SINCE 1870

CRISP

THE FINEST MALT

Webinar 1:

20/03/20

Interpreting Certificates of Analysis (CoA's)

Carl Heron

Crisp Malt QR Code and Typical Values

- All of our bags carry a QR code on the label
- Scanning the QR code with the Crisp Malt App (available for both Apple and Android devices) will bring up the analysis for that particular batch

- Typical parameter values can be found for all our malts on the Crisp Malt website at www.crispmalt.com

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CoA – Moisture

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MALT ANALYSIS

Best Beer Company - Ale Malt

Order Number	348149/0	**Delivery Date**	03/04/2019
Contract Ref	0621/19	**Malt House**	Gt. Ryburgh
Customer Ref	3000429729		

		Specification Values			
Parameter	**Units**	**Min**	**Target**	**Max**	**Analysis**
Moisture	%	2.5		3.2	**3.0**
IOB Extract 0.7mm dry basis	l deg/kg	306			**310**
IOB Colour Visual	deg EBC	5.0		7.0	**5.2**
Total Nitrogen dry basis	%	1.40		1.60	**1.47**
IOB Total Soluble Nitrogen dry basis	%		report		**0.59**
IOB Soluble Nitrogen Ratio	%	37.0		41.0	**40.1**
IOB FAN in Wort	mg/l		report		**133**
Friability	%	85.0		98.0	**94.5**
Homogeneity	%	95.0			**99.4**
Alpha Amylase dry basis	DU	32		60	**33**
Diastatic Power as is basis	deg IOB		report		**81**
IOB Beta Glucan in Wort	mg/l			120	**88**
IOB Wort pH	Units		report		**5.96**
Screenings 2.2mm	%			1.0	**1.0**
Nitrosodimethylamine	ug/kg			1.5	**0.5**

Variety Flagon 2018 100%

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Moisture Measurement

- Determined on milled malt by measuring weight loss upon oven drying
  - 5 g samples dried at 105°C for 3 hours
- Moisture content related to malt type and is also an economic parameter
- Many analysis results reported on ‘dry basis’

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CoA – Extract

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Extract – from gravity of wort

- Determined on malt that has been milled on defined mill setting
  - Disc mill used producing finer grist than roller mill

For IOB malts, gap between the discs is set at 0.7 mm

For EBC/ASBC malts, gap between the discs is 0.2 mm

To assess level of modification fine coarse difference can be measured, the greater the difference the less well modified the malt

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Extract – from gravity of wort

- Wort produced in a mashing bath
- Thinner mash than brewery mash
- No sparging
- Two mashing methods depending on reporting IOB or EBC/ASBC
- After mashing, wort is separated through filter paper and the gravity of the wort determined on a densitometer.
  From this, the extract value is calculated
- IoB is expressed as: L°/kg
- EBC/ASBC is expressed as: %

