2003 AACC Pacific Rim Meeting: Wheat quality management and processing into the 21st century.

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EXECUTIVE SUMMARY:

OVERALL:

The meeting showed clearly that all sectors of the wheat industry are facing major changes in the way they do business. The factors that impinge on the industry include: changing goverment policies, such as regulatory changes, corporate shake-ups, technical advances, rapidly changing consumer attitudes and a rapidly changing international grain trading environment.

1: INTERNATIONAL WHEAT MARKETING

All major international wheat traders are facing similar issues. These include;
-deregulation of buyers in export markets leading to tougher scrutiny of consistency and uniformity in shipments as well as tighter, and more technical, specifications. All exporters are using, or are moving to, a "customer focused" approach.
-changes in the grading, handling, storage and transport of wheat, either through changed government regulations [Canada, Australia], or through corporate and market driven exigencies [USA, Australia].
-the "big three" exporters are all concerned with the emergence of a group of low-cost, non-traditional exporters as well as with increased exports [outside the EU] by the EU.

2:WHEAT GRADING

Wheat grading is changing in all exporting countries based on "customer focused" marketing protocols. The changes in wheat grading are potentially more profound in the USA and Canada, and the outcome of the change process in both countries is still uncertain. However, in all cases, principles of variety identification, prediction of end-use functionality and ensuring uniformity of supply are driving the technical and policy changes needed to address changing market needs.

3: WHEAT BREEDING

Breeding is also under pressure as a result of the changing marketplace. Changes are based again on a customer focus and, as succinctly put by one speaker, breeders need to address the business risks of both growers and processers of wheat, through adaptation, yield and end-use functionality. Breeders are aware of the growers' "bottom line" and the need to use available genetic diversity to reduce the input costs for growers, thus improving gross margins. Breeders are also aware of the need to generate wheats with market-desirable end-use properties and wheats with increased uniformity of quality attributes across different production locations and times. Breeders also expressed a need for stable and clear market intelligence to help make the correct selection decisions.

Breeding in Australia is being radically restructured, consolidated and "corporatized". This may affect the consistency of purpose seen previously in the Australian industry and may detrimentally impact its competitivness. Conversely, after a shake-down period while dealing with the technical and policy changes needed to address it, removal of the mandatory "kernel visual distinguishability" requirement from the Canadian grading system will remove a large constraint from Canadian breeders This may make the Canadian industry better positioned to respond to changing market needs, and much more competitive in the international trade. Both processes bear careful watching as they continue to evolve.

4: FLOUR MILLING

The flour milling industy worldwide is facing further consolidation, restructuring, shutdowns, stagnating levels of wheat flour consumption and increased levels of regulatory oversight. Millers worldwide, despite different product spectra and demographics, are all facing changing consumer preferences in baked, and other, wheat based products and, consequently, they need to respond with changes in the mill products required to supply these changing needs. As with the other sectors with the wheat industry, mills are addressing issues of input efficiencies [costs] and further uniformity of output to both remain profitable and to grow their businesses.

5: BAKING

This is a mirror image of what is happening in flour milling and the two are intimately connected. The baking industries worldwide are facing stagnating baked product demand, changing product preferences within the available demand, real declines in bread prices [recession in Japan, the"Walmart factor" in the USA] and increased public and regulatory scrutiny on food safety issues. These issues and others have led to major consolidations, such as the "mega-mergers" like Kraft/Nabisco in the USA. Bakeries are also facing a changing, and tougher, regulatory milieu, mostly based around labelling but also, in the USA, on food security.

6: OTHER ISSUES

-**Australia** using doubled haploid populations to speed breeding and to define component functionalities.
-**Canada** using CWRS, CPSW and CWHW as noodle making wheats. Flour specs; Falling Number > 300 sec, particle size < 130 μm, some protein strength required.
-Nippon Flour Mills, **Japan** presented new noodle technologies for RTE "Chouli-men" noodles. Key quality factors for Chouli-men; smoothness, elasticity, separability of noodles, minimum texture deterioration in storage [decreased moisture gradient, aging of starch] heavy use of subsidiary raw materials and vacuum mixing.
-**USA:** SKCS/NIR may be able to measure class, protein, color, hardness, heat damage, bunt, vitreousness simultaneously.
-**Canada:** presented details of competitive new hard white varieties, Snowbird and Kanata with projected acreage of 1,000,000 acres by 2005.

