

PASTA DISHES AS A VEHICLE FOR MEETING WHOLE GRAIN REQUIREMENTS IN SCHOOL MEALS: CHALLENGES, OPPORTUNITIES AND BENEFITS

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ABSTRACT

Pasta, a popular versatile grain food served in many venues, is served much less frequently in schools. The purpose of this paper is to understand the challenges and opportunities involved in pasta procurement, preparation and service by foodservice directors (FSD). FSD reported benefits of serving pasta to include variety, affordability, lower fat, potential sources of whole grain and fiber and pasta foods being well-liked by children. Despite these benefits, pasta dishes appear less frequently compared to other entrees and side dishes. Serving pasta more frequently may incorporate less expensive, nutritious and versatile dishes that would closely meet the new nutrition standards for school meals.

Keywords: pasta, whole grain pasta, school meals, foodservice directors

INTRODUCTION

Whole-grain intake is associated with reduced risk for certain chronic diseases, including obesity, diabetes, and heart disease (Lutsey et al., 2007; McKeown et al., 2009; Newby et al., 2007; Sahyoun, Jacques, Zhang, Juan, & McKeown, 2006). The 2010 Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010) and MyPlate (U.S. Department of Agriculture, 2011) recommend a healthier diet placing greater emphasis on plant sources, by choosing fiber-rich fruits, vegetables, and whole grains. Despite the whole grain recommendation suggesting at least half of all grains consumed as whole grains, the National Health and Nutrition Examination Survey (NHANES) indicates only 1 in 10 individuals including school-aged children consume the recommended amount of at least three whole grain servings per day with the majority consuming less than one (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010).

Since 2004, some schools have voluntarily participated in the Healthier US School Challenge (HUSSC) to promote healthier school environments through better nutrition and physical activity. More recent nutrition standards have been proposed by the Institute of Medicine (IOM) (Institute of Medicine [IOM], 2009) and the USDA School meals program (Nutrition Standards in the National School Lunch and School Breakfast Programs; 2012) to promote healthier school environments which include: increasing the availability of fruits, vegetables, whole grains, and fat-free and low-fat fluid milk in school meals; reducing the levels of sodium and saturated fat in meals; and helping to meet nutritional needs of school children within their calorie requirements. All grains offered in the school meals program must be whole grain rich by July 1, 2014.

Stakeholders including public and private schools and food manufacturers have already begun to investigate the challenges of incorporating more whole grains into various grain products. Plate

waste studies conducted in elementary schools demonstrate that whole grain flour can be successfully incorporated at varying levels into grain-based foods, ranging from entrees such as pizza crust (Chan, Burgess-Champoux, Vickers, Reicks, & Marquart, 2008; Schroeder, Ronnei, Arndt, & Marquart, 2010), pancakes (Chu et al., 2011; Hur & Reicks) hamburger buns/dinner rolls (Rosen, Sadeghi, Schroeder, Reicks, & Marquart, 2008) and tortillas (Chu et al., 2011; Hur & Reicks; Toma et al., 2009) to desserts and snacks such as cookies (Toma et al., 2009) and crackers (Sadeghi & Marquart, 2009; Sadeghi & Marquart, 2010). With an increased demand for whole grain foods, manufacturers have reformulated a variety of popular grain-based foods to contain more of the whole grain ingredients (Mancino, Kuchler, & Leibtag, 2008). However, fewer efforts have focused on developing higher quality, child-friendly whole grain pasta products for schools.

Consumers of lower socioeconomic status with children, seeking lower cost, convenient and healthy pasta options have recently driven growth in the pasta and pasta-based meals segment (Ellis, 2010). When it comes to offering whole grain pasta products, retail groceries greatly exceed the foodservice sector. Restaurants may offer whole grain pasta, however, this menu component appears about 10% of the time compared to the refined counterparts ("Mintel Menu Insights Weekly Top 10," 2011). As whole grain pasta appears more frequently on the shelves in the retail market (Nielsen Retail Sales, 2010) and becomes more common in restaurants, a question remains - how is whole grain pasta faring in the school environment?

Analysis of a nationally representative sample of 398 school menus indicated that only 4% of all lunch meals offered pasta regardless of pasta type (whole wheat or refined) which appeared 3%, 5%, and 8% of the time on elementary, middle and high school menus, respectively (Condon, Crepinsek, & Fox, 2009). Despite the low frequency of pasta being served in schools, it is a popular well-liked food among children, a good source of energy, low fat, and versatile (Rosen, Hauge, Arndt, Veal, & Marquart, 2011). Regardless of the significant advantages of pasta related to likability, nutritional value and potential use in a wide variety of entrees and side dishes, pasta and more specifically, whole wheat pasta is currently underrepresented in school meals.

