted with a group of subject matter experts that consisted of Food Scientists, Registered Dietitians, and non-scientific volunteers employed by Tyson Foods, Inc. An additional Registered Dietitian, not included in the pilot study, corroborated the nutritional

knowledge findings from the focus group sessions. The pilot study and corroboration efforts enhanced the reliability and validity of the focus group sessions. The experts identified any ambiguity from the moderator questions and confirmed that the responses addressed the research questions. As a result of the pilot study, minor changes were made to packaging and the moderator guide to promote a more in-depth retrieval of information.

The two focus group sessions had 14-16 participants each and the duration of each session was 45-60 minutes. The focus group discussion started with an introduction and an ice breaker question of “How long have you been a Tyson team member?” The sessions had three areas of interest. The first 15 minutes were structured to investigate the participants’ current method of determining portion sizing of chicken products. The second 20 to 25-minute segment was spent comparing and contrasting prototype package #1, #2, and #3. The participants were asked specific questions regarding the three package designs. The third 10-minute segment was spent rating the packages with likability and effectiveness of communicating portion size. Participants were given stickers with “smiling faces”, “neutral faces”, and “frowning faces” and were asked to place a sticker by each of the three prototype packages. The last five minutes were spent with a wrap up conversation that spoke to the importance of portion size communication and participants were encouraged to provide suggestions that would be helpful to include or remove from the prototype packages. The moderator also summarized the group’s responses to ensure the participants were comfortable with the results of the discussion, an activity that acted as a member check to improve qualitative credibility [56]. The researcher observed from the observation room and took additional notes while also annotating non-verbal communications of the participants. The focus group questioning route used during all three segments is provided in Appendix C.

## **Data Analysis**

Recordings from each focus group session were secured on external drives and also downloaded onto a computer for ongoing review. The audio/video recordings, researchers' observation notes, and participants' annotations on the contrast-compare board were transcribed verbatim into a Microsoft Word document. The documents were imported into Nvivo 9 qualitative data analysis software for investigation by constant comparison analysis technique, as developed by Glaser and Strauss [53,54]. The three major characteristics of this analysis technique were used to first segregate the data into small units in order to attach codes (descriptors), next the coded data was grouped into categories, then lastly the researcher developed multiple themes for each focus group session for an overarching comparison [53]. Constant comparison analysis was effective in comparing the homogeneous and heterogeneous consumer segmentation of the participants for emerging themes and data saturation.

## CHAPTER 4

### RESULTS/FINDINGS

This chapter presents the findings from focus group sessions held during the study. The findings relate to both research objectives:

RO1: Describe consumers' current methods of determining portion sizing of chicken products.

RO2: Examine consumers' perceptions of how effectively three package designs communicate portion size.

The findings are presented in order of research objective. Emergent themes are identified, and excerpts from the focus group sessions are incorporated for transparency of the findings.

#### **RO1: Describe consumers' current methods of determining portion sizing of chicken products.**

The approach to describing consumers' methods of determining portion size involved retrieving information about the participants' nutritional literacy relevant to portion size. The groups were shown a club store package of Tyson Grilled and Ready Chicken Breast Strips. The weight of the package was 44 ounces and the servings per container reflected in the Nutrition Facts panel stated "about 14," and this is based on the governmental Reference Amount Customarily Consumed (RACC) of 3 ounces. The groups were asked how they determined what a serving size or proper portion of the chicken strips would be. The moderator then provided actual product from the bag for added visual help. The internal chicken strip product consisted

of varying sizes of fully cooked, frozen chicken breast strips that ranged in size from 1.5 inches – 3 inches in length and approximately 0.5 inches in width.

Portion size was not customarily considered by the participants. Most measured portions by habit or experience and weren't concerned about consuming the exact serving size of this chicken product. The Stressed Strugglers and Conflicted Stress Managers did not consider the amount of food they consumed as important. They generally ate until they were full.

*We just dump it out on a pan! All the kids are eating dinner tonight and we just put it on a pan.*

Even though the Wellness Proactives are disciplined in their dietary consumption, a few were not concerned with portion size of this product and typically “eye-balled” the amount on their plate. There were statements about preparation of more in a serving for adults and less for children, although a few participants commented on preparing double or triple servings for teenage male children. One Wellness Proactive commented about recommended serving size of three ounces in general.

*We're not going to eat [just] three ounces. I don't think the majority of people in this room realize how small three ounces is. I would say probably 90% of Americans are eating WAY more than three ounces!*

The Life-Balancing Weight Managers were the most vocal about measuring techniques and adherence to proper portion size consumption. This concern corresponds to the LBWM's consumer segmentation characteristic of “Mindful of health and nutrition, but struggle with weight issues and guilt about eating” and would be expressed in the disciplined act of measuring. Some Life-Balancing Weight Managers measured, weighed, or used visual cues.



*I would use my fist as a guide or use a measuring cup. That's usually what I do unless it says specifically four strips or three strips.*

The participants were asked to raise their hands to show how important the proper portion or serving size was to them. The three choices were Important, Somewhat Important, and Not Important. The results can be seen in Table 5:

Table 5. Serving Size Importance

Participant #	Importance	Gender	Consumer Segment	Acronym
<b>Group 1</b>				
1	Not Important	M	Conflicted Stressed Manager	CSM
2	Not Important	M	Conflicted Stressed Manager	CSM
3	Important	F	Life-Balancing Weight Manager	LBWM
4	Important	F	Life-Balancing Weight Manager	LBWM
5	Somewhat Important	F	Conflicted Stressed Manager	CSM
6	Somewhat Important	F	Wellness Proactive	WP
7	Somewhat Important	F	Wellness Proactive	WP
8	Somewhat Important	M	Wellness Proactive	WP
9	Somewhat Important	F	Wellness Proactive	WP
10	Important	M	Life-Balancing Weight Manager	LBWM
11	Somewhat Important	F	Life-Balancing Weight Manager	LBWM
12	Not Important	F	Conflicted Stressed Manager	CSM
13	Not Important	M	Conflicted Stressed Manager	CSM
14	Somewhat Important	F	Conflicted Stressed Manager	CSM
15	Somewhat Important	F	Wellness Proactive	WP
16*	Didn't raise hand	M	Life-Balancing Weight Manager	LBWM
<b>Group 2</b>				
1	Somewhat Important	F	Wellness Proactive	WP
2	Somewhat Important	F	Life-Balancing Weight Manager	LBWM
3	Not Important	M	Wellness Proactive	WP
4	Not Important	F	Life-Balancing Weight Manager	LBWM
5	Somewhat Important	M	Wellness Proactive	WP
6	Somewhat Important	F	Wellness Proactive	WP
7	Somewhat Important	F	Wellness Proactive	WP
8	Somewhat Important	F	Life-Balancing Weight Manager	LBWM
9	Somewhat Important	F	Life-Balancing Weight Manager	LBWM
10	Not Important	F	Stressed Struggler	SS
11	Somewhat Important	F	Stressed Struggler	SS

Table 5. Serving Size Importance (Cont.)