DETAILED NOTES

1: INTERNATIONAL WHEAT MARKETING

USA: [Henry Stevens; USWheat]

Major issues for USA are:
Privatisation and **deregulation** of buyers in export markets. [eg; the central buying agency in Japan is set to be dissolved]
the implications are;

- more absolute quality specifications.
- greater scrutiny of inter and intra cargo variability.
- greater emphasis on end-use functionality in a more diverse set of quality specifications.

Non-traditional suppliers.
These suppliers produce variable quality, from very good to very poor. Currently their supply is UNPREDICTABLE in quality and quantity.

USA response to the changing global grain trade:

- Forget the days on "one-size-fits-all" shipments.
- Forget the days of the USA as the low cost supplier.
- Increasingly emphasise the provision of "value" to the customer.
- For the USA the wheats meeting customer needs largely exist. The challenge is to ensure that the quality [as defined by the customer] is always there [consistency / predictability].
- Redefine grading and classing system so it has relevance to end-use functionality.

BOTTOM LINE: the premiums will come to those whose supply is most predictable

CANADA: [Graham Worden, CWB]

TOP LINE: Seeking UNIFORMITY

Canada has a **WHEAT QUALITY ASSURANCE SYSTEM [WQAS]** based on 4 pillars;
1: Kernel visual distinguishability (KVD)
-expectation of an association between kernel type and quality / functionality.
-allows efficient handling.
2: Variety Registration
-each class has a SPECIFIC end-use functionality.
-reference varieties used, new ones must be equal or better.
-[currently] KVD must be maintained.
-quality overides agronomics.
-very limited numbers of new varieties [in CWRS 25 varieties are allowed, 10 of these are 80% of production].
3: Grading system
4: Handling system
-based on on-farm storage. Canadian farmers COULD store the entire crop [790,000 farmers @ min 500 tonnes (18,500 60lb bushels) each]

CHALLENGES TO THE CANADIAN SYSTEM
-KVD limitations on breeders in variety development efforts.
-non-class varieties [non-Canadian varieties, unregistered]
-winding back of KVD.

VISION FOR THE CONTINUING EVOLUTION OF THE CANADIAN WQAS.

Wind back KVD requirement to allow new flexibility while retaining best parts of current system. Changes subject to consultation and revision.

Priorities:
-maintain uniformity and consistency.
-develop / adapt technologies to replace KVD for variety or class identification [eg; electrophoretic variety ID / works currently in the limited genetic diversity within classes generated by decades of KVD-constrained breeding, may not work on greater diversity].
-make it EVOLUTIONARY, as a deliberately stepwise program.

Retain KVD until the 7 stepwise components of the new WQAS are put in place.
1: Generate class eligibility lists.
2: Invoke DECLARATION process [affidavits] at all points of transfer in supply chain.
3: Test all shipments for varietal composition. Sample retention is a key component here, it works for the AWB.
4: Develop adequate testing capabilities; techniques and capacity. Ensure that testing and sample retention allow routine monitoring and traceback.
5: Develop accountability system for the declaration process. This is to include both INCENTIVES and maeningful, enforceable PENALTIES.
6: Develop export certification scheme; extra certification that ONLY varieties eligible for the shipped class are included.
7: Undergo cost / benefit review process to determine vlue of inclusion of non-KVD varieties in the Canadian system.

Changes to be first implemented in small, lower risk, classes.

AUSTRALIA: [Bob Cracknell, AWB Ltd]

Major challenges come from managing changes WITHIN the system., eg; privatizations of former government / semi-government enterprises at many levels of the supply chain.
-Marketers have become public companies
-Bulk handling authorities have been privatized
-Freight bodies becoming wholly or partly privately owned OR, for example, AWB through the Australian Bulk Alliance now owns it own trains and leases rail space and time, giving farmers more optionsfor delivery. Some of the railroad investment is from the USA!!! [Australian Rail Group operating in WA and SA is a Western Australian based joint venture between Wesfarmers Limited and **Genesee & Wyoming Inc** of the USA]

AWB now owns elevators, outloading terminals as part of the Australian Bulk Alliance [AWB Grainco in Queensland is part owned by Con Agra!!!!