Whole wheat pasta was first introduced into the school meals program through the USDA commodity program during the 2008-2009 school year (U.S.D.A. Food and Nutrition Service, 2008). Few districts (< 25%) obtained the whole wheat pasta and preferred to allocate funds to higher priced commodity items including fruits, vegetables or entrees (Rosen et al., 2011). This led to the procurement of pasta through local purveyors with a subsequent purchase of refined products due to a lack of availability of whole grain pasta (Rosen et al., 2011).

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The limited availability of pasta in school meals suggests challenges to overcome in serving whole grain pasta for school meals. There is much opportunity to increase whole grain intake of school children through the inclusion of whole grain pasta in grain-based entrees and side dishes. Grains must meet the "whole grain rich" definition for which FDA does not currently have a standard label for the whole grain content of foods. Therefore USDA requires meeting one of the temporary following criteria: whole grains per serving must be ≥ 8 grams, product includes FDA's whole grain health claim or first ingredient is whole grain (HUSC criteria)(Nutrition Standards in the National School Lunch and School Breakfast Programs, 2012). Given the low moisture content of pasta, the "whole grain rich" serving can be met without having to be 51% of the total flour as whole grain flour, similar to various ready to eat cereals. These partial whole grain pasta products could offer a unique opportunity to dramatically increase whole grain intake in schools without compromising food quality, taste and consumption.

The purpose of this study was to identify challenges, opportunities and benefits associated with the introduction and use of refined and whole grain pasta in the National School Lunch program through a nationally represented sample of school foodservice directors.

METHODS

Study Development and Survey Design

Survey items were developed based on initial interviews and focus groups conducted with managers and foodservice directors related to purchasing, perceptions, and service of whole grain pasta in school settings (Rosen et al., 2011). The survey was broadened to include questions regarding refined grain pasta as interviews and focus group results indicated foodservice personnel had little to no experience with whole grain pasta in most schools.

The survey included questions about demographic characteristics, factors affecting purchase, service and perceptions of pasta use in schools. Demographic questions included foodservice occupation, school district size, percentage free and reduced meals, location, and registered dietitian status. To assess purchasing a series of questions were asked about types (shapes) of pasta purchased (refined and whole grain), brand names and manufacturers. Four items further investigated general pasta procurement (scaled from 1-5 where 1 = strongly disagree and 5 = strongly agree) while additional questions asked about commodity products (4 questions) and a specific national brand (3 questions).

Several items were used to determine the perceptions of pasta in school foodservice by foodservice directors. School foodservice directors (SFD) were asked to rate pasta in terms of importance to the overall meal (ranked from 1-10 where 1 = lowest and 10 = highest) corresponding benefits (9 items) and barriers (7 items). Use of pasta in school meals was investigated (7 items scaled from 1 to 6 where 1 = not at all important and 6 = very important). Questions were asked about methods used by SFD to identify (7 items) and determine the amount of whole grain (2 items) included in the pasta. To investigate an ideal whole grain pasta, 12 items were included ranging from physical characteristics like shape, appearance, and taste to fortification and packaging (scaled from 1 to 6 where 1 = not at all important and 6 = very important). Frequency of pasta use by school level (elementary, middle and high), menu option (entrée or side dish) and preparation as being labor intensive (scaled from 1 to 6 where 1 = not at all important and 6 = very important) was asked.

Frequency and means of purchasing practices, perceptions and serving pasta were determined. Scores were computed by summing

the responses across the items that comprised the procurement categories as well as availability of pasta products, brands and manufacturers. The pilot survey was administered and pre-tested with a convenience sample of SFD ($n = 6$) to assess clarity and comprehensiveness of items. Revisions were made as needed.

Participants

The survey was emailed in January 2010 to pre-registered participants from the Annual Nutrition Conference (ANC) for the School Nutrition Association (SNA). Approximately two weeks later a second survey was emailed to non-responders. For completing the survey, respondents were entered into a raffle drawing for \$50 Visa gift cards ($n = 2$) or a netbook (value \$300). There were 707 valid email addresses of which 320 surveys were completed, resulting in an overall response rate of 45%. However, only surveys with respondents indicating Foodservice Director for their primary or most recent position were used for analysis ($n = 237$). The study was approved by the University of Minnesota Institutional Review Board with passive consent procedures.

