Food Barley Market Expansion through Barley Product Development for Asian and Latin American Markets & US Food Service
September 2013

Extensive research conducted by public and private entities during the past two decades has clearly shown that human consumption of barley can provide numerous important health benefits, including the reduction of bad cholesterol and associated risk of cardiovascular disease; positive glucose control in diabetes management; reduction of certain cancers; and enhancement of the human immune system. Despite these overwhelming data, food barley consumption remains relatively low due to a lack of knowledge of its unique health, processing and flavor attributes. This project was conceived to overcome this lack of knowledge and acceptance of barley as a principal cereal ingredient. Due to limited resources, we chose to target two key market segments that showed significant promise for future growth: Asian and Latin American cereal manufacturers and domestic school food administrators and nutritionists.

FINAL REPORT

Contacts:

Dr. Juliet Marshall
University of Idaho
1776 Science Center Drive
Idaho Falls, ID 83402
208-529-8376
jmarshall@uidaho.edu

Ms. Kelly Olson
821 W. State Street
Boise, ID 83702
Idaho Barley Commission
208-334-2090
kolson@idahobarley.org

Table of Contents

Page

Introduction ……. 3

Barley Foods in Schools Final Report ……. 3

Barley Foods in Schools: Challenges and Opportunities …….. 8

Asian Food Barley Technical Short Course ……..12

Brochure and Participants ……..12

Barley-Fortified Wheat Flour Product Development Short Course
Table of Contents ……... 14
Schedule and Agenda ……... 15
Course Evaluation …… 17

Latin American Food Barley Technical Short Course

Brochure and Participants ……. 19

Barley-Fortified Wheat Flour Product Development Short Course
Table of Contents ……... 20
Schedule and Agenda ……... 21
Course Evaluation …… 24

Sample Menus and Recipes ……. 26
Apple Blueberry Barley Alamode ……. 27
Tropical Bliss Barley Salad ……. 28
Munch Mouth Chicken Barley Recipe and Final Analysis …….. 29

University of Idaho & Idaho Barley Commission
FSMIP FINAL REPORT
Food Barley Market Expansion through Barley Product Development for Asian and Latin American Markets & US Food Service
September 2013

Introduction: Extensive research conducted by public and private entities during the past two decades has clearly shown that human consumption of barley can provide numerous important health benefits, including the reduction of bad cholesterol and associated risk of cardiovascular disease; positive glucose control in diabetes management; reduction of certain cancers; and enhancement of the human immune system. Despite these overwhelming data, food barley consumption remains relatively low due to a lack of knowledge of its unique health, processing and flavor attributes. This project was conceived to overcome this lack of knowledge and acceptance of barley as a principal cereal ingredient. Due to limited resources, we chose to target two key market segments that showed significant promise for future growth: Asian and Latin American cereal manufacturers and domestic school food administrators and nutritionists.

Goals and Objectives: Jump start demand for value-added food barley production in the Pacific Northwest region by facilitating the development of innovative consumer food products that contain barley as a principal ingredient, with specific focus on targeted Asian and Latin American food manufacturers and school food service buyers and nutritionists.
Establish protocols for third-party certification of desirable barley fiber content to provide more transparent procurement process for sourcing food barley by domestic and foreign food processors and manufacturers.

I. Provide technical training for domestic and foreign food processors on ways to expand the use of barley as an ingredient in traditional cereal foods.

Issues and challenges: Lack of knowledge of barley's unique traits, processing characteristics and suitability as a cereal food ingredient has impeded market demand for value-added food barley in U.S. and export markets. This grant was designed to overcome this lack of knowledge by providing technical training for domestic and foreign food processors on cereal food applications using barley, including noodles, breads, tortillas and cookies. The response from the training course participants was very positive, which prompted us to sponsor and self-fund a targeted trade mission to follow up on the interest with the goal of securing food barley production contracts in 2013.

Strategies: Executed by the Idaho Barley Commission and collaborators:

We conducted two Technical Short Courses on Barley-Fortified Wheat Flour Product Development for Asian and Latin/North American Markets in March 2012 and August 2012. These courses were designed and implemented by a very capable team of cereal and food chemists and technicians at the Wheat Marketing Center in Portland, OR, who has a long and successful track record of delivering training on the use U.S. grains in multiple food applications in multiple foreign markets.

Due to strong interest from these targeted export markets we were unable to accommodate any participants from the domestic food manufacturing industry but we continue to canvass interest

in future technical training, including a survey being conducted and personal one-on-one meetings with Western U.S. cereal processors scheduled in the fall 2013.

Completed training courses included:

1. **Asian Short Course was conducted at the Wheat Marketing Center on March 5-9, 2012, with a total of 9 participants:** 2 from Japan, 4 from Taiwan and 2 from South Korea. Participant evaluations were excellent across the board and recommendations for changes were carefully evaluated by the Idaho Barley Commission (IBC) and Wheat Marketing Center (WMC) personnel in order to improve the second short course. We made contact with all Asian participants in April and August 2012 to determine future actions/strategies they are considering as a result of this short course.
2. **Latin American Short Course was conducted at the Wheat Marketing Center on August 13-17, 2012**, with 4 participants from Mexico and 3 from Colombia. Participant evaluations were excellent across the board. There was a unanimous request for follow-up training, particularly in the area of barley milling. We made follow-up contact with all participants in October 2012 to discuss future strategies for producing and selling food barley into these key markets.

3. Based on strong interest in the targeted Asian markets we organized and self-funded a **Food Barley Trade Mission to Japan, Taiwan and South Korea in October 27-November 7, 2012**: this market visit included participation by the IBC Chairman and grower from Bonners Ferry, Idaho and a barley merchandiser from Genesee, Idaho. The two-person team met with more than a dozen companies in all three markets and have responded to requests for product samples and additional information.

Results: We successfully secured food barley production contracts in 2013 totaling more than 3500 MT worth more than $900,000.

Future priorities: We have expanded our barley food sample program to introduce our food barley varieties to a wide cross section of domestic and foreign food processors. For domestic food manufacturers, we are currently surveying interest and have begun planning a second round of technical training targeted for winter 2013/14. We remain in close contact with all Asian and Latin American participants on their interest for more training and sourcing Pacific Northwest food barley.