AWB Ltd still retains “single-desk” export status through license from Australian govt.
The major goal is to MAXIMIZE RETURNS BY LOWERING COSTS. The philosophy is to use a **systems management** approach to match customer requirements with availability of stocks in the grain pool. AWB supplies approx. 4000 “parcels” to 100 customers each crop year. [On a 16 million tonne [590 million bu] crop this equates to parcels averaging 4000 tonnes [150,000 bu].

Major cost burden to growers is the internal cost structure of storage, transportation and handling generated by the historical structure of the handling system. This eats up AUD$ 1.4 billion [US$770 million @ AUD$1.00 = USD$0.55] of the AUD$4 billion [USD$2.2 billion] export wheat turnover.

Longterm average production by state.

Western Australia	7.7 million tonnes	[285 million bu]
South Australia	3.2 million tonnes	[118 million bu]
Victoria	2.3 million tonnes	[85 million bu]
New South Wales	7.6 million tonnes	[281 million bu]

Queensland 1.7 million tonnes [63 million bu]

Where AWB has been involved there has been a 33% reduction in port costs.
Rail freight costs in NSW and Victoria have also decreased by about 1/3 over the 6 years 1996-2002.

2: WHEAT GRADING

USA: [Marianne Plaus GIPSA]

History of GIPSA/FGIS.

Talked on evolution of grain standards.

Suggested that there is too much insistence on public comment.

Protein testing has evolved from Kjeldahl to NIRR to NIRT to Combustion N_2 and leading to investigations of global calibrations using artificial neural networks.

Canada: [Jim Dexter, Canadian Grain Commision [CGC]]

Cornerstones of wheat grading in Canada
-Grade definitions.
-CGC standard samples. These are made anew each year and reflect MINIMUM allowable quality for each class and grade.
-Scientific support from the CGC Grain Research Laboratory.
-Standardized equipment and methods.

Canadian grain regulations contain a written description of each grade. But, for example, "Reasonably well matured, reasonably free from damaged kernels" is not a very precise definition of anything.

Classes and grades reflect end-use functionality.

The aim is to **"take the aesthetics out of the grading system"**.

Grading system changes with time. For example, tightening of fusarium and sprouting tolerances, such as a reduction in the tolerances for total sprouted grains and a great reduction in the tolerances for severely sprouted grains.

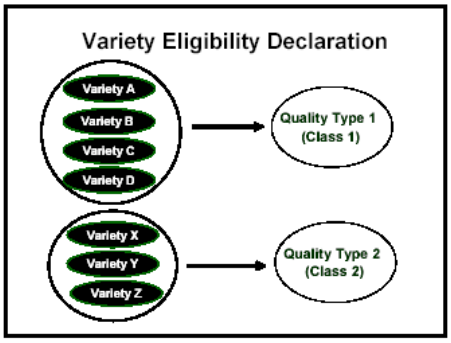
As seen before there is registration of varieties. Before release advanced breeding lines are subjected to **3 years testing.** The quality model is already established. So, for instance, there is a pre-existing range of dough strength for CWRS into which any new variety must fit before being accepted.

All SAMPLING is by mechanical means, no others sample collection method are allowed and thereis pneumatic delivery of the samples to [where??].

Protein determined by NIR.
Sprouting determined by RVA.
Objective visual testing for "total damaged kernel count" using machine vision.

NIR now has wider uses, as has happened in Australia, for parameters such as kernel hardness and milling quality.

Variety ID
Variety ID becomes more crucial as they move towards Identity Preserved marketing models as well as production of non-traditional wheats such as nutraceutical, industrial and other, possibly GMO, varieties.
Eligibility declaration backed up by DNA based technology [This contradicts CWB proposal of electrophoresis of proteins]. The gaol for the DNA technology is that it eventually will be applicable for driveway [delivery] use.
Eligibility declaration also backed by penalties and and an automatic grading as "feed" if the grower declines the declaration.