Statistical Analysis

Survey data were analyzed with SAS version 9.2 (2008, SAS Inc, Cary, NC). Frequency distributions were generated. Nonparametric Kruskal-Wallis tests were used to determine differences in mean values for ordered categorical variables by region. Differences with $P < 0.05$ were accepted as statistically significant.

RESULTS AND DISCUSSION

Survey respondents indicating Foodservice Director (FSD) as their current or most recent position were included in the analysis ($n = 237$). Five surveys were discarded due to $>85\%$ incomplete because $<15\%$ had been completed.

Geographical distribution included: Midwest (30%), South (34%), West (17%) and Northeast (19%). The majority ($>92\%$) of FSDs indicated that all schools in their district participated in the National School Lunch Program however, the school level mostly likely not to participate was high school. Sixty percent of FSDs stated enrollment was less than 10,000 students while the percentage of free and reduced meals was highly diversified with the majority (70%) ranging from 10 to 60%. Over half of FSDs indicated that the method most often used to plan menus was food based planning over the nutrient standard menu planning. Less than 20% of respondents indicated they were dietitians.

Refined pasta was served much more frequently in schools than the whole grain counterpart (Figure 1). FSDs indicated refined pasta types were served on average three times more than the whole grain pasta equivalent (mean 4.9 ± 2.8 , 1.5 ± 1.6 , respectively). The top ranking pasta shapes (spaghetti, macaroni, and rotini) did not differ by type (refined vs. whole grain). The pasta shapes ranked in this study are similar to those served in restaurants where spaghetti continues to be the most popular refined-grain pasta shape followed by penne and macaroni ("Mintel Menu Insights Weekly Top 10," 2011).

Pasta brands and Manufacturers were mentioned by 66% ($n = 159$) of FSDs. Although commodity (USDA) pasta was mentioned most frequently, 38% of FSDs reported not using commodity pasta. A majority (76%) reported they would rather spend commodity dollars on food items other than pasta. Most FSDs agreed or strongly agreed that brands of pasta purchased depended on cost (74%), pasta being included as an option from commodity products (62%), belonging to a buying group or alliance (56%), and the broker/vendor (52%).

