Is Malt The New Hops?

Rocky Mountain Micro Brewers Symposium
Friday, February 17 – 2017
University of Colorado, Colorado Springs
Susan Welch, Skagit (pronounced like MAGIC...) Valley Malting
Is Malt the New Hops?

- Hops has special place in Craft Brewing movement, but ‘The 1st step in brewing is making the wort.’ (Ashton Lewis, The Home Brewers Answer Book)
- Both are about flavor and experimentation – like yeast, fruit, barrels
- Both benefit from knowledge transfer from conventional industry, but require new investment

But, pursuing flavor and developing malt as underexplored ingredient is just plain...more difficult!
- $/Bbl cost of malt is high, relative to other raw materials.
- Malt, especially base malt, is integral to the process of fermentation!
- The conventional demand and supply structure propped up a continental barley supply not perfectly suited to All Malt brewing.
CONVENTIONAL DEMAND

Good Beer Requires Quality Barley

“...barley is to beer as grapes are to wine. You cannot make a good wine out of bad grapes and you can’t make a good beer out of bad barley. You can make a terrible beer out of good barley, that’s easy to do. But at least start right.”

– Bill Coors
Adolph Coors was 26 when he came upon the Rocky Mountain spring water that convinced him to build his brewery in Golden in 1873.
Mega, international corporations, adjunct, flagship brand driven, distant from ag’l raw materials (except Coors)
VALUE
Flavor
Performance
Versatility and Diversity
Price over Authenticity
Reliability
Decision Making

CONVENTIONAL DEMAND ATTITUDE
Homogeneity across market and time
Predictable, enzymatic, efficient, no ‘off’ conditions
Little brew innovation on malt varieties as flavor
Malt is almost a commodity; little reference to ‘origin’
Value security of grain supply, delivery, functionality
Corporate, cost dominated
VALUE
Flavor
Performance
Versatility and Diversity
Price over Authenticity
Reliability
Decision Making

CONVENTIONAL SUPPLY ATTITUDE
Strive for barleys that fit the standard, blend to spec.
Predictable, enzymatic, efficient, QA focused on ‘off’ items (PFY)
Large batch, reliance on narrow, monolithic gene pool
for barley for adjunct brewing, little r & d on flavor
Malt is almost a commodity, focus on grain procurement
Adequate grain supply and logistics for barley & malt dominate
Corporate, cost dominated, strategic
Homogeneity
Predictable, high enzymes, efficient
Large batch, reliance on limited, monolithic gene pool for barley, little r & d on product differentiation
Malt is almost a commodity
Logistics for barley and malt dominate
Corporate, cost dominated decision-making

THERE ARE MANY CHALLENGES, BUT THE SYSTEM WORKS!
Jester King is an authentic farmhouse brewery committed to mixed culture and spontaneous fermentation. Our beers incorporate our natural surroundings and local agriculture, so as to make beer uniquely tied to a time, place, and people. Our tasting room provides a beautiful, relaxed setting to enjoy the Texas Hill Country with friends and family.
Values new sensory opportunities, flavor!
Values predictability, but not at expense of exploration; All malt brewing opens new doors.

Values choices – varietal, style, terroir – all interesting. Pilot brew systems abound
Provenance, agricultural community, health benefits, environmental impact, and flavor/performance all matter.

Value consistency, good service, QA, reasonable pricing and security of grain supply, safety and BMP

Brewer leads raw material selection. Thought leaders everywhere!
Not impossible, but it’s a challenge!
• SOME POSSIBILITIES FOR MALT EXPLORATION BY ALL MALT BREWERS:

  – DIVERSIFY FLAVOR AND CHARACTER EXPRESSION OF WORT
    • Variety, Terroir, Malthouse

  – IMPROVE YOUR PROCESS OUTCOMES
    • Brewhouse yield
    • functionality with other ingredients
    • More control over wort composition for controlled fermentation.