Variety ID is also necessary, even under KVD, where there are plural quality types within a class.

There are, of course, cost associated with doing this.

Overall this is the way Dexter sees the Canadian wheat export industry changing.

Now: marketing by class and grade.
The future: marketing by customer specification and and functional properties.

Australia: [Bob Cracknell, AWB Ltd]

Original "grade" in Australia was Fair Average Quality [FAQ]. Of course it was neither fair, nor average, being a non-descript bulking of sound grain meeting certain cleanliness requirements.

Decision to grow only white wheat was taken in 1923.

The "pool"system associated with FAQ had all revenues and costs averaged and all growers received the same unit price at the farm gate, regardless of what the produced or their real costs for storage and delivery to the elevator. This was clearly not an ideal system.

AWB has had for some time now had a "payment for quality" [PFQ] system based on;
-protein content [tested by NIR, this is the keystone to the PFQ system]
-variety [class]
-low screenings
-low moisture

3: BREEDING

Canada: [Ron DePauw, Agriculture and Agri-Food Canada]

The breeding strategy is to address **business risks**;
-of the wheat growers through adaptation [yield, resistances to biotic and abiotic stresses]

-of the processors through appropriate kernel characteristics

Use genetic enhancement to address high input costs and low commodity prices.

Factors;
-WTO
-transport costs
-Good Agricultural Practice [GAgP]
-Good Manufacturing Practice [GMP]
-emerging exporters
-climate change
-government withdrawal from research funding
-disease and insect risks
-niches
-biotechnology, including; intellectual property rights, freedom to operate and GMO concerns, both consumer and environmental
-soil quality preservation, including; salinity and erosion
-consolidation of agribusinesses
-depopulation and aging of rural communities
-subsidy levels – claimed for USA $CAD135, Canada $CAD26, Australia $CAD9 [all per tonne]

Canada, as dryland wheat in USA and Australia is a low input enterprise [low margins]. The low input levels shape variety development.

Producer business risks
based on the idea that -"the plant is the factory", it is the output

-changeable biotic stresses; fungi [rusts etc], insects [saw fly etc]
-changeable abiotic stresses; seed bed stresses, junvenile heat and drought exposure, grain filling stresses; heat, drought, cold, frost, wet [rain].

In a low input system we need to address these factors with **natural genetic variability**. Is this possible? In addition, **degrading factors** adversly affect wheat prices. Some of these can also be addressed with natural genetic variability.
-black point
-insect damage
-Test weight
-bleaching
-sprouting
-non hard, vitreous kernels

Protein – CWRS take a big jump in price $CAD13.50 / tonne between 11 and 13.5% protein, the price jump is not so big between 13.5 – 14.5% protein [diminishing marginal returns] showing that the best **value** a breeder can deliver w.r.t. protein to producers is to ensure that average protein increases from 11 – 13.5%.

Reducing business risks through breeding– how?
-conventional breeding
-biotechnology; accelerated inbreeding through doubled haploids [non-GMO]
development of molecular markers for early selection [non-GMO]
use of rDNA technologies [GMO]
-all require the conventional grunt work of data collection and analysis.
-marker assisted selection targets; low and high MW glutenins, gliadins, alpha amylase inhibitors [all these could also be done as biochemical markers], disease resistance, high protein [*Triticum dicoccoides*].

Australia: [Tony Blakeney, consultant]

Focus on noodle-wheat breeding.
One third of Australian wheat becomes noodles.
Leveraging ALLIANCES along the supply pipline, as breeders are the most distant from the marketplace.
Vertical integration.
Breeders need **clearly defined objectives.** This is especially important where there are highly heritable, simply inherited genetic differences [hard/soft, part waxy/wild type, red/white] that derive **conflicting quality attributes**. Clearly defined objectives allow the breeder to make the market applicable selection and shelve the [hopefully well adapted] sister line to allow **rapid response** to changing market demands when and if the alternate quality type becomes desirable in the market.

A centralized marketing and handling system serves well the purpose of setting objectives by providing **stable and clear** market intelligence. However, wheat breeding in Australia is moving towards a corporate model of competing companies, away from a reliance on public breeding programs. There is a profound risk that this will compromise the ability of the Australian industry to maintain its **reputation** as an exporter of wheat of **predictable** quality.