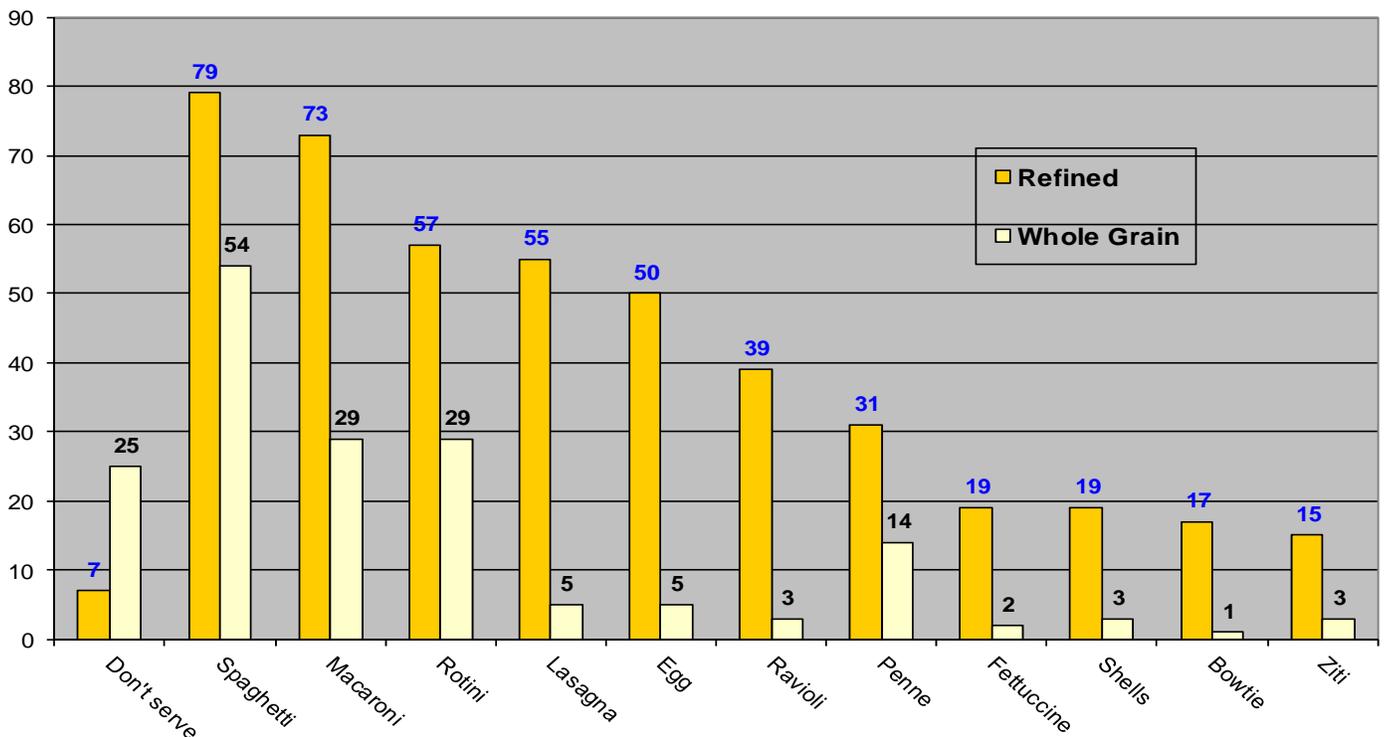


Figure 1: Pasta types served by foodservice directors

In order to understand the importance of pasta as part of the school meal, FSDs rated pasta on a scale of 1 to 10. Overall pasta was rated relatively high (mean = 6.65) as demonstrated by the following positive attributes: affordable, satisfying / filling meal, versatile, high student meal count and well-liked food (Table 1). To assess the difference between the advantages and disadvantages related to the importance of pasta, scores were calculated for each. Scores related to advantages to serving pasta remained fairly positive for all geographical regions while the disadvantage to serving pasta were less frequently reported and similar between regions (Table 1).

To elicit knowledge specifically about whole grain pasta, FSDs were asked if the content of whole grain was known when whole grain pasta products were ordered and if product identification/verification methods were used. Only two-thirds of FSDs answered these questions while slightly over half of respondents indicated that the grams and percentage of whole grain was known (60% and 63%, respectively). The preferred way to verify a whole grain product was to read the labels (first ingredient was whole grain) or other markings such as stamps or claims. A low response rate to these whole grain identification/verification knowledge questions suggests that this aspect of purchasing may be confusing to school nutrition professionals (Chan, Hesse, Reicks, & Marquart, 2009; Hesse, Braun, Dostal, Jeffery, & Marquart, 2009).

The ideal whole grain pasta, as reported by FSDs included an appearance (5.0 ± 1.1), taste (5.0 ± 1.1), and similar texture (4.9 ± 1.2) to the refined counterpart. Manufacturers have been working on these sensory aspects of whole grain pasta addressing the darker color and grainier texture of traditional whole grain pasta by making pasta with various levels and types of flour, such as finely ground white whole wheat flour, which closely matches traditional pasta in color, texture and acceptance by children (Chan, Marquart, & Burgess-Champoux, 2005). Fortifying pasta with fiber and calcium ranked

relatively high (range 4.4 ± 1.2 to 4.6 ± 1.1) while protein fortification was not quite as popular (4.0 ± 1.5). Having the appropriate foodservice packaging (4.5 ± 1.3) appeared to be important to FSDs while incorporating other whole grains (4.1 ± 1.4) and lowering the cost of a pre-cooked option (4.0 ± 1.6) were moderately favorable. FSDs reported shape and additional flavor or color (3.9 ± 1.5 and 3.4 ± 1.5 respectively) as least important for an ideal pasta product.

Despite many positive comments by FSDs pasta was served rather infrequently during school meals. Pasta was served every other week or monthly in elementary schools (61%), and on a daily or weekly basis in middle (54%) and high (59%) schools. Regardless of grade level, pasta appeared more frequently as a main entrée (92% to 96%) than as a side item (68% to 74%). The School Nutrition Dietary Assessment (SNDA) report indicated similar results where pasta only appeared in 4% of all school menus with the highest frequency in high schools (Condon et al., 2009). Challenges to increasing pasta use in schools includes competition with popular and less labor intensive items (e.g. burgers or pizza), constraints in kitchen and/or cafeteria facilities, and lack of appropriate equipment (Rosen et al., 2011). FSDs reported that labor had little influence on the service of pasta in school meals (2.8 ± 1.7). However, the managers may indirectly, through verbal or non-verbal information, influence the director's decision to purchase and serve pasta (Rosen et al., 2011).