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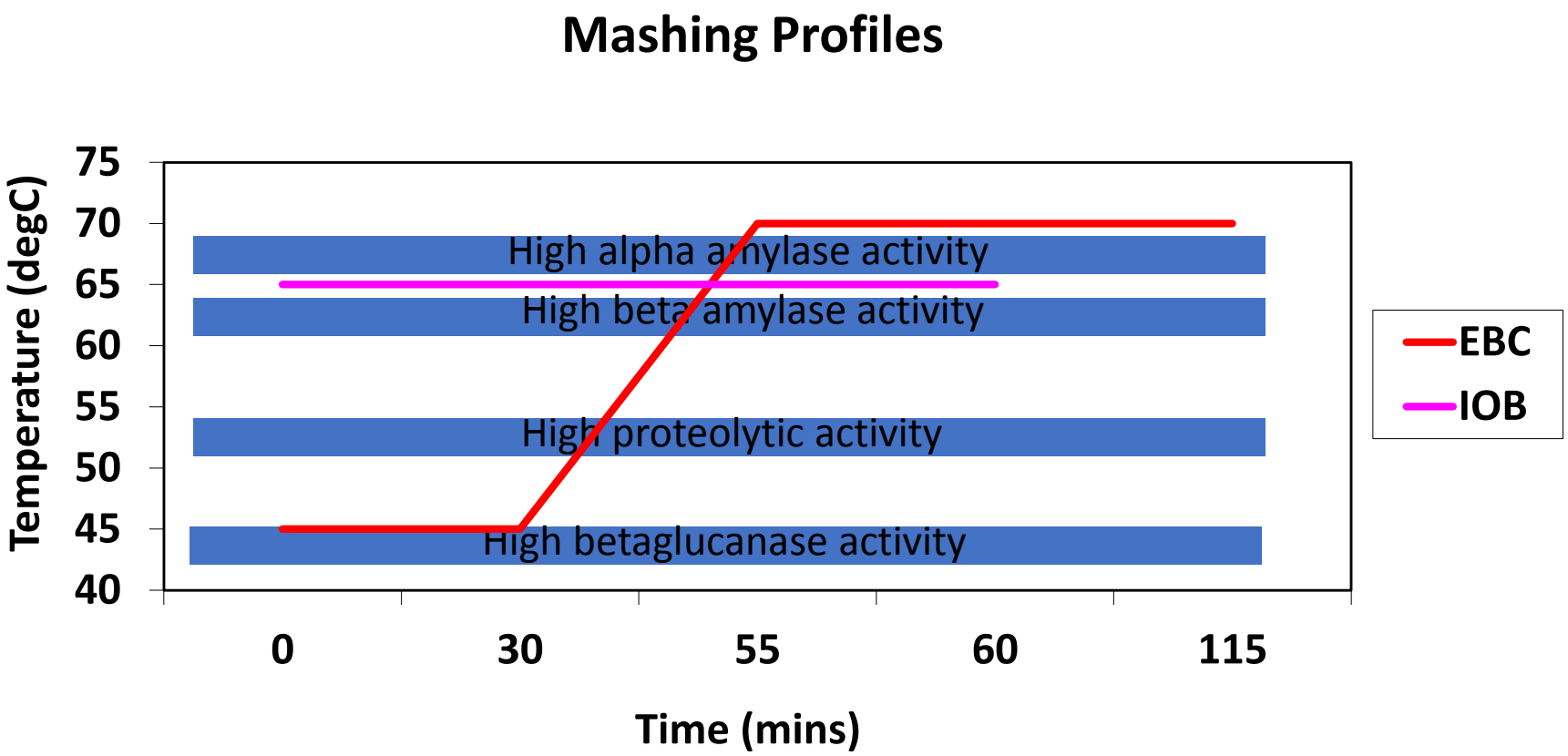
IOB vs EBC/ASBC mashing



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Extract – Interpretation

- Every batch of malt will be slightly different - you should adjust the amount of malt you add by batch using the “as is” extract value
  - If extract isn’t reported “as is” it can be calculated from the “dry” extract value as follows:-

    $$\text{as is extract} = \frac{\text{dry extract} * (100 - \text{moisture})}{100}$$

- A lab extract value will always be higher than what you can achieve in the brewery (unless you have a hammer mill)
- Crisp mash their crushed malt to check extract consistency, more about that on the next webinar
- When constructing recipes always factor in your brewhouse efficiency (80 to 98% depending on system and manufacturer)

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CoA – Colour

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Nitrosodimethylamine	ug/kg			1.5	**0.5**

Variety Flagon 2018 100%

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Colour

- Measured by visually comparing colour of wort to standard colour discs
- Can also be measured by spectrophotometer for yellow coloured beers
- Highly coloured worts from say crystal or chocolate malts have to be carefully diluted to bring them into the range of the coloured discs

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Colour – Interpretation

- Every batch of speciality malt will be slightly different - you should adjust the amount of malt you add by batch for colour
- Tolerances can be as wide as +/- 50EBC, so going from one end of the specification range to the other from batch to batch would definitely affect final beer colour
- Beer consumers can detect a colour difference of 1°EBC - not everyone can afford a colour meter so why not take a photo of a pint glass of the beer and compare each batch to that for consistency?

