

PROJECT NO: New

TITLE: Translational Intervention to Determine Whether Repeated Exposure of Hard White Wheat Whole Grain versus Hard Red Wheat Whole Grain Bread Will Increase Liking and Intake in Children from Low-Income Families Who Rarely Consume Whole Grain Bread

PERSONNEL: PI – Dr. Samantha Ramsay, RDN, LD; Co-PI – Dr. Ling-Ling Tsao, Co-PI

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JUSTIFICATION: Attention to whole grain food continues to influence consumer demand for palatable whole grain products. Preliminary results from the 2014-2015 IWC project demonstrated greater preference for hard white wheat versus hard red wheat in young children. While results of greater preference is promising, the population sample was highly educated, were of a high socioeconomic status, were predominantly Caucasian, and the majority of the families incorporated whole grain breads into their daily consumption. Continued examination of children and parents' preferences for whole grain bread with hard white wheat versus hard red wheat can direct consumer intake and product purchasing. Extending the current work to specifically focus on more diverse families with a low income and who demonstrate limited whole grain bread consumption can reinforce the value of using hard white wheat grain in products to effectively support national efforts of greater whole grain wheat consumption. In addition, it will continue to reinforce the mission to capture this rapidly growing market of hard white wheat grain by showing how children who previously do not consume whole grain breads will consume whole grain breads made from hard white wheat grain.

HYPOTHESIS & OBJECTIVES:

Young children (3-5 years of age) will prefer hard white wheat bread significantly more than hard red wheat bread in a sample population of children from a low income and who consume few whole grain wheat bread products.

Objectives:

1. Identify children's frequency of whole grain wheat bread products consumption and determine whether children are bitter sensitive using the PROP test.
2. Identify children's preferences for bread made from hard white wheat versus bread made from hard red wheat using a three-point preference scale and audio recording of children's verbal comments about the bread.
3. Identify parents' bread product consumption and intake patterns using a questionnaire on preference, purchasing, and use of bread products.
4. Determine whether repeated exposure will result in greater liking and intake of bread made from hard white wheat grain versus hard red wheat grain.

PROCEDURES: Children attending Head Start Centers (HSC) and Child Care Centers (CCC) in Moscow, Lewiston, Coeur d'Alene/Post Falls, and Spokane and their parents will be recruited to participate in the study (n=100). In the summer 2015, HSC and CCC directors will be contacted to begin informing parents of the possibility to participate in the study. Fliers will be placed in the Centers and eligibility criteria will be a lower income status and limited consumption of 100% whole grain bread products. In the of fall 2015, using a rolling enrollment protocol families will complete consent forms and a consumer questionnaire to capture bread purchasing, use, and consumption habits by the adults and children in the family. Over the course of six months, graduate research assistants will visit each Center one to two times a week for

eight weeks to conduct taste activities with each child. The taste activities will follow the protocol of capturing children's liking and preferences using a three-point face scale. Children will be offered to taste two samples each of hard white wheat bread and hard red wheat bread prepared in ¼ inch cubes without the crust. Each sample will be weighed to the nearest tenth of a gram prior to the activity and after the activity to estimate difference in weight as a proxy for children's intake. In addition, each taste activity will be audio recorded and children's responses will be transcribed to capture children's verbal report of appearance, texture, and taste. All bread products will be prepared in the Margaret Richie School of Family and Consumer Sciences Carmelita Spencer Foods Laboratory using Breadman® bread machines and the Breadman® basic white bread recipe following the standardized protocol developed in the previous project.

Throughout the 2015/2016 year, a sub-sample of children with special needs (i.e. autism spectrum disorder) and their parents will be recruited to participate in the intervention (n=10). Each child and one parent of the sub-sample will complete the same protocol as describe above, but their information will not be included in the larger sample analysis.

Collaboration with Dr. William Price and Dr. Bahman Shafii with Statistical Programs through the College of Agricultural and Life Sciences will occur to confirm population sampling, experimental design, and to conduct statistical analysis. The statistical analysis will include descriptive reporting of data on children and parents' use of bread products from the questionnaires and children's reported preferences during the taste activities. Non-parametric tests will be used to determine differences in children's taste preferences for hard white wheat bread versus hard red wheat bread and comments from the audio transcriptions. T-tests will be used to determine differences in gram consumption of hard white wheat bread versus hard red wheat bread over the series of repeated exposures. Reporting of the results will immediately follow the analysis.

DURATION: The duration of the project is 1 year.

COOPERATION: Two FCS academic units will be involved in the study (Food and Nutrition and Early Childhood Development and Education), in addition the College of Agricultural and Life Sciences Statistical Programs will collaborate on the work. Continued collaboration with Katherine O'Brien with the University of Idaho Wheat Quality lab will be maintained as well as Rueben McLean for access to Idaho flour.