Participant #	Importance	Gender	Consumer Segment	Acronym
12	Somewhat Important	F	Conflicted Stressed Manager	CSM
13	Somewhat Important	M	Conflicted Stressed Manager	CSM
14	Somewhat Important	F	Stressed Struggler	SS

\*Participant 16 came into the focus group session late and missed the opportunity to comment on the importance of serving size.

Consumption of recommended portion size was considered important by only three participants in the Life-Balancing Weight Manager consumer segment. There were seven participants that did not consider consumption of recommended portion size important at all. Of these seven, one was a Wellness Proactive, one was a Life-Balancing Weight Manager, four were Conflicted Stressed Managers, and one was a Stressed Struggler.

The majority of participants felt consumption of recommended portion size was somewhat important with 19 in total or sixty-five percent of the focus groups' participants. The group consisted of nine Wellness Proactives, four Life-Balancing Weight Managers, four Conflicted Stressed Managers, and two Stressed Strugglers. With the majority of the participants viewing portion size as somewhat important, the researcher believes that probing into package design interventions and various communication tools may broaden the understanding of relevance for proper portion size literacy of many different consumers.

**RO2: Examine consumers' perceptions of how effectively three package designs communicate portion size.**

The three prototype packages were designed as single serve packages, therefore measuring by the consumer wouldn't be necessary. The USDA recommended serving size for this type of product was denoted in the net weight of the package, as well as, called out in a burst

on the front panel. The brand name “Right Fit”, a runner, weight icon, protein call out of 16 grams, and green background color were used on all three packages in the same type of design layout. The difference in the three packages is the shape. Prototype #1 was designed as 6 single serve packages with perforated area for separation. Prototype #2 was a single serve unit shaped like the end of an arrow. Prototype #3 was shaped like a runner in flight instead of utilizing the runner icon. The designs and icons were strategically used to understand if package manipulation by design or by the utilization of “health halo” type call outs would affect the nutritional knowledge of the participants in any way.

The groups were shown all three prototype packages in random order and asked the same questions upon viewing. Audio transcription of the sessions along with transcription of the white boards were used to analyze for themes. The following were identified as the most important themes due to the frequency of discussion (Table 6). The themes are presented in order of most frequent to least frequent. Exemplary excerpts of each theme are presented to demonstrate the groups’ perceptions.

Table 6. Recurring/Common Themes

Theme	Prototype Package #1		Prototype Package #2		Prototype Package #3	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Communicates Portion Size	X	X	X	X	X	X
Communicates Snacking Versus Meal	X	X	X	X		
Communicates Health/Healthy	X			X	X	
Communicates Convenience	X		X	X		
Communicates Expensive			X		X	X

### **Package Communicates Portion Size**

There was some confusion about whether 3 ounces is the correct serving size for this type of product. Once the participants were clear on the appropriateness of the packaged portion, most participants in both groups felt all three prototype packages communicated portion size, but some participants commented that they would consume more than one serving at a sitting. Importance of knowing proper portion size was reflected in the comments of the participants seen in Table 7.

Table 7. Packaging Communicates Portion Size Comments

Group	Participant	Comment
1	#6 (WP)	<i>I personally think that [package design] is huge because it shows how we have misconstrued portion size.</i>
1	#9 (WP)	<i>I think we all struggle with what the true portion size is.</i>
1	#4 (LBWM)	<i>I feel like all three of them [prototype packages] have portion control in mind. [The packaging] Makes it where you don't have to measure or weigh or whatever and that's nice.</i>
1	#13 (CSM)	<i>Anyone really trying to control their calories would know what a three ounce serving is. I don't know, several of you probably aren't aware, but that [3 ounce serving size] is what the government is recommending we eat. That's not the size I would like to eat, but that's all we need to maintain our bodyweight.</i>
1	#2 (CSM)	<i>When you look at that package [Prototype #2], that package [Prototype #1], and that package [Prototype #3] the serving sizes all read three ounces, even the big bag says three ounces. These [packages] are just proportioned, but it's all the portion we are supposed to eat.</i>
1	#1 (CSM)	<i>But these packages don't communicate portion control to me. They communicate snack-type products that are quick and easy.</i>
2	#1 (WP)	<i>So for me, if I need a quick protein snack before I go to the gym or afterwards of whatever, this would be a perfect meal for me. I know the exact portion of protein for me is in this packet.</i>
2	#7 (WP)	<i>It would be kind of disappointing if you saw what three ounces was in there [the package] and it was like that's not enough to buy and that could be enough to steer you away [from purchasing] or I would have to have two of those [packages].</i>
2	#2 (LBWM)	<i>It's [portion size] not misleading in these packages.</i>
2	#12 (CSM)	<i>Are they microwaveable?</i>
2	#14 (SS)	<i>These [prototypes] would be great for recipes when it calls for a certain amount of chicken.</i>

The Wellness Proactives and Life-Balancing Weight Managers had concerns regarding consuming the correct amount of the product and discussed their belief that not many consumers understand what a three ounce serving is. The Conflicted Stress Managers were knowledgeable about proper portion size. The Stressed Strugglers were interested in the convenience of the portioned products, which is aligned with their consumer segmented characteristics. All groups did discuss the positive aspects of the single serve packaging and the benefits.

