US Wheat Associates
Foreign Market Development Report
Wheat Quality Improvement Team to Central America and Mexico

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Period of Travel
17 January 2009 to 24 January 2009

Purpose of Travel

1) Gather input on wheat quality from key customers (i.e., market class-specific likes and dislikes) and return that information to the US wheat research and extension communities.
2) Listen and respond to needs and concerns of customers regarding wheat quality, reinforcing a spirit of cooperation between supplier and purchaser.
3) Share stories of success in achieving specific levels of quality in wheat varieties released today.

Itinerary

Country, City	**Arrival date**	**Departure date**
Costa Rica, San Jose	17 January 2009	19 January 2009
Guatemala, Guatemala City	19 January 2009	21 January 2009
Mexico, Mexico City	21 January 2009	22 January 2009
Mexcio, Monterrey	22 January 2009	24 January 2009

Contacts
On file at USW offices in Portland and Mexico City

Summary of Key Wheat Quality Messages -- gained through one-on-one meetings with leading US wheat customers, across all markets

1) **The lack of consistency of physical (cleanliness), rheological, and end-product quality of grain shipments (rail or ocean vessel) remains the "squeaky wheel" for most customers in this region.** Exceptions of improved consistency could be noted, such as HRW wheat out of the PNW, but generally, this single topic was thematic among all customers. The highest level of quality is less important than quality uniformity at a class-appropriate level, that is, one that provides value. What is not so obvious is the degree to which the inconsistency in rheological or

end-product measures exceeds variances associated with i) the environment across a class-specific region, or ii) varietal composition that may vary from one area to another within a region, or iii) the measurement device itself or the operator.

2) **HRW wheat has become the dominant and preferred class in the Mexico/Central America region**, with generally better quality, especially in the end product which includes pan bread, artisan breads, and "sweet" rolls. HRW wheat breeders would be well advised to gain familiarity with product performance of newly released varieties, such as through the OVA program, and make adjustments accordingly.
3) **The alveograph, or its improved offspring, the consistograph, remains <u>the</u> instrument of choice to evaluate end-use quality** in soft <u>or</u> hard wheat. Parameters of choice vary by region, whether for P/L ratio in Costa Rica and Guatemala or W value in Mexico. All markets expressed interest in the possibility of a market-applicable end-use functionality testing device that could be incorporated into the FGIS or grain inspection system. It is time.

Summary of Key Wheat Quality Messages, by country

Costa Rica

<u>Relevant background information</u> (market, consumption, competitors)

- Costa Rica and Guatemala are becoming reliable purchasers of relatively small shipments of multiple classes of wheat – HRS, HRW, SRW, and to some extent, SW. Rather than importing one class and simply forcing it into their multiple end-products, they have become extremely value conscious, which shows in their purchase specifications.
- The US is by far the principal supplier of wheat into Costa Rica, with minor participation by Canada and Mexico. Costa Rica produces no wheat of its own.
- Exports of US wheat have totaled more than 200 TMT in four of the past five years. Trends appear to be stable. HRS wheat is the dominant US class imported.
- Consumption of wheat is highest in Costa Rica, relative to other Central American countries, yet lags behind per capita consumption in Mexico by about 25%.

<u>Key messages across classes</u>

- Overall satisfaction was evident with US wheat.
- Lack of consistency was noted between ocean vessel shipments of HRS, HRW, or SRW wheat within a given milling year. When asked directly about US HRS

wheat, the lack of consistency seemed to revolve around alveograph performance, namely P/L ratio (range of 0.38 to 0.65 in MY09) and W value (varying from 350 to 420).