II. Development and implementation of testing protocols to certify levels of beta-glucan fiber content in various barley sources.

Issues and challenges: The development of barley varieties with high levels of beta-glucan in the endosperm requires appropriate screening and selection. The current methodology associated with screening necessitates time consuming and expensive “wet chemistry” laboratory techniques that destroy the sample. The development of a faster, high-throughput method that would not destroy the sample would increase the efficiency of selection in the breeding program, while maintaining limited and viable seed that can then continue to be used in the breeding program. Near Infra-red (NIR) spectrophotometry has been utilized to measure various whole grain characteristics, such as protein. The utilization of NIR spectrophotometry for measuring beta-glucan content requires the development of a mathematical formula that approximates beta-glucan content based on NIR reflectance data. Large numbers of samples are measured with the NIR spectrophotometer and a regression equation is developed based on actual results obtained from standard laboratory procedures.

Strategies: Executed by the University of Idaho Extension

1. University of Idaho completed calibration of the NIR for beta-glucan content using barley samples from segregating populations grown in 2010 test plots. Calibration samples obtained from collaborators at the USDA-ARS were tested for beta-glucan content using standard laboratory procedures. The same samples were tested utilizing the NIR spectrophotometer from which calibration curves were determined.
2. A separate sample set was later tested utilizing the same "wet-chemistry" procedures in the laboratory to determine beta-glucan content. These samples were subsequently tested on the NIR utilizing the calibration curve previously developed. Simple correlation tests (Pearson Correlation Coefficients) showed a strong positive correlation of wet chemistry beta-glucan measurments to NIR measurements of $r=0.89775$ with $P>0.001$.

Results: While not as accurate as wet-chemistry, the correlation of NIR values with precise chemical measurements should allow us to rapidly advance populations with non-destructive analyses.

Future priorities: The algorithm developed will be used in conjunction with the USDA-ARS breeding program for rapid screening of barley populations to reduce costs associated with previous testing methodology and increase the speed of testing.

III. Develop and test consumer acceptance of new barley-containing foods geared specifically for school-aged children as a way to help school food providers meet new nutritional standards and mandates that require higher levels of whole grain and fiber levels to help achieve improved health outcomes.

Issues and challenges:
We felt school food service was an obvious target for expanding the use of food barley because of the well established nutritional and health benefits of barley fiber, coupled with the changes in school meal nutritional standards in response to the rise in childhood obesity. The prevalence of obesity is alarming: for children aged 6 to 11 years the rate increased from 6.5 percent in 1980 to 19.6 percent in 2008. For adolescents aged 12 to 19 years the rate grew from 5 percent to 18.1 percent. To combat these alarming trends, the USDA Food and Nutrition Service implemented new rigorous meal standards which may give barley usage a boost in the future. Specifically, by 2014 all grains used in school meals must be whole grain content and fiber content must also increase substantially. Barley is a good fit for these changing nutritional standards, yet a lack of knowledge and information has hampered more widespread utilization.

Strategies: Executed by the Idaho Barley Commission and collaborators:

1. **Research on new trends in barley food product development in the US domestic market and identification of products suitable for school food service:**
   IBC and two food barley researchers met with four major US food companies on October 9-13, 2011 in Battle Creek, MI; Madison, WI; Minneapolis, MN; and Omaha, NE. We identified several promising areas of new product development that will have suitability for school food service.

2. **Integrating barley foods into school food service:**
   IBC conducted interviews of four Idaho school lunch administrators in September 2011 to begin determining the most appropriate ways to integrate barley content into school meals.

Based on the valuable input we gleaned from our October meetings with four major U.S. food companies, we concluded there was a need for an independent professional assessment on strategies for expanding use of barley in school meals. We solicited proposals from qualified nutrition experts in February 2012 and hired a consultant in March 2012. This independent evaluation was supported entirely with matching funds. The final assessment was presented in October 2012.

3. **Barley recipes suitable for breakfast and lunch schools meals:** Based on the consultant's recommendations, we engaged the services of a certified nutritionist/chef based in Boise, Idaho to develop and test three new recipes for use in school meals. These recipes included: Apple Barley Yogurt Ala Mode, Munch Mouth Chicken and Barley Pilaf and Tropical Barley Pork Salad for use in Idaho schools in the 2013/14 school year and for inclusion in the USDA recipe database. We also entered into a collaboration with a school nutritionist in Bethel, OR school district to develop additional barley recipes.

4. **Idaho Barley Commission participated as a sponsor and trade show vendor for the first ever Idaho Farm to School Conference held in Boise, Idaho on July 23-24, 2012.** We met personally with more than 50 school nutrition professionals on unique opportunities for barley usage in Idaho school meals, particularly targeted at the new whole grain and fiber standards adopted by USDA and the Idaho Department of Education.

Results: New barley recipes have been disseminated and well received by Idaho school food service nutritionists and managers in fall 2013. We have shared these recipes with other key school food service contacts in Oregon and California and have begun working with a northern California food manufacturer on new products specifically designed for local school districts using barley as a principal grain ingredient. We also have launched an outreach effort with Idaho tortilla manufacturers on using barley as a whole grain ingredient in tortillas targeted for school service industry.

Future priorities: We are working on entering the newly created barley school service recipes into the USDA recipe database to promote widespread utilization. We are investigating training for Idaho, Oregon and possibly Utah school food service administrators and nutritionists.