  – AUTHENTICATE YOUR BRAND BY CREATING SEED TO GLASS TRANSPARENCY

  – MEET SUSTAINABILITY GOALS BY LOCAL/REGIONAL SOURCING
Craft Malt – A Revival of Local Ingredients and Traditional Methods

“The drive behind craft (NEW) malt comes from the desire to have local-to-regional agriculture supply local-to-regional brewers/distillers, and to do so in a transparent fashion. It is a natural extension of the local foods movement, and in many ways an evolution of the craft beer and distilled spirits movement itself.” Craft Maltster’s Guild
...Give Malt a Chance...
HOW CAN NEW MALTSTERS PURSUE THE OPPORTUNITY?
- REDEFINE boundaries of conventional offerings:
- REDEFINE boundaries of conventional offerings to brewer’s advantage:

**NEW Possibilities:**

*Single Variety Malts:*
- explore varietal differences; terroir; malthouse on:
- flavor, characteristics, brewhouse performance
- interplay (functionality) with yeast, hops, barrelage, etc

*Low Protein Barleys for All Malt Brewing*

*Custom or Small Batch malting:*
- Signature malts, new grains, smoked or peated, sprouted
# American Malting Barley Association, Inc.

## Malt Returns Breeding Guidelines

### Ideal Commercial Malt Criteria

<table>
<thead>
<tr>
<th></th>
<th>Six Row</th>
<th>Adjunct Two Row</th>
<th>All Malt Two Row</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMBA Member Interest</strong></td>
<td>20%</td>
<td>55%</td>
<td>25%</td>
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<tr>
<td><strong>Barley Factors</strong></td>
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<tr>
<td>Plump Kernels (on 6/64)</td>
<td>&gt; 80%</td>
<td>&gt; 90%</td>
<td>&gt; 90%</td>
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<tr>
<td>Thin Kernels (thru 5/64)</td>
<td>&lt; 3%</td>
<td>&lt; 3%</td>
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<tr>
<td>Germination (4ml 72 hr. GE)</td>
<td>&gt; 98%</td>
<td>&gt; 98%</td>
<td>&gt; 98%</td>
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<tr>
<td>Protein</td>
<td>≤ 13.0%</td>
<td>≤ 13.0%</td>
<td>≤ 12.0%</td>
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<tr>
<td>Skinned &amp; Broken Kernels</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
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<tr>
<td><strong>Malt Factors</strong></td>
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<tr>
<td>Total Protein</td>
<td>≤ 12.5%</td>
<td>≤ 12.8%</td>
<td>≤ 11.8%</td>
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<tr>
<td>on 7/64 screen</td>
<td>&gt; 60%</td>
<td>&gt; 70%</td>
<td>&gt; 75%</td>
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<tr>
<td><strong>Measures of Malt Modification</strong></td>
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<tr>
<td>Beta-Glucan (ppm)</td>
<td>&lt; 120</td>
<td>&lt; 100</td>
<td>&lt; 100</td>
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<tr>
<td>F/C Difference</td>
<td>&lt; 1.2</td>
<td>&lt; 1.2</td>
<td>&lt; 1.2</td>
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<tr>
<td>Soluble/Total Protein</td>
<td>42-47%</td>
<td>40-47%</td>
<td>38-45%</td>
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<td>Turbidity (NTU)</td>
<td>&lt; 10</td>
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<td>&lt; 10</td>
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<tr>
<td>Viscosity (absolute cp)</td>
<td>&lt; 1.50</td>
<td>&lt; 1.50</td>
<td>&lt; 1.50</td>
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<tr>
<td><strong>Congress Wort</strong></td>
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<tr>
<td>Soluble Protein</td>
<td>5.2-5.7%</td>
<td>4.8-5.6%</td>
<td>&lt; 5.3%</td>
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<tr>
<td>Extract (FC db)</td>
<td>&gt; 79.0%</td>
<td>&gt; 81.0%</td>
<td>&gt; 81.0%</td>
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<tr>
<td>Color (*ASBC)</td>
<td>1.8-2.5</td>
<td>1.6-2.5</td>
<td>1.6-2.8</td>
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<tr>
<td>FAN</td>
<td>&gt; 210</td>
<td>&gt; 210</td>
<td>140-190</td>
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<tr>
<td><strong>Malt Enzymes</strong></td>
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<tr>
<td>Diastatic Power (*ASBC)</td>
<td>&gt; 150</td>
<td>&gt; 120</td>
<td>110-150</td>
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<tr>
<td>Alpha Amylase (DU)</td>
<td>&gt; 50</td>
<td>&gt; 50</td>
<td>40-70</td>
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</tbody>
</table>