- Heavy dependence was noted across all classes of HRS, HRW, and SRW wheat for the alveograph (constant-absorption method) and for wet gluten content to characterize strength and extensibility of wheat shipments. The team recognized shortcomings of this dependence in truly characterizing functionality of a flour sample, particularly for hard wheat, given that the resulting dough may not be optimized for absorption and therefore the gluten will be underdeveloped before measurement of P, L, and W. The same may be true for wet gluten characterization, where the dough is not adequately mixed, leaving larger-sized glutenins to be washed out before gluten quantification.
- Customers in this market have a tendency to tender above-grade; so, for example for HRW, specifications may include grade no. 2 (or better) at 59.0 lb/bu test weight and 2% wheat of other classes.
- Routine tests are performed in private laboratories for DHV, falling number, and DON/aflatoxin, when those services can be adequately provided instead by FGIS.

Key messages within classes

HRW

- HRW is typically blended with HRS in making bread flour to fulfill short-term shortages in desired protein content of HRS and to compensate for recent price spikes in HRS. Industrial bakers were able to blend in more HRW to achieve similar functionality in their bread flours for greater economic value. HRW flour is also being blended into semolina for pasta production. Some indication was given that HRW may be used to improve extensibility of HRS.
- The use of an optimized mill for HRW (and for HRS and durum) has apparently lessened the demand for consistency in kernel size. Milling quality is based strictly on test weight, and any within-class variation appears to be tolerated, though this condition may be the exception rather than the rule in the C. American region.
- Overall satisfaction with the HRW class was tempered by comments of high protein (12.7-12.8%, when tendered at 12.5%) coupled with a wet gluten content of 30 to 31% (see across-class comments). A wet gluten content below 32% means proportionately less HRW may be blended with the more costly HRS class, as the low-wet gluten HRW was perceived to decrease loaf volume.

HRS

- The effect of lower protein content in the ’08 HRS crop was aggravated by the absence of bromate (for fermentation gas retention) in flour formulations.

- Customers considered a "positive correlation to exist between hardness of grain (i.e., higher DHV) and quality of the protein"; more specifically, higher DHV was believed to bring higher wheat protein, higher test weight, and lesser scab damage.

Other classes

- SRW wheat shipments were said to be extremely variable but provided suitable product quality at a wheat protein content of about 10%. The higher protein is desired for producing cookies with slightly harder bite that is perceived to have greater freshness in the humid environment of Costa Rica.
- Target alveograph values were P, 38-42; L, 90-105; P/L, 0.38-0.42.

Guatemala

Relevant background information

- Guatemala imports almost 500 TMT of US wheat, and the 5-year trend appears to be upward. Traditionally, HRW wheat is by far the dominant class, followed by HRS (note, the reverse of Costa Rica).
- Wheat purchases have recently shifted from the Gulf to the PNW using combination-cargoes of SW, HRW (from Montana), and HRS to achieve lower dockage and foreign material (FM) levels.
- SRW is substituted for SW to maximize economic value (SW can be priced $100/t more than SRW).
- Canada prices CWRS at the US HRW price to maintain some presence in the region.
- The overall market for wheat-based foods in Guatemala (and other Central American countries) is growing thanks to continued evolution in convenience foods made from wheat, driven by growth in the economy, household income, franchising in the region, and a youthful population.
- Key food components of the expanded wheat market are Asian-style noodles, cookies and crackers, and pasta.

Key messages across classes

- The customer base roughly portions out as 90:10 artisan:industrial baking, with slight movement toward industrialized baking operations. With heavy emphasis on manual operations, bread doughs must have forgiving and adaptable qualities—in addition to strength—due to variable ambient conditions and unexpected delays in processing.
- Buyers now source out of the PNW instead of the Gulf to realize more consistent quality and cleaner wheat; biological contaminants persist more at the Gulf than

in the PNW. Wheat from the PNW tends to be most similar to wheat imported from Canada.