Breeding targets for export wheats have been derived through GRDC [Grains Research and Development Corporation] by the **Wheat Quality Objectives Group.** The group consists of senior and experienced representatives of the processing industry, from all sectors, baking, milling, breeding, quality testing, marketing, who, through a consultative process, define the quality targets for each class. This type of structure is under threat as a result of the increasing corporatization of farming, breeding, marketing and processing of wheat. However, individual companies, such as AWB Ltd may continue with a similar model for setting there own quality standards given the success of this model up to now.

USA: [Bob Graybosch, USDA-ARS, Nebraska]

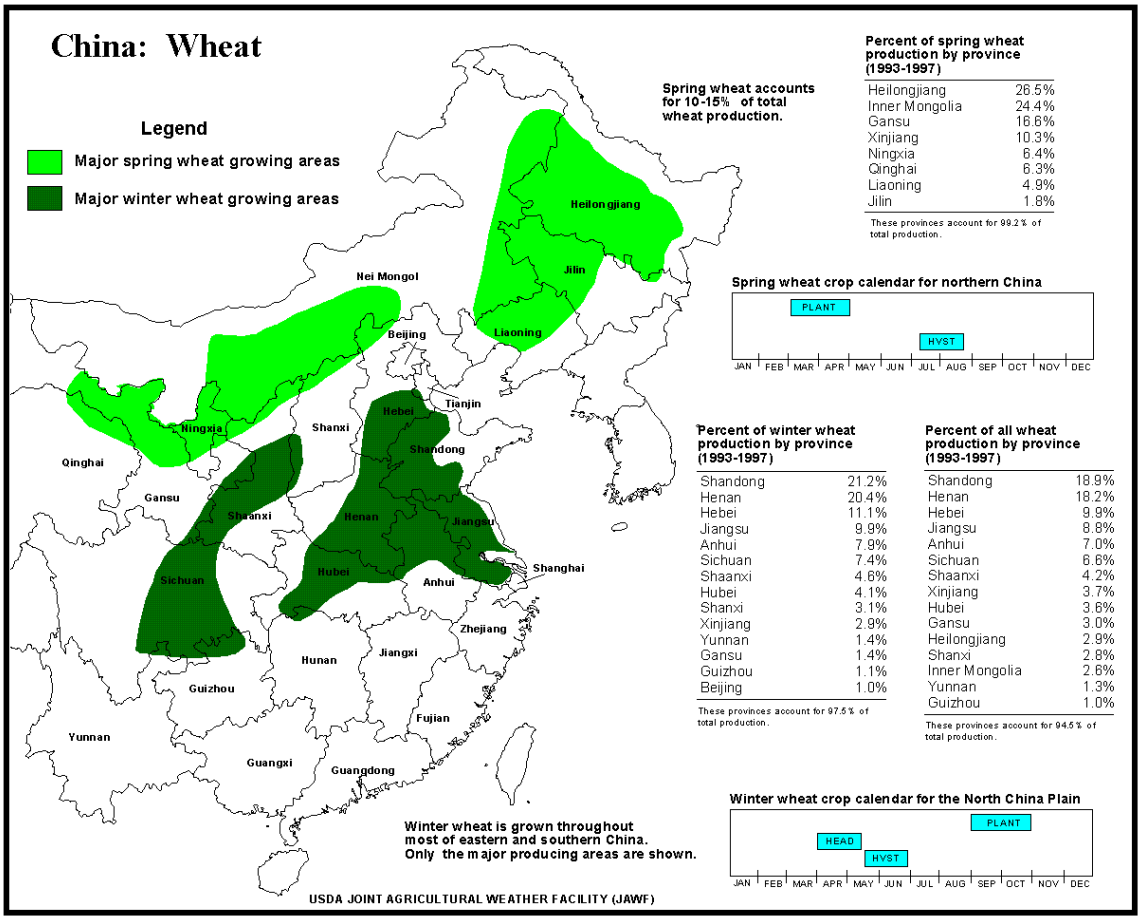
Programs to develop high yielding disease resistant hard winter wheats are underway in all winter wheat growing areas.
Growers reward for yield and test weight, not quality.
Breeders beginning to diversify quality attributes of released cultivars. Other main objectives are;
-improved tolerance to pre-harvest sprouting [white wheats in particular].
-reduced levels of Polyphenol-oxidase
-acceptable noodle processing quality
-specific domestic attributes such as good tortilla quality