IV. Overall observations, findings and lessons learned:

We encountered no obstacles or barriers to the completion of our project and made no changes to the original project design. Our overall observations and findings include:

1. We found strong interest from cereal food manufacturers in both Asia and Latin America to utilize barley as a key ingredient based on its health properties (fiber). We conducted on-site evaluations at the conclusion of both technical trainings sessions, which helped us identify and target interest in procuring food barley, which we used to design a follow-up trade mission to Japan, Taiwan and South Korea. These technical training courses and follow-up trade mission to Asia resulted in substantial acreage contracts in Idaho in 2013 worth nearly a million dollars, with growth opportunities in the future.
2. Additional training is required to fully develop the market potential in Latin America, which we have placed high priority on for future market development effort.
3. We have determined that school meals are a very feasible and appropriate target for expanding barley usage, particularly as schools meet the 2014 target of 100% whole grain consumption. We have committed substantial resources in 2013-14 to continue this effort and we will be introducing three new barley recipes in Idaho and Oregon schools in the 2013-14 school year. We will continue to make direct contact with U.S. food manufacturers

on incorporating barley ingredients into packaged foods prepared for school meals, with tortillas an immediate target.

4. The NIRS calibration worked well on testing white barley samples, but testing of dark barley resulted in readings of zero beta-glucan content. This will present an obstacle in the development of various specialty barleys that range in color from blue to purple to black. Those colored barleys will have added health benefits that include higher levels of antioxidants.

Lessons learned:

1. Lack of available open market supplies of food barley in the United States remains a significant constraint to more rapid market utilization. We are tackling this issue by working with grain companies and cereal processors to embrace production contracting.
2. NIR calibration will be effective in rapidly screening large quantities of barley samples. Incorporating high-beta-glucan barley with the added health benefit and visual attractiveness of colored barley will limit a breeding program first to the development of high beta-glucan lines followed by the incorporation of added color traits.
3. New USDA school meal pattern regulations have restricted calories from grains so the ability to integrate new barley foods / recipes has become more challenging. However, interest remains high in barley as a whole grain component in future school meals.

V. Project Beneficiaries:

Targeted cereal food manufacturers (total of 13 major food companies) from Japan, Taiwan, South Korea, Mexico and Colombia were the immediate beneficiaries of increased knowledge and understanding of barley as a suitable ingredient in manufacturing noodles, breads, tortillas and cookies. This knowledge led to immediate interest in increased imports of food barley from the Pacific Northwest production region. Our barley producers directly benefitted from increased opportunities for contract production of a value-added grain with significant rotation benefits in this production region (more than three dozen growers secured production contracts in 2013). A wide number of grain procurement companies and cereal food manufacturers (big and small) will benefit in the future from having access to NIRS technology to verify beta-glucan fiber content in the barley they procure to meet their specific end-uses. School food administrators throughout the country (main focus is Western U.S. where barley can be more readily sourced and processed) will benefit from learning about ways to integrate healthy barley into their whole grain servings while successfully meeting their new rigorous school meal pattern and nutrition standards.

VI. Contributions by Public and Private Partners:

This project successfully brought together a broad cross section of public and private partners, with overall coordination provided jointly by the University of Idaho Extension and Idaho Barley Commission. For the technical training on barley use in cereal products we utilized the services of the non-profit Wheat Marketing Center in Portland, OR to design and deliver the expert training. For the school food service strategy, we engaged in an extensive outreach to private cereal processors including mills and food manufacturers and public school food service administrators and nutrition experts to determine suitable strategies for introducing barley foods into school meals. Many of the projects that were initiated under this grant are ongoing and will require a sustained effort in order to realize the goals of expanding food barley use through barley product development for Asian and Latin American markets & U.S. school food service. This grant enabled the Idaho Barley Commission and University of Idaho to develop some key building blocks necessary for achieving our long -term goal of increasing food barley utilization through these export, school food service and other marketing channels.

VII. Presentations and publications:

1. Technical Manual: Barley – Fortified Wheat Flour Product Development Short Course, Wheat Marketing Center, Portland, OR
2. Technical Short Course recruitment brochures (two)
3. Feasibility Assessment of Barley Use in School Meals
4. Three new barley recipes designed for school breakfast and lunch
5. NIRS results – presentation to ConAgra at USDA-ARS facility

VIII. Budget and matching funds:

FSMIP funding: $67,200.
Total matching funds provided by the Idaho Barley Commission and collaborators: $98,331.77.

Grant contacts:

Dr. Juliet Marshall, University of Idaho, 208-529-8376, jmarshall@uidaho.edu
Ms. Kelly Olson, Idaho Barley Commission, 208-334-2090, kolson@idahobarley.org

"State funds for this project were matched with Federal funds under the Federal-State Marketing Improvement Program of the Agricultural Marketing Service, U.S. Department of Agriculture."

BARLEY FOODS IN SCHOOLS:

Challenges and Opportunities

Dayle Hayes, MS, RD, President, Nutrition for the Future, Inc. October 11, 2012

After a review of available quantity recipe databases and a survey of a few hundred school nutrition professionals (see survey on page 3), as well as conversations with several district nutrition directors, the challenges and opportunities for increasing barley foods in school kitchens and cafeterias are quite clear. The challenges, opportunities and some resources are outlined below:

CHALLENGES:

Barley recipes for schools:

- Like most Americans, the vast majority of school nutrition professionals have limited experience preparing barley foods, other than soup, at home.
- No barley recipes could be found in the **USDA Recipes for Schools** and very limited barley recipes are available (see attached).
- With little preparation experience and few recipe resources, barley foods are simply not on the menu planning radar of school nutrition programs.

New meal patterns and barley:

- The **2012 Nutrition Standards for School Meal Patterns** have placed new maximums on grain foods, even whole grains like barley.
- School meal directors are struggling to plan and serve menus that are acceptable to

customers within the existing grain restrictions.
- Since directors feel that they have little flexibility with grains, they are sticking to basics (rolls, wraps, etc.) and not really willing to "experiment."

Availability of barley foods for schools:

- Most of the barley currently available in schools is in the form of prepared, ready-to-eat cereal foods, usually served in school breakfast programs.
- Some food companies, like **Indian Harvest**, are currently offering prepared grain and/or legume mixes.
- In a few states, notably Alaska and Minnesota, barley flour is available and has been extensively used to prepare baked products.

OPPORTUNITIES:

Increasing barley recipes for schools:

- In order to increase barley foods served in schools, school nutrition professionals will need recipes that have been tested in schools.
- These barley recipes should be in the USDA format (see Beef Vegetable Soup recipe) and include a complete HACCP plan.
- Ideally, new barley recipes should be tested in several districts, of different sizes and demographics (free/reduced percentages, ethnicity, etc.).