- Colour for both IoB and EBC malts is expressed as EBC units

- For ASBC malts colour is expressed as °L and is approximately half the EBC value

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CoA – Nitrogen

CRISP — THE FINEST MALT (SINCE 1870)

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CRISP — THE FINEST MALT (SINCE 1870)

Nitrogen

- Protein measured as ‘nitrogen’ in UK
  - Total nitrogen content x 6.25 = protein content
- Determined by Dumas (pyrolysis) analysis
- Extent of breakdown assessed by measuring nitrogen content of wort **(total soluble nitrogen or TSN)** and calculating of soluble to total protein (**soluble nitrogen ratio or SNR**)

$$SNR = \frac{TSN}{TN} \times 100$$

- This ratio is reported as Kolbach Index (KI) for EBC analysis and S/T for ASBC analysis and is usually 5% higher due to proteolytic stand during lab mashing

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Nitrogen – Interpretation

- The SNR (KI or S/T) gives a good indication of the extent of endosperm modification
- Too low (less than 36%) and the malt is under modified which may result in poor extract release. There may be insufficient yeast nutrients which could result in sluggish or stuck fermentations
- Too high (higher than 43%) and the malt is over modified. This may result in excessive protein in the wort and yeast growth will be vigorous resulting in over-attenuation and high yeast counts in the finished beer. It could also lead to issues such as formation of protein hazes and poor foam stability

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CoA – Friability

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Friability - Cell Wall Breakdown

- Measured by determining the ‘crushability’ of 50 g of malt in a friabilimeter
  - Weight of malt passing through mesh screen after 8 mins running
  - Analysis of friability also gives data for homogeneity, partly unmodified grains and whole grains

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Interpretation of Friability data

- Friability is another indicator of modification of the endosperm and the extent of β-glucan breakdown
- Values lower than 85% may indicate that the cell walls haven't been broken down sufficiently and the starch will be difficult to access leading to lower extract and more viscous wort. Very high values (98% +) may lead to malt damage during handling and shatter upon milling
- The additional measures of homogeneity, partly unmodified grains and whole unmodified grains give additional information as to the consistency of malt modification

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CoA – Enzyme Potential

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Enzyme Potential

Starch degrading enzymes measured by:

- DU (Dextrinising Units)

  - alpha amylase which breaks down starch molecules into smaller pieces (dextrins)

- DP (Diastatic Power)

  - Primarily beta amylase which breaks down starch and dextrins to maltose and other fermentable sugars

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Interpretation of Enzyme Potential

- If the level of amylolytic enzymes in the malt are low or out of balance with each other there can be issues with yield and fermentability
- Ale malts should have a typical minimum IoB DP of 45
- Lager and extra pale malts should have a typical minimum IoB DP of 60
- The higher the DP the more fermentable the final wort will be - use higher mash temperatures to counter this when using extra pale malt
- EBC analysis expresses DP as DPWK and is calculated from the IoB value by

$$DPWK = (IoB\ DP \times 3.85)-16$$

- ASBC analysis expresses DP as °Lintner and is calculated from the IoB value by

$$°L = IoB\ DP \times 1.1$$

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CoA – Beta Glucan

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CRISP — THE FINEST MALT (SINCE 1870)

Beta Glucan

- Major component of endosperm cell walls
- High levels of wort beta glucan indicate poor modification
- Some crop years see higher levels than others and it's up to the maltster to adapt the malting process to reduce these viscous compounds as low as possible
- Oats and rye have very high levels of beta glucan, even after malting and should be used with caution

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Thanks for listening!

BARLEY MALTING MALT

Natural Wholesome Nutritious

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