### **Package Communicates Snacking Versus Meal**

Both groups felt the smaller packages indicated Prototype #1 and #2 were snack size packages. Some felt the single serve package design wouldn't be functional for use in preparing a meal. Both of these prototypes were positively viewed as kid-friendly lunch items or salad additions, based on the package design and 3 ounce serving size. Prototype #3 was not acceptable to either group for snacking or meal preparation. As both focus groups viewed Prototype #1 and #2, the discussion brought insight to why the participants thought the packages were snacks versus meals. Both packages were designed to hold the same amount of product, Prototype #2's design seemed to communicate more than just a snack portion. These comments are found in Table 8.

Table 8. Packaging Communicates Snacking vs. Meal Comments

Group	Participant	Comment
1	#8 (WP)	<i>To me the packages are more individualized, just for one person! But if you are making this product for the whole family, then you would use regular product [bulk bag].</i>
1	#3 (LBWM)	<i>Three ounces looks a little small and that is where the snack perception is coming from. Six ounces would be more acceptable at dinner.</i>
1	#14 (CSM)	<i>I know they are both three ounces, but I would perceive this [Prototype #2] as a more full meal rather than the smaller snack size.</i>
2	#1 (WP)	<i>Great snack for on the go, hustling from school to practice, or whatever.</i>
2	#8 (LBWM)	<i>I see it [Prototype #2] as my meal on a plate with some grapes or whatever. This is my meal already done.</i>
2	#14 (SS)	<i>It [Prototype #2] would be great for kids' lunches. Perfect size portion for a child.</i>

### Package Communicates Health

All three prototype packages were designed with the same color scheme, brand name of “Right Fit”, a runner, a barbell icon, serving size call out of “3 ounces”, protein claim, and the same Nutrition Facts. Both groups thought the design layout of all three prototypes communicated health or that the product was healthy in some way. The health conscious Wellness Proactives and Life-Balancing Weight Managers did not indicate during the focus group sessions that these single serve packages would be interventions that would be readily adopted by them. The dietary struggling Stressed Strugglers indicated these prototype packages would be healthy snacks for people that might have medical issues that were food related, but did not indicate these package designs would be something they might purchase. These participant comments can be found in Table 9.

Table 9. Packaging Communicates Health Comments

Group	Participant	Comment
1	#8 (WP)	<i>This communicates to me healthy. If I was walking along and saw that, I would think healthy because of the running guy.</i>
1	#2 (CSM)	<i>It speaks to a guy that's working out and needs a quick protein snack after running or whatever.</i>
2	#7 (WP)	<i>The "Right Fit" implies the right size.</i>
2	#8 (LBWM)	<i>The name [Right Fit] means healthy to me.</i>
2	#2 (LBWM)	<i>It's communicating healthier for you. It is green with a runner, weight bar, and protein claim. Indicates healthier for you.</i>
2	#11 (SS)	<i>This is great for health issues. Like if you are diabetic and need protein during the day or if you have had gastric bypass done and you have to eat protein frequently.</i>

### Package is Convenient

Both groups felt that Prototype #1 and #2 were designed in a manner that was very convenient for busy schedules and fast-paced lives. Prototype #3 was not thought of as convenient based on the design shape. All participants felt the two packages would be great for “on the go” eating and easy for children to use as snacks or in a packed lunch for school. There was more interest driven by the convenience of the single serve packages and for most participants, portion size wasn't part of their agenda. Whether the product was microwaveable in the package was an important aspect for the Stressed Strugglers. Participants' comments can be found in Table 10.



Table 10. Packaging Is Expensive Comments

Group	Participant	Comment
1	#9 (WP)	<i>These are sturdy and would work well to throw into kids lunch boxes.</i>
2	#7 (WP)	<i>It's like the big kid version of lunchables that has more protein in it.</i>
1	#2 (CSM)	<i>These would be great for packing lunches for the kids. Just throw it in their lunch box.</i>
1	#13 (CSM)	<i>These would be a lot easier to eat out of than grabbing down into a [big] bag. If you are on the go kind of thing.</i>
2	#10 (SS)	<i>It would be extremely convenient if you could cook in the package. If it was microwaveable.</i>

### Package Communicates Expensive


Participants did not have any issues with Prototype #1 or #2 design or substrate material, but did believe the different shape and material used to design Prototype #3 would increase the cost of the packaging and also the product within the package. This issue promoted conversation concerning adoption, or lack of adoption, for the invention [5]. Most participants would not purchase Prototype #3 based on the design and material used. They indicated that the cost of the packaging would increase the cost of the actual product and the value to them would be diminished based on the implied cost. Participants' comments can be found in Table11.

Table 11. Packaging Is Convenient Comments

Group	Participant	Comment
2	#7 (WP)	<i>I'm going to go against, I think it is over engineered. That's an expensive package. It's a cool shape, but I probably wouldn't buy it.</i>
1	#3 (LBWM)	<i>It looks expensive.</i>
1	#4 (LBWM)	<i>I was going to say it looks like a waste of packaging money and I'd rather the company spent less money on the fancy packaging and give me a less expensive product.</i>
1	#16 (LBWM)	<i>Oh yeah by the feeling of it too. It's very sturdy, but it seems like I'm paying more for the packaging than I am for the actual product inside of it.</i>

At the end of both focus groups, the participants were asked to rate the packages with stickers that had a “smiling face”, “neutral face”, or a “frowning face.” This information will increase the ability to target specific consumers and possibly affect their adoption rate for the intervention [5]. The ratings can be viewed in Table 12.

Table 12. Prototype Package Design Ranking

Group	Prototype Package			
1	#1	9	7	0
1	#2	8	8	0
1	#3	0	0	16
2	#1	10	4	0
2	#2	6	8	0
2	#3	0	3	11

Both groups liked Prototype Package #1, with Prototype Package #2 ranking second. Most participants did not like Prototype #3 based on comments describing the prototypes' ineffective design was not suitable for snacking, meal preparation, or was convenient in any way. The participants did agree the Prototype #3 communicated the product was healthy.

The participants were asked, at the end of each focus group, what modifications or improvements would they like to see made to the prototypes in order to increase portion size communication or the overall acceptability of the packages.