Increasing variety of barley foods in schools:

- Support development and dissemination of products from companies, like **Indian Harvest**, that offer prepared mixes like those for soups and salads.
- Support dissemination of tested baked good recipes that include barley flour, such as those from the **Cooperative Extension Service in Alaska**.
- Investigate opportunities to include barley and barley flour in Farm to School (F2S) programs, like the ones pioneered in Alaska.

RESOURCES:

Oregon school nutrition directors:

- Jennie Kolpak in **Bethel School District** has been mentioned as a possible director to pilot test recipes in her schools.
- Ms. Kolpak would be an excellent choice; she understands how to create standardized recipes with HACCP plans and is very familiar with F2S.
- There are several other Oregon districts that might also be appropriate, including Portland (larger) and Grants Pass (smaller).

Other school nutrition resources:

- **Chef Garrett Berdan, RD** (garrettberdan@gmail.com) from Bend would be an excellent culinary expert; he has done significant work in schools.
- **Roxann Roushar** (rroushar@edenpr.k12.mn.us), Director in Eden Prairie, Minnesota, has significant experience using barley and barley flour.
- **Johanna Herron (**johanna.herron@alaska.gov**)** has worked on the barley flour recipes developed by the Cooperative Extension Service in Alaska.

- **Alaska Flour Company** has worked closely with Cooperative Extension on the development of school recipes.
- Whole Grains Council published ***Whole Grain Recipes for Foodservice*** and is currently running a contest especially for school nutrition programs.

This is a SHORT survey about the use of BARLEY FOODS in schools, prepared for the ***Idaho Barley Commission***. Everyone who completes a survey AND provides their name + email address will be entered into a drawing for a _____.

NOTE: Your email will not be used for any other purpose than the drawing for this prize. All surveys will be destroyed at the end of the project period (by December 2012) and names/emails will not be shared with anyone besides Nutrition for the Future, Inc. staff.

For the purposes of this survey, BARLEY FOODS refers to the following items:

Whole pearled barley	Barley flakes
Barley flour	Barley cereal (

Does your child nutrition program currently serve any BARLEY FOODS to students? (circle one)

YES NO DON'T KNOW

IF YES, please list the menu items that include barley, such as Beef-Barley Soup or Barley Tea Scones. For each item, please rate how much students like the food on a scale of 1 (not at all) to 5 (very popular).

_____ 1 2 3 4 5

_____ 1 2 3 4 5

_____ 1 2 3 4 5

In your opinion, what are OBSTACLES to serving more BARLEY FOODS in school nutrition programs? For each item, please rate how much of a problem it is on a scale of 1 (not really an obstacle at all) to 5 (major problem).

Children and/or staff are not familiar with BARLEY FOODS. 1 2 3 4 5

Cooks do not know how to prepare BARLEY FOODS. 1 2 3 4 5

BARLEY FOODS do not taste very good. 1 2 3 4 5

Does your family eat any BARLEY FOODS at home?

YES NO

If YES, please list 2 to 3 of the ways your family enjoys BARLEY FOODS?

_____

NAME _____ EMAIL _____

Asian Food Barley Technical Course – Brochure and Participants.

TECHNICAL SHORT COURSE
MARCH 5-9, 2012

COURSE AGENDA

March 5 - Overview, food barley varieties and production trends, barley processing challenges and nutritional benefits

March 6 - Asian Noodle Processing and Product Evaluation

March 7 - Steam Bread and Flat Bread Processing and Product Evaluation

March 8 - Artisan Bread Processing and Product Evaluation

March 9 - Cookie, and Tortilla Processing and Product Evaluation

COURSE OBJECTIVES

To enhance nutritional value of wheat flour-based products using barley flour.

To develop formulations and modified processing conditions for barley-fortified wheat flour-based products.

IDAHO BARLEY COMMISSION

Idaho Barley Commission
821 W. State Street
Boise, ID 83702
208-334-2090
www.idahobarley.org
Ms. Kelly Olson, Administrator

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT SHORT COURSE

Wheat Marketing Center
1200 NW Naito Parkway, Suite 230
Portland, OR 97209
503-295-0823
info@wmcinc.org
Dave Shelton, Director

ASIAN TECHNICAL TEAM

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT SHORT COURSE
MARCH 5-9, 2012
WHEAT MARKETING CENTER
PORTLAND, OR

SPONSORED BY:
IDAHO BARLEY COMMISSION
WHEAT MARKETING CENTER
US GRAINS COUNCIL
UNIVERSITY OF IDAHO
USDA FSMIP

Hotel Accommodations:
Residence Inn Portland Downtown at RiverPlace
2115 SW River Parkway
Tel: 503-552-9500
Www.residenceinn.com

Asian Technical Team Members

JAPAN

Mr. Ishida, Junichi
Research & Development
Torigoe Co., Ltd
6-8-8, Hakozaki-Futo,
Higashi-ku, Fukuoka,
812-0051 Japan
Tel: 81-092-631-5014

Id-fukuoka@the-torigoe.co.jp

Mr. Kinoshita, Takafumi
Research & Development
Pasco Corp of America,
subsidiary of Shikishima Baking Co.
6500 North Marine Drive
Portland, OR 97203
Tel: 503-289-6500

tkinoshita@pascoamerica.com

TAIWAN

Mr. Chen, Hsin-Jung
R&D Manager
Mr. Mark Food Ent. Co. Ltd.
17, Yuwen Rd., East
Dist., Tainan City 701,
Taiwan
Tel: 886-937-616071
g89201068@gmail.com

TAIWAN

Mr. Peng, Ming-Dar
Plant Manager
Tay-I Flour Mill Co, Ltd.
No. 2-1, Dai Lin Road,
Taoyuan City, Taiwan
Tel: 886-3-361-8885
dardarpeng@hotmail.com

Ms. Huang, Shu-Nu
(Mrs. Peng)
Tay-I Flour Mill Co, Ltd.
No. 2-1, Dai Lin Road,
Taoyuan City, Taiwan
Tel: 886-3-361-8885
lady3291@gmail.com