Limitations of this study included a relatively low response rate and skipped questions, which might indicate some response bias. No information was available from survey non-respondents, further limiting our ability to generalize our findings to a broader group of FSD. However, the response rate (40%) was within the range of 30% to 50% observed for other published survey results from food and nutrition professionals (Gilmore, Maillet, & Mitchell, 1997; Rogers, 2003). Despite having a low response rate respondents included a national sample of FSD that reflects pasta use in schools.

Table 1: Advantages and Disadvantages Related to Pasta Served in Schools

	Response percentage (n)	Overall Mean ± SD	West ^a (n = 42) Mean ± SD	Midwest ^b (n = 70) Mean ± SD	South ^c (n = 79) Mean ± SD	Northeast ^d (n = 44) Mean ± SD	Kruskal Wallis p-value
Pasta rating score	97% (235)	6.7 ± 1.8	6.2 ± 1.8	6.7 ± 1.7	6.3 ± 1.8	7.3 ± 1.8	0.005
Advantages*							
Affordable	70 (166)						
Satisfying/ filling	62 (145)						
Versatile	60 (141)						
High count / well liked	57 (135)						
Comfort food	49 (115)	4.6 ± 2.4	4.2 ± 2.4	5.0 ± 2.3	4.2 ± 2.5	5.3 ± 2.3	0.028
Nutritious	49 (115)						
Sub to rice /potato	43 (102)						
Low in fat	43 (100)						
Adds fiber	40 (94)						
Disadvantage**							
Allergies	2 (4)						
Whole grain not available	3 (7)						
Consistency varies with product	12 (28)						
Labor intensive	13 (31)	1.0 ± 1.1	1.1 ± 1.1	1.0 ± 1.1	1.0 ± 1.1	1.0 ± 1.1	0.94
Consistency varies with cooking	14 (34)						
Competes with other entrée items	26 (61)						
Important as other meal components	33 (77)						

^aAK, HI, WA, OR, CA, NV, ID, UT, AZ, MT, WY

^bND, SD, NE, KS, MN, IA, MO, WI, IL, MI, IN

^cTX, OK, AR, LA, MS, TN, KY, AL, GA, FL, SC, NC

^dPA, NJ, NY, CT, RI, MA, NH, VT, ME

Scale scores were computed by summing the response for each participant across the advantages (*Scale 0 to 9) and disadvantages (**Scale 0 to 7).

CONCLUSION AND APPLICATIONS (for both industry and education)

With the new school nutrition regulations, whole grain pasta can make a significant contribution to overall whole grain and fiber intake as well as help meet other dietary recommendations, such as increasing vegetables and decreasing sodium through recipe formulation. Pasta is versatile from a food formulation and nutritional perspective because various milled grains as well as dried vegetable and bean flours may serve as pasta ingredients. When looking at other common grain foods served in schools, most contribute similar nutrients and calories. For example, rice, a whole food rather than an ingredient, cannot be significantly changed unless genetically modified like golden rice (Enserink, 2008; Huang, Hu, Rozelle, & Pray, 2005). Pasta offers more grain density, and may allow for lower proportionate levels of whole wheat ingredient to reach 8gms/serving or meet the “whole grain rich” without having to be 51% whole grain flour such as in some bread items. However, pasta made with 51% whole wheat would provide at least 2.5 times more fiber than 51% whole wheat bread. Pasta can be a healthy low-cost food option for schools through the use of versatile ingredients and serve as a delivery vehicle to meet other dietary recommendations through smart ingredient selection and recipe development.

Whole grain pasta is an adaptable food that combines well with vegetables, legumes and low fat dairy in both main and side dish applications. Combining other plant-based foods with whole grain pasta will help familiarize children with a variety of textures and flavors and may increase their desire to eat more foods that are

consistent with the Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010). New or slightly altered traditional recipes need to be kid-friendly in appearance, taste and texture but even small changes possess great potential to increase the inclusion of whole grains, vegetables, and legumes on school menus and their consumption by children. Similar clandestine methods have been investigated with children and adults using whole grains (Rosen et al., 2008) as well as vegetables (Blatt, Roe, & Rolls, 2011).