### **Participants' Suggestions**

1. Ensure the packages are microwavable.
2. Ensure the packages have an "easy open" design.
3. Make availability of 6 pack/3 pack/single serve units for purchase.
4. Use different figures on the packages indicating different sports.
5. Make all prototypes semi-rigid material like Prototype #2.
6. Add Front of Package labeling to the packages.
7. Add a nutrition icon for help with portion sizing.
  - Deck of cards
  - Palm of hand
8. Add a 3 ounce scoop inside of the large 44 ounce bag of product for easy measuring and you would not need to individually pack single serve packages.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine whether purposefully designed packaging, which communicated portion size and positive attributes for the product contained inside, would increase consumers' nutritional knowledge and drive consumer purchases of innovative packaged products. The research will be used by Tyson to align the findings with a specific consumer segment or segments that will educate or help the consumer manage portion size consumption. This could mean limiting calories for weight loss purposes or increasing calories for healthy weight increase, purposely for athletic endurance. This chapter will present the conclusions reached from the focus group sessions for each research objective, and express recommendations for further research.

#### **RO1: Describe consumers' current methods of determining portion sizing of chicken products.**

Understanding the methods used for determining portion size of the participants and whether portion size knowledge is important to them will be helpful in determining consumer segments that might benefit from further nutrition knowledge in the form of a package intervention. The Life-Balancing Wellness Managers used disciplined methods of measuring this type of chicken product. Comments were made that weighing, using household measuring devices, or associating media-communicated icons like the palm of one's hand are normal practices of this consumer segment.

When the participants were asked about the importance of consuming the exact portion size, ten percent thought it was important, sixty-six percent thought it was somewhat important,

and twenty-four percent did not think it was of importance to them. Participants all agreed that they looked at the consumption of protein differently than they would look at the consumption of indulgent type foods like potato chips or candy.

In previous research, distortion of portion size has been correlated to characteristics and behaviors. Higher levels of education, socioeconomic status, social mobility, and self-efficacy are characteristics that have been seen to have an effect on nutritional literacy [5,11,14,16,28,37]. This was also evident in this study. The characteristic attributes of the proprietary consumer segmentation aligned with Rogers' adopter characteristics include varying levels of income, formal education, career advancement, and leadership ability. Some of the segmented groups, in this study, were very familiar with the three ounce portion imagery and communicated this information during both focus group sessions. Life-Balancing Weight Managers had a more disciplined manner of portion measurement than the Stressed Strugglers with the Wellness Proactives and Conflicted Stress Strugglers falling in the middle of this spectrum. These findings corroborate previous research regarding portion size confusion and consequence [17,18,19,20].

**RO2: Examine consumers' perceptions of how effectively three package designs communicate portion size.**

The three prototype packages, used for the focus group sessions, utilized single serving design intervention. All three packages were designed with the same color scheme, included the same front of package claim information, and were single serve 3 ounce portioned products. The particular product described for use in this study was fully cooked, Grilled & Ready Chicken Breast Strips that consisted of varying sizes of chicken breast strips ranging in size from 1.5 inches – 3 inches in length and approximately 0.5 inches in width and typically is difficult to

measure. The participants were instructed that the difficulty in portion measuring was removed for the consumer because all three package designs would contain an exact portion size of 3 ounces and would have the same cost at point of purchase.

The emerging themes were presented in an informational flow of importance in the following order: Package Communicates Portion Size, Package Communicates Snacking versus Meal, Package Communicates Health, Package Communicates Convenience, Package Communicates Expensive. The participants expressed all of the packages communicated portion size by the single serve design, they were healthy products based on the protein claim presented on the front of package, and all packages would be a convenient snack, but not necessarily a meal. The material structure of each prototype had different cost implications to the participants. The rigidity of the material seemed to communicate the package would be more expensive to manufacture.

The researcher is interested in evaluating each single serve prototype package design with the consumer segmentation of the participants that will include Rogers' innovation adoption characteristics. This information will be important for Tyson in order to innovatively market products to the correct audience and be instrumental in educating consumers about nutrition.

The Wellness Proactives and Life-Balancing Weight Managers have concerns regarding consuming the correct amount of the product and discuss their belief that not many consumers understand what a three ounce serving truly looks like. The Conflicted Stress Managers were knowledgeable about proper portion size. The Stressed Strugglers were interested in the convenience of the portioned products. All groups did discuss the positive aspects of the single serve packaging and the benefits.

The rating exercise at the end of each focus group scored the prototype packages in order of liking. Prototype #1 had a combined score of 19 “smiling faces”, 11 “neutral faces”, and 0 “frowning faces”. Prototype #2 had a combined score of 14 “smiling faces”, 16 “neutral faces”, and 0 “frowning faces”. Prototype #3 had a combined score of 0 “smiling faces”, 3 “neutral faces”, and 27 “frowning face”.

### ***Prototype Package #1***

The preference of both groups for Prototype #1 appeared to be associated with participants’ observation that this was a larger “value-sized” package. Previous research indicates this is very important that the consumer feels they are being provided a value at the moment of purchase [25,26,27]. This prototype consisted of 6 - three ounce packages that could be torn at the perforation for utilization of one or all six individual packages. Both groups felt this package would be more value-centric based on the packaging structure and amount of product within the package would be similar to a larger bag of product. The positive comments were specific to the participants aligned characteristics.

The Wellness Proactives would utilize this prototype for themselves before or after going to the gym and liked that the single serve design met their nutritional needs while they enjoyed exercising. This consumer segmentation denotes that they would be proficient in understanding nutrition, exercise and is part of their daily activities. They were very knowledgeable in their communication during the focus group sessions about how they personally would utilize this particular package, which aligns with Rogers’ adopter characteristics of engagement with science and they would have formal education that would promote acceptability of the concept.

The Life-Balancing Weight Managers commented on their personal utilization of Prototype #1 by saying they would use it for a quick snack or even a meal. The package would also benefit their children as a healthy alternative for on-the-go snacking before a ballgame or dance class. These comments align with their characteristics of struggling with weight issues and the guilt that accompanies indulgent dietary habits. They were the most vocal of the four consumer segments used in this research, which supports the researchers alignment of Rogers' Early Adopter category. This category's characteristics include a higher level of income, formal education, decrease their uncertainty by adopting new ideas, and are respected by their peers when communicating in their social network.