- As in Costa Rica, a dichotomy exists in blended class proportions today versus the recent past for bread flour. A bread flour blend of 80:20 HRS:HRW in the past is now 30:70 HRS:HRW.
- White bran is preferred over red bran for its quoted 1 to 2% flour extraction advantage. Millers were not hesitant to voice displeasure over the lack of a HW option for bread flour. If given the choice, and all else equal, HW would bring greater demand than HRW.
- Very little discussion was volunteered for kernel size or weight, except for the obvious desire for higher kernel weight as it was perceived to have better "milling quality".
- Varieties tested in the 2007 crop OVA program performed consistently lower than the local control flours, with exception of SW wheat.
- The emphasis on artisan baking practices creates little opportunity for the baker to adjust the rate of water absorption, which can lead to dough development deficiencies. This condition is worsened in cases of excessive starch damage (>5%) if the mill is not adjusted properly for the particular wheat class (e.g., HRW vs. HRS).

Key messages within classes

HRW

- As a class, HRW has performed very well in a number of areas ranging from loaf volume to test weight (desire 82.2 kg/hl) to falling number. HRW is used as a primary component traditionally in "sweet" rolls (90%HRW, 10% SW) and more recently as a primary component in bread flour (70% HRW, 30% HRS).
- Desired characteristics for sweet rolls are 10.5-11.7% wheat protein, 57-62% farinograph absorption, P/L ratio 0.7-1.2, and a W value of 250-340.
- Shipments from the PNW have provided less variability and better predictability. The best shipments have given straight-dough pup-loaf volumes averaging 880 cc, with a minimal requirement of 800 cc.
- Bakers must decrease fermentation time and the time dedicated to sheeting for bread flours made from 100% HRW.

Other classes

- Shipments of PNW DNS have been more consistent than from the Gulf, with preference given at times to CWRS because it is cleaner, has lower microbiological population counts, and provides better bran separation during milling with lower flour ash.

- SRW shipments originating from the Gulf have come with excessive moisture (12.8% instead of 11.8%) and higher dockage, both factors being inconsistent with levels assured on the certificate.
- SW from the PNW has provided a viable substitute for SRW, with better flour yield, but pricing is not in its favor, nor is SW preferred over SRW for cracker production (better height with SRW).

Mexico

Relevant background information

- Mexico is a maturing and growing market for US wheat in light of free-trade policies, population growth in Mexico (1.2% per year), transportation logistics that offer choice of ocean freight or rail shipments based on competitive pricing, and favorable consumption patterns that fluctuate with wheat prices. Wheat breeding and quality improvement programs, particularly in the Gulf tributary hard and soft wheat growing areas, should focus their efforts on servicing this critical export market.
- Following elimination of the state buying agency CONASUPO in 1994, the milling market in Mexico has become rapidly sophisticated, even though artisan bakers still consume the majority of bread flour (ca. 75%). Nevertheless, several large industrial pan bread manufacturers are influential in the Mexican wheat trade. About 85% of Mexico's total milling capacity is controlled by 15 companies or buying groups.
- Wheat from the USA (HRW, HRS, SRW), Canada, and Mexico (semi-hard) account for virtually all of the wheat purchased by Mexican millers. Importation of Argentine wheat is prohibited by sanitary or other restrictions; else with competitive freight rates, Argentine wheat would be a player, or may yet be a player with time. Domestic wheat production tends to compete more with US SRW and durum wheat than with US HRW wheat.
- Mexico trails only Nigeria as the no. 2 purchaser of US HRW wheat (Gulf tributary). HRW wheat constitutes more than 60% of US wheat sales to Mexico. Mexico is also the no. 2 purchaser of US SRW wheat (about 30% of total SRW exports), as cookie and cracker consumption is expected to increase. HRS wheat constitutes the remainder of US exports to Mexico. Total exports of US wheat have averaged 2.6 MMT since 2004.
- Before ocean freight rates decreased in recent months, rail shipments constituted about 50% of the wheat exported, and virtually all of that was from the Central Plains. With more competitive ocean freight rates, rail shipments may decline despite fewer quality complaints tied to rail shipments and despite recent investments in rail infrastructure across the border into Mexico.