ANTICIPATED BENEFITS/EXPECTED OUTCOMES/INFORMATION TRANSFER: The benefit of the study is to extend previous work in a more ethnically diverse, low income, and non-whole grain bread consuming population. This information can be used to encourage whole grain wheat consumption in non-whole grain bread consumers and foster marketing and product development of hard white wheat whole grain bread. Findings from this research will be presented at the Food and Nutrition Conference and Expo, the annual meeting of the Academy for Nutrition and Dietetics and an Early Childhood and Development Annual Conference. In addition, a manuscript of the findings will be prepared and submitted to a peer reviewed journal.

LITERATURE REVIEW: Taste preferences are the primary factor for children's consumption (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987), and repeated exposure fosters the development of a child's preference for previously disliked foods (Wardle, Cooke, Gibson, Sapochnik, Sheiham, & Lawson, 2003). However, children prefer sweet and salty to bitter and sour tastes (Steiner, 1979); and children have a greater number of papillae with higher taste receptors that make them more sensitive to bitter tastes (Segovia, Hutchinson, Laing, & Jinks, 2002). Whole grain products, such as hard red wheat have a more bitter taste and could impact children's consumption. Hard white wheat does not have as much of a bitter taste and thus could be preferred by children as demonstrated in preliminary results (Keeney, Ramsay, Tsao, Plank, Submitted Abstract). Repeatedly offering foods to children can support their preference and liking of those foods, but in bitter sensitive children and children with limited exposure to whole

grain foods, hard white wheat could better foster intake of whole grains. Families with a low income (Rehm, Monsivais, & Drewnowski, 2011) and children with special needs may have additional challenges consuming nutrient dense foods such as whole grain bread products; thus continued research with this population is needed. Identifying greater consumption of whole grain breads, particularly from hard white wheat, in a more diverse group of children can reinforce the need to use hard white wheat grain for increased whole grain consumption.

REFERENCES:

- Birch, L.L., McPhee, L., Shoba, B.C., Pirok, E., & Steinberg, L. (1987). What kind of exposure reduces children's food neophobia? Looking vs. Tasting. *Appetite*, 9, 171-178.
- Horne, P.J., Greenhalgh, J., Erjavec, M., Lowe, C.F., Viktor, S., & Whitaker, C.J. (2011). Increasing pre-school children's consumption of fruits and vegetables. A modeling and rewards intervention. *Appetite*, 56, 375-385.
- Keeney, L., Ramsay, S.A., Tsao, L., Plank, S. (Submitted Abstract) Children's preference and intake of hard white wheat whole grain bread is greater than hard red wheat whole grain bread. *Journal of the Academy of Nutrition and Dietetics*.
- Rehm, Drewnowski, A. (2011). The diet quality and monetary value of diets consumed by adults in the United States. *The American Journal of Clinical Nutrition*, 94:1333-9.
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- Steiner, J.E. (1979). Facial expressions of the neonate infant indicating the hedonics of food related stimuli. In J.M. Weiffenbach (Ed.), *Taste and Development: the genesis of sweet preference* (pp. 173-189). Washington DC: US Department of Health and Human Sciences.
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IDAHO WHEAT COMMISSION - BUDGET FORM

Allocated by Idaho Wheat Commission during FY 2014

Allocated by Idaho Wheat Commission during FY 2015 \$ 60,760

REQUESTED FY 2016 SUPPORT:

	Salary*	Temporary Help	Fringe **	Travel***	OE****	Grad Fees	TOTALS
Idaho Wheat Commission	\$ 34,560	\$	\$ 1,370	\$ 4,210	\$ 4,700	\$ 15,764	\$ 60,604

OTHER RESOURCES (not considered cost sharing or match):

a) Equipment: bread maker (\$100x4), utensils (\$200), recorder (2x\$100), laptop (\$1000)	\$ 1,800
b) Carmelita Spencer Foods Lab Manager and Fees	\$ 1,000
c) Equipment taste activity (PROP test strips, folding table, cooler/bag, signage, paper)	\$ 1,000
TOTAL OTHER RESOURCES	\$ 3,800

TOTAL PROJECT ESTIMATE FOR FY 2016:

\$ 60,604 (Requested)	\$ 3,800 (Other)	\$ 64,404 (Total)
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BREAKDOWN FOR MULTIPLE SUB-BUDGETS:

	(PI Name)	(PI Name)	(PI Name)
Salary			
Temporary Help			
Fringe Benefits			
Travel:			
Operating Expenses:			
Graduate Student Fees			
TOTALS			

Total Sub-budgets \$

*\$34,560 is requested to cover 50% time for the project manager and two graduate students for 16 pay periods.

**Fringe is 1% for the two graduate students and 9% for the project manager.

***Travel is for the PI and Co-PI to attend two conferences at \$1,000 and to travel to sites (10 x \$85) and for the project manager and the graduate students to travel to sites (16 x \$85)

****Operating expenses include parent and child care setting compensation at (\$2,200), food for the taste activities (\$1500) and Statistical Programs (\$1000).

10.24.2014 - Version