The Conflicted Stressed Manager also liked Prototype #1, but commented on using the package for their children instead of for themselves. Their combined characteristics show that they continually struggle with their dietary choices and seldom adopt new ideas. The researcher aligned the Conflicted Stressed Manager with two of Rogers' adopter categories. The Early Majority and Late Majority difference is determined at the uncertainty of risk and social interaction level. The Conflicted Stressed Manager segment does not include exercise in their daily activity, but is social and involved with the happiness of their families. This is evident by the comments toward using this prototype for their children's lunch, but not necessarily for themselves.

The Stressed Struggler by consumer segmentation and Rogers' adopter category is in a lower socio-economic status, might not have formal education, continually makes the same dietary purchases, and is slow to embrace change. The comments they made were in regards to utilizing the prototype package for quick recipe additions and they did not have concern for any type of nutritional benefit. They did comment that the package would be beneficial to others that



had health-related issues that involved consuming more protein. They seemed to visualize the nutrition benefit for others, but not for themselves.

### ***Prototype Package #2***

The liking for this prototype was second in preference for the participants. Some participants did say that if Prototype #2 were packaged in a perforated unit similar to Prototype #1 they would be interested in purchasing it due to the stronger substrate material. The single serve purchase option seemed to be of concern, but all participants' comments were similar to comments provided for Prototype #1 and agreed the prototype communicated portion size, that it was healthy, was a convenient snack, and the packaging material was sturdier than Prototype #1 and might withstand rougher handling and storage practices.

The Stressed Struggler's defined characteristics, from the proprietary consumer segmentation and Rogers' DI categories, were observed during focus group session 2. The Stressed Struggler's defined behavior would normally show a tendency to be overwhelmed with every day things and they would tend to stick to things that they have purchased in the past and consistently work to reduce their daily stress. These characteristics were seen with statements that they were not too concerned with exact portion size consumption, but were interested in the packaging's convenience aspect. Microwave ability and a suggested redesign of the package that might also include crackers, cheese, or other condiments were suggested by the Stressed Strugglers.

The participants appreciated the ability of Prototype #2 to bring the consumer added convenience. The participants acknowledged the package servings were acceptable for snacking purposes but were not large enough portions for meals, unless it was for a child's lunch. Portion

sizes of four, five, and six ounces were suggested by the participants for an adult serving. This affirms Schwartz and Byrd-Bredbenner's 2006 replication study results that stated adult participants selected up to 45% more food for themselves at each eating occasion [20].

### ***Prototype Package #3***

The participants agreed the Prototype #3 communicated portion size and it was healthy, but was not conveniently packaged and appeared to be constructed very expensively. The participants could not understand the shape and would not purchase it based on the awkwardness of the package design. A few participants liked the rigid material that was used, but most thought the material would increase the total cost of the product.

One Life-Balancing Wellness Proactive commented that the innovative design might intrigue her children, if the package shape resembled a super hero or other character. This particular comment brings value to the findings for marketing to children. Information to communicate nutritional benefits of products on the front of packages (FOP) has been positively accepted as an educational tool in dietary decision-making [34,35,36,37]. Utilizing photographs or health-type imagery, like the runner figure used on these prototype packages, could educate consumers about the product being purchased.

### **Recommendations for Marketing**

All participants agreed these single serve package designs communicated portion size, communicated health, were convenient for busy lifestyles, and were appropriate snacks. The researcher believes the appropriate consumer segment that these particular package design should be marketed to is the Life-Balancing Weight Manager. They were most concerned with

proper portion size consumption and used some form of measuring to ensure their consumption was correct.

This group, by consumer segment defined characteristics, is disciplined in their dietary habits but do struggle with weight issues typically and have guilt about eating. The Life-Balancing Wellness Managers were engaged in the conversations of both focus groups and stimulated other participants in other consumer segments to participate in the conversations. This ability to stimulate others affirms Rogers' DI adopter characterizations of Early Adopters [5]. Early Adopters have the ability to remove uncertainty for new ideas and this was observed in both focus group sessions. Observing Rogers' DI adopter characteristics and the empowering nature of the early adopters' leadership skills of the Life-Balancing Weight Managers, during the focus group sessions, will be beneficial in the inclusion of these leaders in revising the design of the prototype packages even further and executing an effective marketing plan [5].

Consumers prefer the explanation of portion size to be simple [12,14]. Previous research has documented that photographs, infographics, and text-based information can be a straightforward expression of portion size education [31,32,33]. All three prototype packages included the USDA recommended serving size for this type of product. The serving size was denoted in the Nutrition Facts panel and called out in a burst on the front panel. The brand name "Right Fit", a runner, weight icon, 16 gram protein call out, and green background color were used on all three packages in the same type of design layout. All of these attributes and the design layout were viewed by participants as healthy in some manner. Designing packaging that communicates to the consumer in a strategic and consistent manner, by using FOP labeling, could educate consumers on existing packaging without manipulating the consumer package to a single serve design.

As previously stated, the Institute of Grocery Distribution; Small, et al.; Daggett & Rigdon; Riley, et al.; Lillegaard, et al.; and Silk et al. all provided results that show any type of nutrition communication is beneficial to increase consumers' nutritional literacy [12,15,22,30,31,32,33]. The participants offered suggestions for further package design that included FOP labeling and utilization of infographic type pictures. Participants recognized that a deck of playing cards and the palm of your hand were images that resonated a 3 ounce portion of chicken.

### **Recommendations for Future Research**

All three package designs were submitted to the Labeling and Program Delivery Staff /Division Food Safety and Inspection Service/U.S. Department of Agriculture for governmental labeling approval. The Deputy Director of the Labeling and Program Delivery Staff /Division Food Safety and Inspection Service/U.S. Department of Agriculture agreed to participate in this research and reviewed all three prototype packages and made minor suggestions. His suggestions included slight revisions to the barbell icon placement and requested that the FOP call out of "Serving Size 3 OZ." be revised to read "Serving Size 1 Package". This governmental review was crucial in the affirmation that all of the package design communication followed governmental regulations and would not be considered misleading to consumers. These revisions would be needed and further researched for acceptability by the consumer.

