

35th EBC Congress 2015 Poster No. 189 Research Center Weihenstephan for Brewing and Food Quality

## Study of an Analytical Method to Determine the Original Barley Malt Grist Load in a Malt Based Beverage

Zarnkow M.<sup>1</sup>, RadImaier T.<sup>2</sup>, Becker T.<sup>2</sup>, Jacob F.<sup>1</sup> | <sup>1</sup>Research Center Weihenstephan for Brewing and Food

## Quality, TU München, Germany |<sup>2</sup>Chair of Brewing and Beverage Technology, TU München, Germany

**Introduction:** Barley malt is a versatile raw material in the brewing and beverage industry - not just for beer. Nowadays, there is a wide range of malt based beverages available. Especially in terms of nutrition and extract, malt is the value adding ingredient contributing vitamins, minerals, antioxidants and sugars. Malt based beverages can be adulterated by cheaper carbohydrate sources, e.g. sugar syrup, hydrolyzed starch or unmalted cereals. However, to meet consumer and legal requirements, it is of great interest to analyze the malt content in the finished product. When determining the portion of the grist load coming from the barley malt a large number of possible sources of carbohydrates or adjuncts have to be taken into consideration.

**Results and Discussion:** In this work, the quantification of the origin malt grist load of a malt based beverage was evaluated by wort attributes. A range of different malt based beverages were produced by the variation of the mashing regime, the use of different malt types and the addition of ajuncts as well as stabilizing agents. Subsequently, a formula was used that takes the determination of phosphate and potassium content, proline and formol value into consideration. Additionally, sugar as well as the amino acid profiles were measured to authenticate the sample before

using the formula. Table 1 shows the obtained values of potassium, phosphate, proline and the formol value of each mashing regime. As well the original gravity and the delta to the calculated one. Calculated with formula 11. Within these used raw material and different mashing regimes there has been a quite good matching of real and calculated original gravity.

Mash:	Original gravity [°Plato]	Proline [mg/kg]	Potassium [mg/kg]	Phosphat [g/kg]	Formol value	delta calculated to real original gravity [%]	standard deviation
"thick mash"	17.35	500.2	810.0	1.50	25.28	4.61	5.61
"intensive mashing"	12.65	446.2	613,.3	1.17	19.35	9.95	16.73
"adjunct brew"	12.17	388.5	626.7	1.10	15.77	11.20	20.18
"intensive adjunct brew"	11.73	341.5	606.7	1.08	14.62	5.61	1.78
"tannin stabilized"	12.77	547.8	605.0	1.14	17.93	13.34	1.77
"PVPP stabilized"	12.29	529.3	568.3	1.04	16.98	6.51	1.50
"bentonite stabilized"	13.24	586.9	601.7	1.17	17.75	11.82	2.33
"high-short mashing"	13.60	573.2	623.3	1.20	18.40	11.57	3.03
"dark malt"	12.42	361.3	510.0	1.02	14.90	-5.09	0.65
"overmodified malt"	13.05	525.3	495.0	1.07	16.53	2.39	2.48
"undermodified malt"	12.74	615.4	585.0	1.03	15.70	10.92	2.33
"high-short different mashing"	12.56	525.2	575.0	1.03	14.53	3.75	2.25

Table 1: Different attributes of cereal based beverages produced with different grist ratios, malt qualities and mashing regimes.



Formula 1: Weber published these formula for dietary beers<sup>1</sup>. The singular attributes are divided with mean values of these beers. Mean values which could be found in these experiments as well.



Figure 1: Typical boxplots of amino acids in 12 °Plato wort

Figure 2: Test plan for an unfermented beverage to proof step by step on the original barley malt grist load.

beverage?

Summary and Conclusion: BFor a final evaluation, the formula was tested by the comparison with a common method to determine the original gravity in alcohol reduced beer. Beside the statistical calculation of the malt content, an estimate of the sugar profile was possible. But beforehand the amino acids (see Figure 1) and sugar content (data not shown) has to be proofed to authenticate the beverage as pure malt beverage (see Figure 2).

Literature: <sup>1</sup>Weber, O.: Annähernde Berechnung des Stammwürzegehaltes alkoholreduzierter Diätbiere. In: Monatsschrift für Brauwissenschaft (today Brewing Science), 1984, p. 173–175

Alte Akademie 3 · D-85354 Freising · Phone 08161/713331 · Fax 08161/714181 · blq@wzw.tum.de www.blq-weihenstephan.de