- Large retail chain stores usually have an in-store bakery that produces artisan-style baked goods. Cookies and biscuits account for only about 5% of the total flour consumed in Mexico. Asian-style noodles represent one of the fastest-growing subsectors of wheat food products.

Key messages across classes

- Consistency between shipments and within shipments remains the principal factor in determining customer satisfaction. It is the lack thereof that seems to set off a cascade of criticisms on all levels of quality. To quote one influential miller in Mexico, consistency is preferred over any specific type (level) of quality, whether in protein content, moisture content, absorption, or some component of the alveograph. Consistency is the "name of the game" as the millers also expressed, and US wheat, in general, has difficulty in competing on that level when played against Mexican domestic wheat (albeit from a much restricted geographic region) or Canadian classes of wheat. As one miller sarcastically stated, "we don't want kernels the size of a cantaloupe; we just want consistency".
- On a related note, comments voiced among millers and buyers reflected a general distrust in the US grain trade system, and appeared to be at times misdirected at a scientific audience. Disparity of the FGIS certificate with the delivered product was a consensus complaint. Comments generally revolved around moisture content (elevated above stated levels in the FGIS certificate), wheat admixtures of SRW in HRW, cleanliness in the form of elevated dockage, foreign material, or shrunken and broken kernels, and biological content (bacterial coliform). Criticisms of high-moisture wheat, deserved or not, received top billing, as purchase managers argued that delivery of high-moisture wheat allowed little room for margin. We will only know with subsequent harvest(s) if poor harvest conditions in parts of the Great Plains in 2007 and 2008 are as much to blame as anything.
- Purchasers tended to overlook the importance of environmental variation within classes for environmentally sensitive quality parameters – notably protein content, absorption, and alveograph measurements – that can *be reduced but not eliminated* with increasing genetic uniformity among varieties relative to quality targets. The vast geographic regions for HRW and SRW wheat would be notorious for harboring environmental variation.
- Relative costs of rail versus ocean vessel played a key role in purchase decisions, but one prevailing opinion was that consistency of product quality was greater with rail shipments.
- Millers often noted the discrepancy between a given quality parameter in the actual shipment versus the average crop quality value reported by US Wheat

Associates for a given market class, reflecting a misunderstanding in the importance of specification to a certain tolerance range or to a misunderstanding of the natural or environmental range likely to occur across a market class region.

- No less important among all of these issues is the *dire need for functional quality parameters in the official certification system* offered by FGIS. Over-dependence was quite evident with the alveograph (constant absorption) as an across-class barometer of grain quality.

Key messages within classes

HRW

- Contrary to what the Wheat QIT learned in Mexico in 2001, the breadmaking ability of the HRW class generally received favorable marks (e.g., "good manageability")—certainly not the barrage of negative comments voiced eight years ago regarding kernel size, test weight, millability, water absorption, and dough strength. Part of this reversal is related to progress and relevant attention given in breeding programs, but perhaps even more so to intensive efforts on the part of US Wheat Associates to educate millers in Mexico in proper cleaning and mill settings for HRW wheat.
- Comparisons of HRW wheat with domestic Mexican wheat showed similar alveograph W value (indicative, somewhat, of dough strength), but HRW wheat had "better appearance" and produced superior product quality, and particularly superior loaf volume. The desired minimum value for alveograph W value of HRW wheat was generally around 250.
- For another reversal, HRW wheat is now the foremost market class in Mexico, taking the position of the base class in blends, the most common of which is to blend "up" with HRS to raise protein content and strength. Accordingly, any problems in HRW function become magnified in the millers' bottom line.
- The cost of removing "impurities/screeings" in HRW wheat is about 3 to 5%, which makes the total cost of purchasing HRW wheat similar to the cost of Canadian wheat with similar functionality, ultimately reducing the competitiveness of this critical US wheat class.
- Perhaps this comment strictly related to the 2008 crop or to a limited number of shipments or to a certain end use such as modified French loaf bread, but HRW shipments have tended toward the tenacious side of functionality (higher strength, lower extensibility).
- One functional parameter that drew consistent attention in central and northern Mexico was the lack of water absorption at 12% wheat protein. Absorption values quoted for delivered shipments were in the mid-50s, but these values would not be considered truly indicative of the genetic potential of HRW wheat at this protein level.