Further package design research, for portion size communication, should be conducted outside of Tyson Foods, Inc. Even though the participants were engaging and were asked to emulate a typical consumer during the focus group session, the participants are still loyal to Tyson products and could be biased in their opinions. Broadening the consumer segmentation to all eight proprietary consumer segments would bring further clarity and help define the consumer

that would utilize a single serve, premeasured portion sized product for increased dietary awareness. The inclusion of other consumer segmentation may result in other suggestions that could be incorporated into existing product lines. Front of Packaging labeling, infographic type communications, and innovative measuring devices could enhance consumers' experiences while increasing their nutritional knowledge. Educating consumers about proper portion size consumption is instrumental in promoting healthy dietary habits and addressing the obesity issues that are prevalent. The food industry has the ability to educate via food packages and can help influence change.

## REFERENCES

1. Dietary Reference Intakes: Guiding Principles for Nutrition Labeling and Fortification (2003). National Academy of Sciences. Institute of Medicine. Food and Nutrition Board. Available at <http://fnic.nal.usda.gov/dietary-guidance/dri-reports/guiding-principles-nutrition-labeling-and-fortification>. Accessed January 2015.
2. Aim for a Healthy Weight, Keep an Eye on Portion Size. U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute. NIH Publication No. 10-7414 (November 2009).
3. Department of Health and Human Services, Food and Drug Administration. Food Labeling: Revision of the Nutrition and Supplement Fact Labels; Proposed Rule (21 CFR Part 101 [Docket No. FDA-2012-N-1210], RIN0910-AF22).
4. Department of Health and Human Services, Food and Drug Administration. Food Labeling: Serving Sizes of Foods That Can Reasonably Be Consumed at One-Eating Occasion; Dual-Column Labeling; Updating, Modifying, and Establishing Certain Reference Amounts Customarily Consumed; Serving Size for Breath Mints; and Technical Amendments; Proposed Rule (21 CFR Part 101 [Docket No. FDA-2004-N-0258/Formerly Docket No. 2004N-0456], RIN 0910-AF23).
5. Rogers E. Diffusion of Innovations. 5<sup>th</sup> ed. New York, New York: Free Press; 2003.
6. Freeland-Graves J, Nitzke S. Position of the Academy of Nutrition and Dietetics: Total diet approach to communicating food and nutrition information. *J Am Diet Assoc.* 2002; 102(1):100-108.
7. Young L, Nestle M. Expanding portion sizes in the US marketplace: Implications for nutrition counseling. *J Am Diet Assoc.* 2003; 103(2):231-234.
8. Blackburn G, Walker W. Science-based solutions to obesity: what are the roles of academia, government, industry, and health care? *Am J Clin Nutr.* 2005; 82:207S-210S.
9. Division of Nutrition and Physical Activity. Research to Practice Series No. 2: Portion Size. Atlanta: Centers for Disease Control and Prevention, 2006.
10. Freeland-Graves J, Nitzke S. Position of the Academy of Nutrition and Dietetics: Total diet approach to healthy eating. *J Acad Nutr Diet.* 2013;113(2):307-317.
11. Nestle M, Wing R, Birch L, DiSogra L, Drewnowski A, Middleton S, Sigman-Grant M, Sobal J, Winston M, Economost C. Behavioral and social influences on food choice. *Nutr Rev.* 1998; 56(5):S50-S64.

12. Institute of Grocery Distribution (2009). Working Group Report. Portion Size: Understanding the Consumer Perspective. Available at <http://www.igd.com/our-expertise/Nutrition-food-and-farming/Portion-size/3770/Portion-size-Understanding-the-consumer-perspective/>. Accessed December 2014.
13. Barzegari J, Ebrahimi M, Azizi M, Ranjbar K. A study of nutrition knowledge, attitudes and food habits of college students. *World Appl Sci J*. 2011; 15(7):1012-1017.
14. Grunert K, Wills J, Celemin L, Lahteenmaki L, Scholderer J, Bonsmann S. Socio-demographic and attitudinal determinants of nutrition knowledge of food shoppers in six European countries. *Food Qual Prefe*. 2012; 26:166-177.
15. Institute of Grocery Distribution (2012). Working Group Report. Portion size of pre-packaged foods and drink and consumption behaviour. Available at <http://www.igd.com/Research/Nutrition-food-and-farming/Portion-size/4214/Portion-size-of-pre-packaged-foods-and-drink-and-consumption-behaviour/>. Accessed December 2014.
16. European Food Information Council Review 11/2012. The importance of portion information from a consumer and health perspective. Available at <http://www.eufic.org/article/en/expid/importance-portion-information-from-consumer-health-perspective/>. Accessed December 2014.
17. Rolls B, Morris E, Roe L. Portion size of food affects energy intake in normal-weight and overweight men and women. *Am J Clin Nutr*. 2002; 76: 1207-1213.
18. Kral T, Roe L, Rolls B. Combined effects of energy density and portion size on energy intake in women. *Am J Clin Nutr*. 2004; 79:962-968.
19. Wansink B, Painter J, North J. Bottomless Bowls: Why visual cues of portion size may influence intake. *Obes Res*. 2005;13(1):93-100.
20. Schwartz J, Byrd-Bredbenner C. Portion Distortion: Typical portion sizes selected by young adults. *J Am Diet Assoc*. 2006; 106:1412-1418.
21. Ueland O, Cardello A, Merrill E, Leshner L. Effect of portion size information on food intake. *J Am Diet Assoc*. 2009; 109:124-127.
22. Small L, Lane H, Vaughan L, Melnyk B, McBurnett D. A systematic review of the evidence: The effects of portion size manipulation with children and portion education/training interventions on dietary intake with adults. *Worldviews Evid Based Nurs*. 2013; 10(2):69-81.