Goals can vary with geographical location;
-Southern Great Plains; dual purpose grazing and grain production, resisitance to leaf rust
-Central and Northern Great Plains; winter hardiness, stem rust resistance
-Western Regions; drought tolerance, wheat streak mosaic resistance, Russian wheat aphid resistance.
-All regions; stripe rust resistance [much resistance available in current gene pool], non-GMO wheats with herbicide resistance for control of grassy weeds.

China: [H Zhongou, CIMMYT, Chinese Academy of Agricultural Sciences, Beijing, China]

China is both largest consumer and producer of wheat in the world. However lower wheat prices have led to a shift other crops and reduced wheat production.
-108 million tonnes [around 4 billion bu] wheat per year.
-40 million tonnes [around 1.5 billion bu] is “commercial wheat”.
-Of this, 10 million tonnes [370 million bu] goes to noodles and 25 millions tonnes [925 million bu].

Despite reduction in production the latest wheat imports are very low.
-Winter wheats predominate.
-Hard wheats predominate in the North.
-Soft wheats predominate in the South.



http://www.fas.usda.gov/pecad2/highlights/2001/02/China/chwht.gif

Chinese wheats are a mixed population with significant variation for all traits.
-Rmax on extensograph varies **wildly** fom 110-750 BU [Brabender Units] [Very weak to nearly very strong]
-Farinograph stability varies from 3.5 – 17 minutes.

80% of varieties carry the *GluD1a* [2+12] allele, often associated with weaker doughs.
11% of varieties carry the *GluD1d* [5+10] allele, often associated with stronger doughs.

Chinese noodle quality: For many kernel attributes there appear to be optimal relationships with different noodle quality characteristics, rather than linear relationships, such as for protein content in breadmaking.

Selecting for low PPO.
Selecting for high peak viscosity.
Claim that 1B-1R translocation is detrimental to noodle quality as it is for bread making.

Noodle flours in China should be;
-low PPO
-low ash
-medium protein
-medium strength
-have good dough extensibility
-have starch peak viscosity [some contention here amongst audience]

Zhongyou 9507 claimed to be good for both bread [steamed??] and noodle.

Input efficiency:
breeding outcomes sought
quality + yield potential + resistance + input efficiency

Trying to vie with the USA /Canada / Australia wheats
-HWW in northern winter wheat zone.
-SRW in southern winter wheat zone.
-HRS in spring wheat zone [north only]

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4: MILLING

USA: [Glen Weaver, ConAgra Grain processing Group]

The major technical goal is to **manage variation.**
Other important goals;
-help mill customers make better products.
-become preferred supplier.
-improve profitability and grow the milling enterprise.

Issues for the milling industry in the USA;
-regulatory
-labelling
-recalls
-audits
-nutritional confusion
-GMO
-cross contact with GMO material
-HACCP
-kosher
-allergens
-business integration
-steady but low per capita consumption of cereals

Other issues:
-More industry rationalization, new mantra is location, location, location. More consolidation and shutdowns, need to reduce supply chain costs.
-As mills increase in size the critical issues are storage and **raw material control**.
-Changes in the spectrum of products;
from 1983 – 2003
snacks/cakes **up** from 891 to 1522 million lbs.
bread **down** from 6410 to 5883 million lbs.
buns **up** from 2700 to 3600 million lbs.

Australia: [Dianne Miskelly, Allied Mills, Sydney]

Milling and baking industries operate in mature markets. Domestic milling has operated in a deregulated market since the mid-1980's. Since then there have been a number of waves of restructuring, mergers and takeovers to consolidate the industry as is seen in other western economies.

Japan: [S. Nomura, Nisshin Flour Mills, Tokyo]

Increased wheat flour consumption at the expence of rice. Contradictory to Mr Kainuma, claims increase in white pan bread consumtption, but also increased wheat noodle consumption.