* Based on a survey of AMBA's regular members.
• INNOVATE on conventional technology to brewers’ advantage
• AUTHENTICATE shared values between new maltster and new brewer:
• ASSURE brewers that you can provide your malts reliably, consistently, safely - not just this year, but over time:
A Connected Skagit Valley Grain Community

Farmland & Growers

WSU Bread Lab
Port of Skagit
Watershed Mills
City of Burlington
City of Mount Vernon
‘A variety of grain means a variety of flavor’ –

- In-house research
- Academic Relationships
- Seed Companies
- Grower partnerships

**BARLEYS**
- Full Pint
- Scots Bere
- Genie
- UC Davis 1323

**AS MALT:**
- Copeland (organic, standard)
- Alba
- Pull Pint
- Pilot
- Talisman
- Odyssey
- Violetta
- NZ-151
- Obsidian

- other grains

**WHEATS**
- Kara Club White
- Estica
- Yacora Rojo
- WSU Hard Red Winter
<table>
<thead>
<tr>
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<th>Typical Analysis 2016-2017</th>
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<tr>
<td><strong>CORE VARIETAL MALTS</strong></td>
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<tr>
<td>Skagit Copeland Pilsner</td>
<td>81-103.2</td>
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<tr>
<td>Skagit Copeland Pale</td>
<td>81-103.2</td>
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<tr>
<td>Skagit Copeland Ale</td>
<td>81-103.2</td>
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<tr>
<td>Skagit Albo Pilsner</td>
<td>81-103.2</td>
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<tr>
<td>Skagit Albo Pale</td>
<td>81-103.2</td>
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<tr>
<td>Gold White Club Wheat</td>
<td>62-87.11</td>
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<td><strong>GOBELAND SERIES</strong></td>
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<tr>
<td>Vienna</td>
<td>60-115.2</td>
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<td>Light Munich</td>
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<td>Dark Munich</td>
<td>60-115.2</td>
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<tr>
<td>Caramel 5</td>
<td>60-115.2</td>
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<td>Caramel 1.5</td>
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<td>Caramel 10</td>
<td>77-105.1</td>
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<td>Skagit DME ESB</td>
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<td><strong>IMPROVISATIONAL SPECIALTY MALTS</strong></td>
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<td>Pale Ale</td>
<td>60-115.2</td>
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<td>Albo Light Caramal</td>
<td>60-115.2</td>
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<td><strong>EXPLORATORY &amp; EXOTIC VARIETAL MALTS</strong></td>
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<tr>
<td>Pilot Pilsner</td>
<td>80-103.2</td>
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<td>Pilot Pale</td>
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<td>Teleman Pilsner</td>
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<td>Voleta Pilsner</td>
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<td>Voleta Pale</td>
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<td>Odyssey 2013 Pils</td>
<td>84-144.2</td>
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<td>NZ-115 Pils</td>
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*Typical analysis data is intended as a general reference and represent average values subject to standard analytical deviations.*
<table>
<thead>
<tr>
<th>SKAGIT VALLEY MALTING 2016 VARIETALS</th>
<th>2-row conventional</th>
<th>2 row all-malt</th>
<th>Joe Hertrich MBAA Podcasts</th>
<th>German Two Row Pilsner</th>
<th>Skagit Copeland Pilsner (B02-006)</th>
<th>Skagit Alba Pale (B01-635)</th>
<th>Skagit Pilot Pilsner (B01-053)</th>
<th>Skagit Violetta Pilsner (B01-034)</th>
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<td><strong>Barley</strong></td>
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<td>Plump Kernels - on 6/64</td>
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<td>99%</td>
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<td>Skinned and Broken</td>
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<tr>
<td><strong>Barley factors, as malt</strong></td>
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<tr>
<td>Total Protein as malt</td>
<td>&lt;12.8</td>
<td>&lt;11.8</td>
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<td>9.9%</td>
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<tr>
<td>Plump Kernels on 7/64</td>
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<td>9.9%</td>
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<td>Overall Modification</td>
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<td>Beta Glucan (ppm)</td>
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<td><strong>Protein Modification</strong></td>
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<td>Soluble Protein</td>
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<td>S/L</td>
<td>40-47</td>
<td>38-45</td>
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<td>4.3</td>
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<td>FAN mg/L</td>
<td>&gt;210</td>
<td>&gt;210</td>
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<td><strong>Carbohydrate Modification</strong></td>
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<td>Extract Fg db</td>
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<td>&gt;81.0%</td>
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<td>F/C diff</td>
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<td>&lt;1.2</td>
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<td></td>
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<td>1.0 target</td>
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<td><strong>Malt Enzyme Package</strong></td>
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<tr>
<td>Diastatic Power °L</td>
<td>&gt;120</td>
<td>110-150</td>
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<td>75 minimum</td>
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</table>