23. Just D, Wansink B. One man's tall is another man's small: How the framing of portion size influences food choice. *Health Econ.* 2013; 23:776-791.
24. Cornil Y, Ordabayeva N, Kaiser U, Weber B, Chandon P. The acuity of vice: Attitude ambivalence improves visual sensitivity to increasing portion sizes. *J Consum Psychol.* 2013; 24(2):177-187.
25. Vermeer W, Steenhuis I, Seidell J. Portion size: a qualitative study of consumers' attitudes toward point-of-purchase interventions aimed at portion size. *Health Educ Res.* 2010; 25(1):109-120.
26. Chandon P, Wansink B. Does food marketing need to make us fat? A review and solutions. *Nutr Rev.* 2012; 70(10):571-593.
27. Chandon P. How package design and packaged-based marketing claims lead to overeating. *Appl Econ Perspect Policy.* 2013; 35(1):7-31.
28. Parks J. The effects of food labeling and dietary guidance on nutrition in the United States. Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013.
29. Cypel Y, Guenther P, Petot G. Validity of portion-size measurement aids: A review. *J Am Diet Assoc.* 1997; 97:289-292.
30. Lillegaard I, Overby N, Andersen L. Can children and adolescents use photographs of food to estimate portion sizes? *Eur J Clin Nutr.* 2005; 59:611-617.
31. Daggett L, Rigdon K. A computer-assisted instructional program for teaching portion size versus serving size. *J Community Health Nurs.* 2006; 23(1):29-35.
32. Riley W, Beasley J, Sowell A, Behar A. Effects of a web-based food portion training program on food portion estimation. *J Nutr Educ Behav.* 2007; 39(2):70-76.
33. Silk K, Sherry J, Winn B, Keesecker N, Horodyski M, Sayir A. Increasing nutrition literacy: testing the effectiveness of print, web site, and game modalities. *J Nutr Educ Behav.* 2008; 40(1):3-10.
34. Herpen E, van Trijp H. Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite.* 2011; 57:140-160.



35. Roberto C, Shivaram M, Martinez O, Boles C, Harris J, Brownell K. The smart choices front-of-package nutrition label. Influence on perceptions and intake of cereal. *Appetite*, 2012; 58:651-657.
36. Gregori D, Ballali S, Vecchio M, Contreras L, Correa J, Perez C, Luengo J, Moyano E, Arrieta M, Gutierrez A. How mothers cook in Chile: an experimental exercise to use food labels to control portion sizes. *Open Obes J*. 2013; 5:22-29.
37. Roberto C, Khandpur N. Improving the design of nutrition labels to promote healthier food choices and reasonable portion sizes. *Int J Obes*. 2014; 38:S25-S33.
38. Shifflett B, Timm C, Kahanov L. Understanding of athletes' nutritional needs among athletes, coaches, and athletic trainers. *Res Q Exerc Sport*. 2002; 73(3):357-362.
39. Fulgoni V. Current protein intake in America: analysis of the National Health and Nutrition Examination Survey, 2003-2004. *Am J Clin Nutr*. 2008; 87:1554S-1557S.
40. Mamerow M, Mettler J, English K, Casperson S, Arentson-Lantz E, Sheffield-Moore M, Layman D, Paddon-Jones D. Dietary protein distribution positively influences 24-h muscle protein synthesis in healthy adults. *J Nutr*. 2014; 144:876-880.
41. Today's Dietitian Magazine. *Athletes and protein intake*. **June 2014**. Available at <http://www.todaysdietitian.com/newarchives/060114p22.shtml>. Accessed October 2014.
42. Protein Perceptions and Needs, NPD Report Completed: February 2014. Available at <https://www.npd.com/latest-reports/food-and-beverage-protein/>. Accessed December 2014.
43. Heinonen K. Consumer activity in social media: managerial approaches to consumers' social media behavior. *J. Consumer Behav*. 2011; 10:356-364.
44. Forbes L, Vespoli E. Does social media influence consumer buying behavior? An investigation of recommendations and purchases. *Journal of Business & Economics Research*. 2013; 11(2):107-112.
45. Vinerean S, Cetina I, Dumitrescu L, Tichindelean M. The effects of social media marketing on online consumer behavior. *International Journal of Business and Management*, 2013; 8(14):66-79.
46. Anand N, Mahajan R. A statistical analysis of social media as a new investigative tool in marketing. *International Journal of Computer Sciences and Engineering*. 2014; 2(4):83-86.

47. Watson C, McCarth, J, Rowley J. Consumer attitudes towards mobile marketing in the smart phone era. *International Journal of Information Management*. 2013; 33:840-849.
48. Okazaki S, Barwise P. Has the time finally come for the medium of the future? *Journal of Advertising Research*, 2011; March (Supplement):59-71.
49. Okazaki S, Li H, Hirose M. Benchmarking the use of QR code in mobile promotion. *Journal of Advertising Research*. 2012; March:102-117.
50. Shin D, Jung J, Chang B. The psychology behind QR codes: User experience perspective. *Computers in Human Behavior*. 2012; 28:1417-1426.
51. Atkinson L. Smart shoppers? Using QR codes and “green” smartphone apps to mobilize sustainable consumption in the retail environment. *International Journal of Consumer Studies*. 2013; 37:387-393.
52. Okazaki S, Navarro A, Campo S. Cross-media integration of QR code: A preliminary exploration. *Journal of Electronic Commerce Research*. 2013; 14(20):137-148.
53. Onwuegbuzie A, Dickinson W, Leech N, Zoran, A. A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*. 2009; 8(3):1-21.
54. Doody O, Slevin, E, Taggart, L. Focus group interview part 3: Analysis. *British Journal of Nursing*. 2013; 22(5):266-269.
55. McMillan J, Schumacher, S. *Research In Education*. 7<sup>th</sup> ed. Upper Saddle River, New Jersey: Pearson; 2010.
56. Morgan D. *The Focus Group Guidebook*. Thousand Oaks, California: Sage; 1998.
57. Sreejesh, S. Consumers’ attitudinal and behavioral ties with brands: An integrative approach to build a consumer-brand relationship model. *Journal of Research for Consumers*. 2014; 26(1):32-75.
58. Krueger R. *Moderating Focus Groups*. Thousand Oaks, California: Sage; 1998.
59. Krueger R. *Developing Questions For Focus Groups*. Thousand Oaks, California: Sage; 1998.

## APPENDIX A

### IRB APPROVAL LETTER



Office of Research Compliance  
Institutional Review Board

March 26, 2015

MEMORANDUM

TO: Tami Shuck  
Jefferson Davis Miller

FROM: Ro Windwalker  
IRB Coordinator

RE: PROJECT MODIFICATION

IRB Protocol #: 15-02-537

Protocol Title: *Portion Size Communication by Means of Prototype Package Design*

Review Type:  EXEMPT  EXPEDITED  FULL IRB

Approved Project Period: Start Date: 03/25/2015 Expiration Date: 03/05/2016

Your request to modify the referenced protocol has been approved by the IRB. **This protocol is currently approved for 30 total participants.** If you wish to make any further 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.