Trends towards wider product ranges. More intense competition with economic downturn.

Texture and mouthfeel are the major issues for consumers buying decisions. About 200 flour types are produced to meet these demands. Each flour has tight [rigid] specifications so selection of the wheats, milling process, extraction rate and processing characteristics are all critical to success.

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5: BAKING

Japan baking: [Ken Kainuma, Yamazaki Baking Co. Tokyo]

Large issues;
-persistent economic recession, deflation running at about 2% over the 2 years 2000 – 2002 leading to lowered retail sales prices
-food safety concerns from consumers
-stagnation of total flour consumption
-declines in unit price for bread due to delfation, competition and pressure from supermarkets
-increased amount of breads in RTE foods

White bread 600,000 tonnes / year over 10 years [figures are flour usage]
Sweet rolls up from 375,000 to 400,000 tonnes / year over 10 years [?]
Hard rolls and pastry up to 220,000 tonnes
School meal breads down to 50,000 tonnes

households now spend about ¥3100 [about USD$25-30] per year on RTE foods. [Doesn't seem much!]

Food safety issues;
-PERCEPTION of poor food safety driven by some real instances of poisoning from E.coli O157, as well as concerns, real or otherwise, over dioxins, GMO corn and potatoes, other food poisoings, Bovine Spongiform Encephalitis [BSE] and residual chemicals.
Increased number [45-60% over 2 years worried about food safety]. 35% concerned about food additives, 18% about foreign materials, 5% about radiation, 12% about GMO, 12% about packaging chemicals leaching into food and 12% about bacteria. Of course, the food additivies are probaly the least of their real risks, but perception is everything.

Other trends:
Few consumers worried about seeking low calorie foods, slightly increased number of consumers [25%] concerned with nutrition, decreased number [40%] worried about price, down from 50% 2 years ago, or taste.

Japan Institute of Baking Technology has implemented audit scheme for baking plants.

Regulatory issues are also impinging here with new mandatory labelling requirements for known and allowed allergens [eg; nuts], presence of GMO materials.

New breadmaking technologies;
-"**Scalded doughs**" 10 – 20% of flour and equal weight HOT water, mix, cool add to dough.
-gelatinises starch and increases maltose production.
-claimed to give slightly sweet taste, some **anti-staling** properties, and a "remarkable texture" that "dissolves smoothly on eating".
-For Yamazaki this is about 20% of bread sales.

- **"Anti-mould" sponge and dough**, water, flour, yeast and improver in dough along with innoculation of **lactic acid bacteria.** Prolongs shelf life and inhibition of the fungus *Aspergillus niger* is quite marked. Appears to give anti-microbial action of added organic acids [propionates] without the taste that the Japanese consumers don't like.

Australia: [Dianne Miskelly, Allied Mills, Sydney]

Bread is the main end-use of flour. White bread consumption is declining as a result of increased consumption of wholegrain and multigrain style breads. Uniquely, smaller artisan style bakeries [shopfront], franchised or otherwise, now account for 30% of the Australian bread market, a market share gained wholly at the expense of the large consolidated, centralised plant bakeries.

USA: [Maureen Olewnik, AIB, Kansas]

US baking industry characterized by **change**.
-consolidations, including "mega-mergers" like Kraft/Nabisco
-changing consumer demands
-changing regulatory environment

Top 4 bakeries in 2002 were;
-Kraft/Nabisco
-Interstate Brands Corp
-Kellog/Keebler
-Groupo Bimbo

The "**WALMART FACTOR"**
-In 2002 Walmart had $USD218 billion in sales. 72% of sales gains were directly at the expenses of competitors. One third [of gain ?] in food.
-83% of US population shopped at Walmart or Sam's last year.

Walmart says "do it our way or we will go elsewhere".

Changing consumer demands:

-food pyramid
-role of cereal foods in question, reduced consumption of bakery goods – "**The Atkins diet factor**". Less people agree that complex CHO are good for us.
-less claims of low fat, low calories on labels.
-more claims of added nutrients, organics, added calcium [claims on labels of high Ca up 900%].
-Claims of "all natural" up as well
-decreased number of new products, may be a hangover from mega-mergers and could accelerate later.