- Lack of consistency among shipments was cited, especially for wheat protein level, but could be rectified with a better understanding of the magnitude of environmental variation for this trait and how to account for it during specification.

Other classes

- The HRS class received virtually no negative comments with exception of price.
- SRW wheat was by far the "dirtiest" class of US wheat sold to Mexico in 2008, though not surprising given the lack of cleaning facilities in the Gulf, an especially higher moisture content in 2008 due to delayed harvest, and proportionately greater difficulty in cleaning.
- Efforts to substitute domestic wheat for SRW wheat could intensify if domestic production continues to provide a lower proportion of shrunken and broken kernels, foreign material, improved flour yield (78%), and baking characteristics.
- SRW alveograph-W values in 2008 typically varied from 70 to 80, lower than the desired value of about 110.
- Low-test weight of SRW wheat was mentioned as a negative characteristic, but may not be limited to the 2008 crop year when SRW wheat was forcibly harvested from the field with high moisture to make room for spring planted summer crops.

Perspectives

Having been on the Quality Improvement Team that first visited Latin America in 2001, this experience eight years later was a dramatic contrast in some pleasant ways. Favorable comments for US wheat, particularly HRW wheat, exceeded all expectations. The discussion made a pendulum switch from 2001, when HRW wheat was regularly and negatively compared with Canadian classes of bread wheat. In 2009, Canadian classes were compared with HRW wheat as the foundation bread wheat class. HRW wheat no longer carried the "filler" label. Vociferous comments were offered by customers in 2001 about inferior kernel size, absorption, and strength of the HRW class. These were rarely mentioned in 2009, with exception of the proverbial grain shipments that vary widely in expected functionality.

This euphoria may only be temporary, for reasons as a wheat breeder (not as an economist) are truly difficult to reconcile. In the export market, and especially in Mexico, lack of consistency is a thorn in the side of the HRW class. Non-uniformity which is truly indigenous to the class cannot be easily estimated. The gap between, on the one hand, HRW quality targets identified and honored throughout the region, versus on the other hand, the level of quality actually being received by customers in Mexico did not appear at times to be narrowing. One can only speculate how much wider this gap would have been if not for the efforts of US Wheat Associates to service

the Mexican market and educate its buyers on how to purchase and use HRW wheat in their varied operations. This level of customer orientation and satisfaction building will have to rise another notch or customer loyalty could fall to other sources, likely Canada, that can provide profit to both seller and buyer (at the farmers' expense), *and* above all, instill some sense of trust to the Mexican buyer. Somewhere along the way, buyer trust, seller price (the "invisible hand"), and competition must reach equilibrium.

The benefits derived from the Quality Improvement Team (QIT) experience were immense, and they ran parallel to the objectives listed at the beginning of this report. With no doubt, those objectives were realized. However, one treasured co-product that organizers of this program should not overlook is the knowledge gained from interactions among the team members themselves! With constant immersion in a highly specific and scientific area of wheat quality improvement, the QIT experience amounts to a compact sabbatical. Information gained from fellow team members, especially those whose specialty lie in cereal chemistry, was equally valuable to the information collected from our customers. In other words, knowledge of quality factors liked and disliked by our customers was validated, if not enhanced, by the knowledge of those who fully understand the mechanics and biochemistry of quality. Without this added interpretation, I truly believe much of what we heard from our customers would have been jumbled and possibly incomprehensible. Future QITs should maintain a strong presence of qualified cereal chemists to optimize the experience for all team members.