Please note that this approval does not extend the Approved Project Period. Should you wish to extend your project beyond the current expiration date, you must submit a request for continuation using the UAF IRB form "Continuing Review for IRB Approved Projects." The request should be sent to the IRB Coordinator, 109 MLKG Building.

For protocols requiring FULL IRB review, please submit your request at least one month prior to the current expiration date. (High-risk protocols may require even more time for approval.) For protocols requiring an EXPEDITED or EXEMPT review, submit your request at least two weeks prior to the current expiration date. Failure to obtain approval for a continuation *on or prior to* the currently approved expiration date will result in termination of the protocol and you will be required to submit a new protocol to the IRB before continuing the project. Data collected past the protocol expiration date may need to be eliminated from the dataset should you wish to publish. Only data collected under a currently approved protocol can be certified by the IRB for any purpose.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or [irb@uark.edu](mailto:irb@uark.edu).

## APPENDIX B

### PARTICIPANT CONSENT FORM

#### Informed Consent

*Title:* Portion Size Communication by means of Package Design

Researcher:  
Tami Shuck, Graduate Student  
Department of AECT  
University of Arkansas  
E108 AFLS Building  
Fayetteville, AR 72701  
[REDACTED]

Administrator:  
Iroshi (Ro) Windwalker, CIP  
IRB/RSC Coordinator  
Research Compliance  
210 Administration Building  
Fayetteville, AR 72701  
479-575-2208  
[irb@uark.edu](mailto:irb@uark.edu)

*Description:* This is a research study designed to determine whether effective communication, by means of prototype packaging design, can increase portion size nutritional knowledge of consumers and ultimately lead to increased purchases. We may also ask you some other questions. The entire experiment should last less than 45 minutes.

*Risks and Benefits:* The benefits of this study include contributing to the general body of knowledge of nutrition as well as helping to develop a better understanding of how people measure portion size.

*Voluntary Participation:* Your participation in the research is completely voluntary. You are not required to participate in this study or any other if you do not wish to do so. Your future relations with Tyson Foods, Inc. Discovery Center sensory panel will not be affected by your decision whether or not you wish to participate in this study.

*Confidentiality:* All information will be kept confidential to the extent allowed by law, Tyson Foods, Inc. policy, and University policy. Information will be locked in a secure cabinet and seen only by the primary researcher, focus group moderator, and the faculty advisor to insure confidentiality. No identifying information will be destroyed upon completion of the focus group sessions and research project.

*Right to Discontinue:* If at any point during the course of the experiment you feel uncomfortable and do not wish to continue, you are free to rescind your consent without penalty.

If you have any questions, or if any part of this form is unclear, please ask now before signing the statement of consent.

#### Statement of Consent

I, \_\_\_\_\_, have read the description, including the  
(please print)  
purpose of the study, the procedures to be used, the potential risks, the confidentiality, as well as the option to discontinue participation at any time. Each of these items has been explained to me by investigator. The investigator has answered all of my questions regarding the study, and I believe I understand what is involved. My signature below indicates that I freely agree to participate in this experimental study and that I have received a copy of this agreement from the investigator.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(date)

**APPENDIX C**  
**DISCUSSION GUIDE**

**Discussion Guide - Portion Size Communication by Means of Package Design**

**August 2015**  
**Tami Shuck**

**Overall Research Objectives:**

Explore consumer reactions to three (3) prototype package designs and the impact of portion size communication on purchase interest.

- 2 Groups
- 14-16 Participants per Group
- 45-60 minute duration per group

**Introduction:**

Thank you for agreeing to be part of this study. We asked you here today to talk about proper portion sized packaging. I want to learn what is important and what you might look for when purchasing these products.

We ask that, in order to make this discussion the most productive and enjoyable for everyone, we please talk one at a time, speak so all may hear, allow for different points of view, and say what YOU believe. This discussion will be audio and video recorded and there are researchers observing from the adjacent observation room.

**I. Handling portion size currently (15 minutes)**

- How many of you buy our Grilled & Ready poultry products? (show of hands)
- Please tell me about your favorite Grilled & Ready poultry product and the store you usually purchase from?
- Tell me about when, where, and how you use our Grilled & Ready poultry products? Probe for portioning.
- Tell me how and when you would measure a portion of Grilled & Ready poultry products?
- What would be helpful in determining portion size of Grilled & Ready poultry products?
- If you could add any feature to our Grilled & Ready packaging, what would it be?

*The questions are important but the moderator will maintain flexibility. If an issue seems critical to the participants and it aligns with the study purpose, the moderator will explore it more in depth.*

## **II. Packaging Design – 3 Visuals (15 minutes)**

I want to show you three (3) package designs to get your thoughts. They contain the same chicken product and the product can be consumed cold from the refrigerated package or microwaved in the container and consumed hot. What I am MOST interested in are your thoughts of how the package communicates the portion size of the product. I will pass around the packages one at a time. As you look at them, tell me what information you look for when making a purchase decision. Assume the price is the same for both package designs.

Compare and Contrast – write on board  
(white board provided for each package – three total boards)

Participants are shown the three prototype packages (Runner Prototype Package, Runner Square Prototype Package, and Perforated Pouch Prototype Package) and asked the following questions:

What information would you look for on the package to make your purchase decision?

- Probe likes/dislikes

What is most important?

- Probe for benefits

Least important?

- Probe for concerns

Is there anything you particularly like that is not necessarily important to your purchase decision?

- Probe likes, uniqueness, how it fits in hands, ease of using

## **III. Rating Activity (15 minutes)**

Now that you have seen all of the packages, I want you to place a sticker, I have provided, on each white board. The stickers (Smiling Face, Neutral Face, and Frowning Face) will represent the effectiveness of portion size communication.

- Explain your rating.

## **IV. Wrap up (5 minutes)**

I want to thank you for your time evaluating these packages. Your thoughts will be valuable in future product packaging design.