Ms. Lu, His-Wen
Deputy Section Chief
Frozen Noodle Product
Development Dept.
Nam Chow Group
No. 3, Ln. 134, Daping St.
Yangmei City
Taoyuan County 326
Taiwan
Tel: 886-3-452-1340
clfnpdd70@namchow.com.tw

SOUTH KOREA

Mr. Lee, Hyun-Woo
Orion Confectionary Co., Ltd.
#30-10, Munbae-dong,
Yongsan-gu,
Seoul 140-715, Korea
Tel: 82-2-710-6191
ppokki@orionworld.com

Mr. Ko, Seong-Pil
Assistant Manager
Snack Development Team
Nongshim Co. Ltd.
#370-1, Shindaebang-dong,
Dongjak-gu
Seoul 156-709, Korea
Tel: 82-2-820-8205
clover76@nongshim.com

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT

Wheat Marketing Center
1200 NW Naito Parkway,
Suite 230
Portland, OR 97209
503-295-0823

WHEAT MARKETING CENTER

Barley-Fortified Wheat Flour Product Development Short Course

March 5-9, 2012

Table of Contents

Tab 1:	Course program Course evaluation form
Tab 2:	Participants and speakers
Tab 3:	Flour and ingredient information
Tab 4:	Lecture: Improvement of food barley in Aberdeen, Idaho
Tab 5:	Lecture: Barley: opportunities and challenges
Tab 6:	Lecture: Emerging science on barley health benefits
Tab 7:	Lecture: Overview of Idaho barley industry
Tab 8:	Lecture: BGLife barley
Tab 9:	Lecture: Developing barley-fortified wheat flour-based foods
Tab 10:	Workshop: Production of barley-fortified Asian noodles
Tab 11:	Workshop: Production of barley-fortified steamed breads
Tab 12:	Workshop: Production of barley-fortified flat breads
Tab 13:	Workshop: Production of barley-fortified Artisan breads
Tab 14:	Workshop: Production of barley-fortified flour tortillas and cookies
Tab 15:	Wheat Marketing Center information

Barley-Fortified Wheat Flour Product Development Short Course
Asian Technical Team

Wheat Marketing Center, Portland, Oregon
March 5-9, 2012

Objectives

1) To enhance nutritional value of wheat flour-based products using barley flour
2) To develop formulations and modified processing conditions for barley-fortified wheat flour-based products

Monday, March 5
Depart hotel at 7:40 a.m.

AM	8:00	Welcome by Idaho Barley Commission and WMC Team member introduction
	8:30	Food barley variety development - Dr. Gongshe Hu, USDA/ARS barley breeder
	9:00	Barley processing challenges and opportunities - Dr. Andrew Ross, Oregon State University cereal chemist
	9:30	Barley nutritional benefits - Dr. Christine Fastnaught, WestBred, cereal chemist
	Break	
	11:15	Barley production and marketing trends – Kelly Olson, Idaho Barley Commission, Boise, ID and Dan McKay, McKay Seed Co, Almira, WA
	12:00	Lunch provided by WMC
PM	1:00	Developing barley-fortified wheat flour-based foods, Dr. Gary Hou, WMC
	2:00	Lab tour
	3:00	Review barley flour materials and workshop preparation
	4:00	Adjourn
	5:30	Dinner hosted by Idaho Barley Commission

Tuesday, March 6
Depart hotel at 7:40 a.m.

AM	8:00	Asian noodle processing (effect of barley flour fortification on formulations and processing conditions)
	12:00	Lunch provided by WMC
PM	1:00	Asian noodle evaluation (instrumental and sensory)
	4:00	Adjourn

Wednesday, March 7
Depart hotel at 7:40 a.m.

AM	8:00	Steamed bread processing and evaluation
	12:00	Lunch provided by WMC
PM	1:00	Flat bread processing and evaluation
	4:00	Adjourn

Thursday, March 8
Depart hotel at 7:40 a.m.

AM	8:00	Artisan bread processing
	12:00	Lunch provided by WMC
PM	1:00	Artisan bread evaluation
	5:30	Graduation dinner hosted by Wheat Marketing Center (all invited)

Friday, March 9
Depart hotel at 7:40 a.m.

AM	8:00	Flour tortilla and cookie processing and evaluation
	12:00	Lunch provided by WMC
PM	1:15	Open for personal arrangement **(group sightseeing or market survey)**

Barley-Fortified Wheat Flour Product Development Short Course
Asian Technical Team

Evaluation Form

March 5-9, 2012

Overall, how would you rate this short course?

__Extremely Satisfied __Very Satisfied __OK __Somewhat Satisfied __Dissatisfied

Subject Matter: (Was the subject covered in sufficient detail? Was it taught at the level you expected?)

Format: (Length of workshop, timing for each session)

Quality of Lecturers: (Ability to communicate well, were they well prepared and easily understood)

1. Improvement of food barley in Aberdeen, Idaho
2. Barley: opportunities and challenges
3. Emerging science on barley health benefits
4. Overview of Idaho barley industry
5. BGLife barley
6. Developing barley-fortified wheat flour-based foods

Materials: (Were the handouts easy to understand?)

Quality of lab workshops (Does each workshop enhance your understanding of the subject?)

1. Production of barley-fortified Asian noodles

2. Production of barley-fortified steamed breads and buns

3. Production of barley-fortified flat breads

4. Production of barley-fortified Artisan breads

5. Production of barley-fortified flour tortillas and cookies

Which area of the course did you find most beneficial? most interesting? (Refers to specific areas)

Will the information you have learned from this course have an immediate and positive impact on your job or your company's business?

What areas do you think we should improve in the future courses?

What subjects are you interested in but we did not cover in this course?

Are you interested in other courses (Asian noodle technology, flat breads and flour tortillas, bread and hamburger buns, cookies and crackers, bagels and donuts, Artisan breads, whole grain baking, frozen dough, steamed breads, spring rolls, dumplings, etc.)? Please specify.

Other comments (lodging, foods, transportation, hospitality, etc.)