Extended Shelf Life [ESL] bread;

IBC have cut staling rates in half, up to 2 weeks or more shelf life has become possible. Better margins for bakers, what about millers and flour use?

Regulatory Issues

-**Bioterrorism Act;** Facility Registration, **for all food plants and their international suppliers,** by Dec 12 2003.
A "plant" is anywhere that proceses, packs, stores or has ANY contact with food. Concerns with security in these facilities.
-**Allergens**; The big 8, peanuts, tree nuts [inc. sesame], dairy, eggg, soy, wheat, shellfish, fin fish.
-**Recalls;** 64% label related, 18% raw material mislabelling, 18% cross contamination [se allergens]

-**Labelling;** mandatory labelling of trans fatty acids, important in sweetgoods with partially hydrogenated shortening
-**Snack Taxes;** 60% of USA poulation is overweight.

All of these, and the "other", factors lead to an **increased cost of doing business.**

-**Other factors;**
-higher energy costs
-lower margins
-non-flour ingredients becoming commodities, slowing innovation
-**Demographic changes**; increasing proportion of hispanics in USA, aging population, up to 5 languages in a single production facility
-FDA acrylamide plan [http://www.cfsan.fda.gov/~dms/acrypla2.html]
-**Biotech wheat;** 50% of USA consumers comforatable with GM foods, 20% "strongly concerned", 5% will refuse to eat GM foods and those derived from GM ingredients. Potential losses of export sales, swithces to organic output, real possibilities of shortages, crop segregation is costly or even impossible. large contamination potential from "biopharm" crops.

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6: Other key issues in R&D

-**Frank Bekes [Aust]:** Doubled haploid populations show that 1, **7+9**, 5+10 weaker and more extensible than 1, **7+8**, 5+10.
-**Dave Hatcher [Canada]**: noodles; CWRS, CPSW and CWHW all used for noodle making.
- flour specifications for noodles: milled from white seeded wheat, Falling Number > 300 sec, particle size < 130 µm, some protein strength required.
- mills use mixed grists [combinations of different wheats] and "stream picking" to get best balance of cost and quality.
- Hatcher suggests 15%, not 30% reduction in thickness at a roll pass is optimum.

-**Tomoo Moro [Nippon Flour Mills, Japan]:** New noodle technologies for RTE "**Chouli-men**" noodles.
- Key quality factors for Chouli-men; smoothness, elasticity, **separability of noodles,** minimum texture deterioration in storage [decreased moisture gradient, aging of starch]
- **HACCP** compatible production lines
- **Process:** Utilizes vacuum mixing for improved texture, effective use of subsidiary raw materials [emulsifiers, enzymes??], Pass dough through compounding ["make-up"] rolls, rest [maturation] 30 minutes, optimum water depends on season [ambient RH%], gentle stepwise reductions otherwise get rough noodle surface
- **Subsidiary raw materials:** Tapioca starch 5 – 30%, added wheat protein for improvement of "work" [processing] and texture, egg white for texture, egg yolk for flavor and texture, tapioca increases length noodle can be stretched before breaking.
- **Vacuum mixing:** 90 kPa, **better hydration** of flour, increased dough density, less air, increased [improved] hardness and elasticity, also increase elongation ratio as seen with tapioca starch.

-**George Lookhart [USA]:** Variety ID and other, SKCS/NIR may be able to measure class, protein, color, hardness, heat damage, bunt, vitreousness simultaneously
-**Odean Lukow [Canada]:** Canadian hard white wheats Snowbird and Kanata.
- both varieites 2', 7+9, 5+10, LMW "egc" and "ega" for Snowbird and Kanata resp..
- Snowbird is a partial waxy wheat.
- @ 74% extraction 0.36 and 0.38% ash for Snowbird and Kanata resp..
- Farinograph mix times 6.0 and 7.0 minutes for Snowbird and Kanata resp..
- Farinograph stabilities 8.5 and 14.5 minutes for Snowbird and Kanata resp..
- projected acreage, 150,000 [2004], 1,000,000 [2005].
- 2000-2003 3 year, 3 location GxE study.
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