When it comes to reducing added salt or solid fat and added sugar, whole grain pasta may serve as a vehicle to help meet both school nutrition requirements and taste expectations of children. This could be addressed through kitchen preparation (type and amount of oils/butter, salt, sugars), various toppings, lower in fat and calories (e.g. cheeses sauces, meats, etc), and standardized serving sizes. This will require cooperation of manufacturers and distributors for appropriate pasta products and accompanying ingredients for successful kitchen preparation of more healthful pasta dishes.

Innovative solutions from various stakeholders may overcome barriers and provide unique opportunities for increasing whole grain pasta in school meals (Table 2). One approach is to link product developers with school foodservice personnel, with the intention of designing whole grain pasta products that accommodate cost, labor, equipment, preparation and service challenges associated with the service of quality whole grain pasta in school kitchen and cafeteria

Table 2: Benefits and opportunities for stakeholders when whole wheat or whole grain pasta is increased in the school environment

Stake holder	Opportunities	Benefits
Government	<ul style="list-style-type: none"> • Incorporate whole wheat or whole grain • Incorporate more vegetables • Collaborative efforts with stake holders 	<ul style="list-style-type: none"> • Help children meet dietary guidelines • Standardized whole grain pasta products and labeling
Manufacturers	<ul style="list-style-type: none"> • Work more closely with SFD on what is needed related to pasta products characteristics <ul style="list-style-type: none"> • Make products with ↓cooking time • Whole grain/whole wheat products similar to refined • Appropriate packaging • Create items that are “kitchen/environmental” friendly • Create new pasta items that are finger foods 	<ul style="list-style-type: none"> • Increased demand for whole grain/whole wheat products • Taste profile expanded to home environment • Ability to gradually incorporate and be able to change product to meet various guideline
Distributors	<ul style="list-style-type: none"> • Increased demand for certain whole grain/wheat pasta products to meet school requirements 	<ul style="list-style-type: none"> • Less slots for slow moving products • Longer product contracts with manufacturers & schools • Fewer special orders for schools
SFD	<ul style="list-style-type: none"> • Collaboration with <ul style="list-style-type: none"> • Manufacturers • Chefs • Introduce new foods/vegetables • Incorporate new whole grains 	<ul style="list-style-type: none"> • Using pasta can help meet all food group requirement • Using pasta can increase familiarity, acceptance and consumption of new foods & vegetables
Managers/cooks	<ul style="list-style-type: none"> • Innovative way to make pasta <ul style="list-style-type: none"> • Use other equipment to cook (e.g. fryers) • Decreased labor time with pasta combination products 	<ul style="list-style-type: none"> • Make it “environmental” friendly • May cut back on other prep work if main entrée incorporates many food categories
Children	<ul style="list-style-type: none"> • Condition taste preferences for a natural transition • Familiarize children to new foods/vegetables 	<ul style="list-style-type: none"> • Decrease obesity by increasing familiarity and consumption of whole grains and vegetables

environments. Positive deviance—which is based on the observation that in every community there are certain individuals or groups (the positive deviants), whose uncommon but successful behaviors or strategies enable them to find better solutions to a problem than their peers. These individuals or groups have access to similar resources and face some of the same challenges and obstacles as their peers, but somehow they figure out a process to make things work. This may be one method that might be valuable in examining those schools that successfully procure, prepare and serve whole grain foods that children will eat (Pascale, Sternin, & Sternin, 2010).

To meet the new ‘whole grain rich’ requirement several recommendations can be gleaned from this research: development of new whole grain pasta products should be similar in texture, taste and color to the refined pasta currently served in schools. A gradual approach, where substitution of relatively low levels of various whole grain flours in pasta products, may be an effective method to increase whole grain consumption among school children. This gradual approach has been shown to be successful in schools with products including buns, rolls (Rosen et al., 2008) and snacks (Sadeghi & Marquart, 2010).

These new products will involve an increased level of communication across several sectors of the school supply chain, eliciting the cooperation among foodservice personnel, chefs, product developers to develop pasta products for recipe development overcoming challenges of issues related to convenience and taste.

Despite the many benefits of pasta, there are some challenges to include pasta as frequently as other entrees and side dishes in school menus. In addition to making products, foodservice directors need to overcome the barriers related to the incorporation of whole grain

pasta into the school foodservice menus related to availability and cost. Lastly, research needs to be conducted in school facilities (kitchens) to examine preparation, holding and servicing of pasta products. Schools that are already successfully incorporating more whole grain pasta into school meals need to be used as models. The new whole grain rich requirement for all grain products including pasta can be more readily achieved by schools through collaborative efforts within the entire school supply chain from growers to consumers.

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