**General Comments:**

Based on a survey of AMBA’s regular members

Barley should mature rapidly, break dormancy quickly without pregermination and germinate uniformly
The hull should be thin, bright and adhere tightly during harvesting, cleaning and malting.
Malted barley should exhibit a well-balanced, modification in a conventional malting schedule within four day germination
Malted barley must provide desired beer flavor.

_Jun-14_
Skagit Valley Malting Capacity

- **Pilot malt system**
  - 350 lbs. / full batch, as malt
  - Current capacity 1,400 T

- **Production malt system**
  - 3 Single Vessel units
  - 18,000 lbs/full batch as malt
  - 7-9 day ave. process

- **Grain Handling & Storage**
  - Four 850 T bins and
  - 12,000 sq. ft. warehouse
  - Moisture/Temp controlled

- **Organic Process Certified**

- **Planned Site Capacity** –
  - 16,000 T
  - Up to ~ 35 machines
  - Supported by current acres
GOAL

Ability to Process Various Sizes

PROCESS INNOVATION

Grain Sizing System

Minimal damage
Optimal modification of grain type

BREWING IMPROVEMENT

Optimal grist and improved yields
GOAL

PROCESS INNOVATION

Uniformity

Rotating Drum System

Uniform modification and color
Malt performs true to COA
No hidden blending issues

BREWING IMPROVEMENT

• Much lower PUG and WUG values
• Better brewhouse performance
• Improved ability to target color
GOAL

Precision and Accuracy

PROCESS INNOVATION

Monitoring and Control System

- Control modification
- Control enzyme production
- Control dev. color & flavor

BREWING IMPROVEMENT

- Maximum discovery of varietal differences
- Increased uniformity and precision across critical parameters
GOAL

VERSATILITY

PROCESS INNOVATION

MULTIPLE SMALL-BATCH PROCESSORS

- Hit target specs for small batches
- Flexibility in germination time
- Scale up to large volumes
- Custom specs, including organic
- Managed growth of capacity

BREWING IMPROVEMENT

- Maximum discovery of varietal differences
- Repeatable & scalable supply
- Single Variety Malts provide greater control over grain composition
GOAL

Efficiency

PROCESS INNOVATION

Single Vessel Design

Less kernel damage
Minimal footprint
Much less steep water
Optimal Cleaning
No transitions = No lag stress

BREWING IMPROVEMENT

Improved modification means greater yield.
Exceeds brewers sustainability, food safety goals for raw material.

Water consumption gal/T is ‘World Class’
Shared Values with brewing community fosters Pursuit of Flavor
Thank You for your kind attention ~

And the Rocky Mountain Microbrewers Symposium

Credits:
Bruce French
Joe Hertrich
Dave Thomas
John Mallett
Ashton Lewis