TECHNICAL SHORT COURSE
AUGUST 13-17, 2012

COURSE AGENDA

August 13 - Overview, food barley varieties and production trends, barley processing challenges and nutritional benefits

August 14 - Artisan Bread Processing and Product Evaluation

August 15 - Pan and Flat Bread Processing and Product Evaluation

August 16 - Cookie and Cracker Processing and Product Evaluation

August 17 - Tortilla Processing and Product Evaluation / Course Evaluation

COURSE OBJECTIVES

To enhance nutritional value of wheat flour-based products using barley flour.

To develop formulations and modified processing conditions for barley-fortified wheat flour-based products.

IDAHO BARLEY COMMISSION

Idaho Barley Commission
821 W. State Street
Boise, ID 83702
208-334-2090
www.idahobarley.org
Ms. Kelly Olson, Administrator

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT SHORT COURSE

WHEAT MARKETING CENTER

Wheat Marketing Center
1200 NW Naito Parkway, Suite 230
Portland, OR 97209
503-295-0823
info@wmcinc.org
Dave Shelton, Director

Latin American Technical Team

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT SHORT COURSE
AUGUST 13-17, 2012
WHEAT MARKETING CENTER
PORTLAND, OR

SPONSORED BY:
IDAHO BARLEY COMMISSION
WHEAT MARKETING CENTER
US GRAINS COUNCIL
UNIVERSITY OF IDAHO
USDA FSMIP

Hotel Accommodations:
Residence Inn Portland Downtown at RiverPlace
2115 SW River Parkway
Tel: 503-552-9500
www.residenceinn.com

Latin American Technical Team Members

COLOMBIA

Mr. Jorge William Morales
General Manager
COLOMBINA DEL CAUCA S.A.
Cali, Colombia
Tel: (572) 829-5305
wmorales@colombina.com

Mr. Juan Manuel Martinez
MOLINOS SAN MARTIN
Calle 17A No. 35-22
Bogota, Colombia
Tel: (571) 360-8715
J.martinez@organizacionmas.com

Mr. Helmuth Garcia
General Manager
PROCOHARINAS S.A.
Calle 15 No. 32A-36,
Bogota, Colombia
Tel: (571) 247-4737
hgarcia@procoharinas.com

MEXICO

Mr. David Lorenzo Cano
General Director
MUNSA
Blvd. Fco. E. Kino #309,
Col. Country Club, C.P. 83010 Hermosillo,
Sonora, Mexico
Tel: (662) 289-0075
dcano@munsa.com.mx

Mr. Javier Delgado
Corporate Quality Manager
MUNSA
Sufragio Efectivo y Nicolas Bravo #1110, Col. Centro C.P. 85000 Ciudad Obregon, Sonora, Mexico
Tel: (664) 413-3258
jdr@munsa.com.mx

Mr. Efrain Rincon
Quality Manager and Customer Service
MOLINA GUADALAJARA
Calle 3 No. 690, Zona Industrial, C.P. 44940, Guadalajara, Mexico
Tel: (333) 145-2460
erincon@grupo-kasto.com

MEXICO

Mr. Pedro Medina
Research, Innovation & Development
ALTEX
Condominio 6, Casa 6, Fraccionamiento el Olimpo,
Toluca, Estado de Mexico,
Mexico C.P. 50240
Tel: (728) 282-7950, Ext 293
pmedina@grupoaltex.com

BARLEY-FORTIFIED WHEAT FLOUR PRODUCT DEVELOPMENT

Wheat Marketing Center
1200 NW Naito Parkway,
Suite 230
Portland, OR 97209
503-295-0823

WHEAT MARKETING CENTER

Barley-Fortified Wheat Flour Product Development

Short Course

August 13-17, 2012

Table of Contents

Tab 1:	Course Program Course evaluation form
Tab 2:	Participants and speakers
Tab 3:	Flour and ingredient information
Tab 4:	Lecture: Food barley variety development
Tab 5:	Lecture: Barley processing – Challenges and opportunities
Tab 6:	Lecture: Barley nutritional benefits
Tab 7:	Lecture: Barley production and marketing trends
Tab 8:	Lecture: Developing barley-fortified wheat flour-based foods
Tab 9:	Workshop: Production of barley-fortified Artisan breads
Tab 10:	Workshop: Production of barley-fortified pan breads and flat breads
Tab 11:	Workshop: Production of barley-fortified cookie and crackers
Tab 12:	Workshop: Production of barley-fortified flour tortillas
Tab 13:	Wheat Marketing Center information

WHEAT MARKETING CENTER

Improving the Competitive Edge of United States Wheat through Education and Research

Barley-Fortified Wheat Flour Product Development Short Course

Latin American Technical Team

Wheat Marketing Center
Portland, Oregon
August 13-17, 2012

Objectives

To enhance nutritional value of wheat flour-based products using barley flour
To develop formulations and modified processing conditions for barley-fortified wheat flour-based products

Monday, August 13
Depart hotel at 7:40 a.m.

AM	8:00	Welcome by Idaho Barley Commission and Wheat Marketing Center Team member introduction
	8:30	Food barley variety development Dr. Gongshe Hu, USDA/ARS barley breeder
	9:00	Barley processing challenges and opportunities Dr. Andrew Ross, Oregon State University cereal chemist
	9:30	Barley nutritional benefits Dr. ~~Christine Fastnaught~~, WestBred, cereal chemist Dr. Greg Fox
	Break	
	11:15	Barley production and marketing trends Kelly Olson, Idaho Barley Commission, Boise, ID Sam White, PNW Farmer Cooperatives, Genesee, ID
	12:00	Lunch provided by WMC Menu: Salad, fresh fruit, lemongrass chicken stir fry, jasmine rice, Thai spring rolls, date and walnut wontons
PM	1:00	Developing barley-fortified wheat flour-based foods, Gary Hou, WMC
	2:00	Lab tour
	3:00	Review barley flour materials and workshop preparation
	4:00	Adjourn
	5:30	Dinner hosted by Idaho Barley Commission

1200 N.W. Naito Parkway, Suite 230, Portland, OR 97209-2831
Ph: (503) 295-0823 FAX (503) 295-2735 Email: info@wmcinc.org

Tuesday, August 14
Depart hotel at 7:40 a.m.

AM	8:00	Artisan breads Effect of barley flour fortification on formulations and processing conditions
	12:00	Lunch provided by WMC Menu: Salad, saudage and peppers, rice pilaf, baked tomatoes, focaccia bread, cheesecake
PM	1:00	Artisan bread evaluation (instrumental and sensory)
	4:00	Adjourn

Wednesday, August 15
Depart hotel at 7:40 a.m.

AM	8:00	Pan/flat bread processing and evaluation
	12:00	Lunch provided by WMC Menu: Salad, salmon, rice, green beans almondine, rolls
PM	1:00	Pan/flat bread processing and evaluation
	4:00	Adjourn

Thursday, August 16
Depart hotel at 7:40 a.m.

AM	8:00	Cookie and cracker processing
	12:00	Lunch provided by WMC Menu: Salad with papaya and avocado, southwest chicken lasagna, rice, tortilla chips and salsa, cookies
PM	1:00	Cookie and cracker evaluation
	5:30	Graduation dinner hosted by Wheat Marketing Center (all invited) Chart House Restaurant

Friday, August 17
Depart hotel at 7:40 a.m.

AM	8:00	Tortilla processing and evaluation
	12:00	Lunch provided by WMC Menu: Salad, linguine with prawns, spanikopita, grilled vegetables, grilled pita, baklava
PM	1:15	Course evaluation Afternoon open for personal arrangements, such as group sightseeing or market survey

Barley-Fortified Wheat Flour Product Development Short Course
Latin America Technical Team

Evaluation Form

August 13-17, 2012

Overall, how would you rate this short course?

__Extremely Satisfied __Very Satisfied __OK __Somewhat Satisfied __Dissatisfied

Subject Matter: (Was the subject covered in sufficient detail? Was it taught at the level you expected?)

Format: (Length of workshop, timing for each session)

Quality of Lecturers: (Ability to communicate well, were they well prepared and easily understood)

1. Improvement of food barley in Aberdeen, Idaho
2. Food barley: opportunities and challenges
3. Emerging science on barley health benefits
4. Immunofiber
5. Barley production and marketing trends
6. Developing barley-fortified wheat flour-based foods

Materials: (Were the handouts easy to understand?)

Quality of lab workshops (Does each workshop enhance your understanding of the subject?)

1. Production of barley-fortified Artisan bread

2. Production of barley-fortified pan bread

3. Production of barley-fortified flat bread

4. Production of barley-fortified cookie

5. Production of barley-fortified crackers

6. Production of barley-fortified flour tortillas

Which area of the course did you find most beneficial? most interesting? (Refers to specific areas)

Will the information you have learned from this course have an immediate and positive impact on your job or your company's business?

What areas do you think we should improve in the future courses?

What subjects are you interested in but we did not cover in this course?

Are you interested in other courses (Asian noodle technology, flat breads and flour tortillas, bread and hamburger buns, cookies and crackers, bagels and donuts, Artisan breads, whole grain baking, frozen dough, steamed breads, spring rolls, dumplings, etc.)? Please specify.

Other comments (lodging, foods, transportation, hospitality, etc.)

Barley Commission Sample K-8 Lunch Menus

Day 1

Tropical Bliss Barley Salad
½ cup Sliced Bananas and Strawberries
½ cup Baby Carrots
1 Fat-Free Milk

Meal Components
2 oz eq M/MA
1.25 oz Grain
¾ cup Fruit
1.125 cup Vegetable
1 cup Milk

Day 2

Munch Mouth Chicken Barley
½ cup Fresh Broccoli
2 Tbsp Dressing
½ cup Kiwi and Grape Salad
1 Whole Grain Roll
1 Fat-Free Milk

Meal Components
2 oz eq M/MA
2.25 oz eq Grain
½ cup Fruit
¾ cup Vegetable
1 cup Milk

Day 3

Apple Blueberry Barley A'la mode
½ cup Sliced Peaches
¾ cup cherry tomatoes
1 oz String Cheese
1 Fat-Free Milk

Meal Components
1.75 oz eq M/MA
1.25 Grains
1 cup Fruit
¾ cup Vegetable
1 cup Milk

Barley Commission Sample 9-12 Lunch Menus

Lunch 1

Tropical Bliss Barley Salad
1 cup Sliced Bananas and Strawberries
½ cup Baby Carrots
1 Whole Wheat Bread Stick
1 Milk

Meal Components
2 oz eq M/MA
2.25 oz Grain
1.25 cup Fruit
1.125 cup Vegetable
1 cup Milk

Lunch 2

Munch Mouth Chicken Barley
¾ cup Fresh Broccoli
2 Tbsp Dressing
1 cup Kiwi and Grape Salad
1 Whole Grain Roll
1 Milk

Meal Components
2 oz eq M/MA
2.25 oz eq Grain
1 cup Fruit
1 cup Vegetable
1 cup Milk

Lunch 3

1 ½ cups Apple Blueberry Barley A'la mode
1 cup cherry tomatoes
¼ cup Cottage Cheese
1 Milk

Meal Components
2.5 oz eq M/MA
2.5 Grains
1 cup Fruit
1 cup Vegetable
1 cup Milk

Apple~Blueberry Barley A'la Mode

Serving Size:
Heaping 3/4 cup Barley Apple Mixture
with ¼ cup Yogurt
Number of Servings: 100

Ingredients

13 lbs	USDA Frozen Blueberries	3 cups	Brown Sugar, packed
3.5 #10 cans	USDA Sliced Apples	1 ½ T	Baking Powder
1.75 gal	Water	½ cup	Vanilla Extract
6.25 lbs	Dry Barley	¼ cup	Cinnamon
4 cups	1% Milk	1 T	Salt
4 cups	USDA Frozen Eggs, Thawed	6.25 qt	Low-Fat Vanilla Yogurt

Directions

Preheat oven to 400°F.

Prepare Ingredients

Thaw blueberries. Drain juice from apples.

Prepare Barley

Mix water with barley in a steam table pan and cover tightly with foil. Bake for 45 minutes to 1 hour. Remove from oven and let cool for 20 minutes.

Mix Baking Ingredients

In a bowl: mix milk, eggs, brown sugar, baking powder, vanilla, cinnamon, and salt. Whisk until well mixed.

Prepare Dish

Add baking ingredient mixture to cooked barley and mix well. Add in drained apples and thawed blueberries, mix well. Cover tightly and bake for 50 minutes.

Serve Dish

Serve a heaping 3/4 cup warm barley apple mixture and top with ¼ cup vanilla yogurt.

Chef Tips

Thawing the blueberries before mixing into the barley mixture will give this dish a beautiful color. It is a good idea to cool the barley for 20 minutes before tossing with the egg mixture. If the barley is too hot, it will cook the egg mixture before it has a chance to get mixed into the barley dish. Getting the egg mixed into the dish well before baking helps the dish to bind together during baking.

Designed By Chef Brenda Thompson for the Idaho Barley Commission

Meal Components

.75 oz eq M/MA
1.25 oz eq Grain
.5 cup Fruit

Nutrition Information

291 Calories
1.5g Saturated Fat
173g Sodium

IDAHO BARLEY COMMISSION

Tropical Bliss Barley Salad

Serving Size: See Directions
Number of Servings: 100

Ingredients

15.25 lbs	USDA Cooked Ham	1 T	Salt
3 #10 cans	Pineapple Tidbits	1 ½ Cups	Vinegar
4 lbs	Yellow Onions, whole	14 oz bag	Coconut, shredded
5.25 lbs	Red Pepper, whole	1.75 gal	Chicken Broth, low-sodium
2 Cups	Cilantro	6.25 lbs	Dry Barley
11 cups	Pineapple juice	16 lb	Lettuce, chopped
5 ½ cups	USDA Vegetable Oil		

Directions

Preheat oven to 400°F.

Prepare Ingredients

Dice Ham. Drain pineapple and reserve juice. Dice onions. Dice red pepper. Remove stems from cilantro.

Prepare Salad Dressing

In a blender or food processor mix cilantro, pineapple juice, vegetable oil, salt, and vinegar. Refrigerate for two hours prior to serving. Whisk well before serving.

Prepare Pineapple

Toss drained pineapple with coconut right before serving.

Cook Barley

Mix chicken broth, onions and barley in a steam table pan and cover tightly with foil. Bake for 45 minutes to 1 hour. Remove from oven and cool in refrigerator.

Serve Dish

Lay 1 cup lettuce on tray and top with a heaping ½ cup barley, 2.44oz diced ham, 2 T red pepper, and ¼ cup pineapple. Serve with 3 T salad dressing.

Chef Tips

The amount of juice from canned pineapple will vary and will not be enough to make the dressing in this recipe. However, using the juice from the canned pineapple in combination with concentrated pineapple juice will decrease food costs.

Coconut is a trendy health food right now. Using trendy foods in your recipes helps you compete with popular restaurants.

Designed By Chef Brenda Thompson for the Idaho Barley Commission

Meal Components

2 oz eq M/MA
1.25 oz eq Grain
.25 cup Fruit
.625 cup Vegetable

Nutrition Information

375 Calories
4g Saturated Fat
726g Sodium

IDAHO BARLEY COMMISSION

Munch Mouth Chicken Barley Recipe and Final Analysis

Recipe: 000197 Munch Mouth Chicken Barley
Recipe Source:
Recipe Group: ENTREES

Alternate Recipe Name:
Number of Portions: 100
Size of Portion: 1 Cup

Recipe HACCP Process:

900771 GARLIC, FLAKES 011284 ONIONS,DEHYDRATED FLAKES 002029 PARSLEY,DRIED 902484 Lemon Pepper with Zest of Lemon 902445 USDA Diced Chicken Meat (Processed) 020004 BARLEY 902437 Chix broth, low sodium 902448 USDA Carrots, Frozen, Sliced, 30# 100352	1 1/2 CUP 1 1/2 CUP 1 1/2 CUP 3/4 CUP 12 1/2 LB 6 1/4 LB 1 3/4 GAL 10 1/4 LB	Preheat oven to 400°F. Prepare Chicken Mixture Mix garlic flakes, onion flakes, parsley, and lemon pepper together. Add frozen chicken pieces to seasonings and mix well; let set for two hours to overnight in the refrigerator.
011291 ONIONS,SPRING OR SCALLIONS (INCL TOPS&BULB),R	2 CUP, chopped	Prepare Dish Evenly spread uncooked barley over bottom of pan. Top with seasoned chicken, spread evenly. Spread carrots over chicken. Pour chicken broth over mixture. Cover tightly with foil and bake for 1 hour. Finish Dish Slice green onions and sprinkle onions over dish after cooking.

*Nutrients are based upon 1 Portion Size (1 Cup)

Calories	222	kcal	Cholesterol	54.00	mg	Protein	22.49	g	Calcium	*19.60*	mg	13.69%	Calories from Total Fat
Total Fat	3.38	g	Sodium	198.11	mg	Vitamin A	*9.75*	RE	Iron	*2.03*	mg	3.56%	Calories from Saturated Fat
Saturated Fat	0.88	g	Carbohydrates	27.50	g	Vitamin A	*33.37*	IU	Water†	*4.67*	g	*0.00%*	Calories from Trans Fat
Trans Fat†	*0.00*	g	Dietary Fiber	6.89	g	Vitamin C	*2.09*	mg	Ash†	*0.81*	g	49.53%	Calories from Carbohydrates
												40.52%	Calories from Protein

N/A - denotes a nutrient that is either missing or incomplete for an individual ingredient
* - denotes combined nutrient totals with either missing or incomplete nutrient data
† - denotes optional nutrient values

NOTICE: The data contained within this report and the NUTRIKIDS® Menu Planning and Nutritional Analysis software should not be used for and does not provide menu planning for a child with a medical condition or food allergy. Ingredients and menu items are subject to change or substitution without notice. Please consult a medical professional for assistance in planning for or treating medical conditions.