



**NEW BEER
STYLES**



**DRINKABILITY
&
INFLUENCE
FACTORS**



**VLB
BERLIN**

Versuchs- und Lehranstalt für Brauerei in Berlin (VLB) e.V.

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Recommended literature

1. „Beer Drinkability – A Review“ by Rubens Mattos and Roberto H. Moretti, MBAA TQ vol. 42, no. 1, 2005
2. „Drinkability“ – Ausgewogenheit und Harmonie der Inhaltsstoffe sowie Anreiz zum Weitertrinken, by Gastl, Hanke, Back, Brauwelt Nr. 45, 2007
3. „Correlation between the Drinkability of Beer and Gastric Emptying“, by Nagao et al., Biosci. Biotechnol. Biochem., 62 (5), 1995
4. „Sensory specific satiety: More than ‘just’ habituation?“ by Wilkinson and Brunstrom, doi: 10.1016/j.appet.2016.04.019
5. „Influencing the organic acid profile of beer by application of adsorbent materials“ by Tyrell and Fischer, J. Inst. Brew. 2014; 120
6. „Funktionelle Getränke auf Basis vermälzter Zerealien und Pseudozerealien“, Diss.Krahl, TUM, 2010
7. (K)ein Durstlöscher, Seidl, C., „Craft“ No. 04-2018



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Allgemeine Geschäftsbe

Über uns

Hast du einen Account?



Paul Staxx Spraget

@MarshallStaxx

Folgen

"Cask ale has great drinkability". WTF exactly is "drinkability"? The lack of barb-wire, sharks, or ebola in yr pint glass?

02:56 - 1. Dez. 2015

5 Retweets 13 „Gefällt mir“-Angaben



7 5 13



The REPEAL Nut @thebeernut · 1. Dez. 2015

Antwort an @MarshallStaxx

@MarshallStaxx Big fan of drinkability here. That thing where the first time you look at your pint it's half gone? That's drinkability.

2 2



Paul Staxx Spraget @MarshallStaxx · 1. Dez. 2015

@thebeernut I dunno, seems more like "being pretty thirsty" to me.

1

The REPEAL Nut @thebeernut · 1. Dez. 2015

What is DRINKABILTY?

- + „The quality of being drinkable or the capacity to be drunk”
- + <https://www.collinsdictionary.com/de/worterbuch/englisch/drinkability>
- + “A poorly made beer that is mass produced and is watered down. This cross between an adjective and an adverb is used as a marketing scheme to get people who are not looking for flavor in beer, (...) Thus, a "beer" with this kind of label is without flavor and character and should not be consumed by humans who have dignity.”
- + <https://www.urbandictionary.com>

This is DRINKABILITY!

“A beer that has good drinkability is the one that invites the drinker to another glass.” (1)

„Using the phrase drinkability to describe a beverage does relate mostly to the attractiveness to consume this beverage aiming at the level of enjoyment connected with the consumption“ (2)

„A beer shall create the wish to go on drinking with every sip“ (7)

Aspects of DRINKABILITY (1)

1. Sensory effect

is caused by the aroma, taste, temperature, and texture of the beer. These characteristics can inhibit the will of drinking. This mechanism (...) is called “specific sensory satiety”, i.e., specific attributes of a food or beverage recognized by the subject and inhibit his/her will to continue consumption.

2. Cognitive effect

represents the information and beliefs of the subject related to the beer properties and its effects on the consumer. One common example of this effect is the consumer that avoids a certain beer brand, claiming that it causes headaches after he drinks it.

Aspects of DRINKABILITY (1)

3. Post-ingestive effect

includes normal consequences to the human organism caused by the ingestion of beer, e.g., distention of stomach wall, rate of gastric emptying, and production of hormones and physicochemical receptors by the intestinal tract.

4. Post-absorptive effect

This effect is related to the biochemical mechanisms resulting from metabolites in the blood stream. This occurs after beer metabolites have already been absorbed at the intestinal tract. It includes the effects of alcohol, glucose, and amino acids on the brain functions.

Examples



„sensory effect“

- + Beer that is not well perceived by specific consumer because of certain sensorical impressions
 - OFF FLAVORS
 - Too bitter / unpleasant bitterness
 - Too strong
 - Too fruity
 - „Flat“
 - ...



„cognitive effect“

- + Good for drinkability
 - Information the consumer relates to the product
 - e.g. regional effects
 - e.g. information from advertisement
 - Message of a certain product
 - e.g. „craft“
 - e.g. expectation of positive health effects
 - Not for alcohol contents > 1,2abv
 - Temperature, CO₂ content to create refreshing effect
 - Others

„cognitive effect“

- + Bad for drinkability
 - Unpleasant sensory other than taste and aroma
 - e.g. unwanted degree of turbidity
 - e.g. not appealing appearance of product at point of sale
 - „Reputation“ of certain products
 - e.g. „beer makes fat“
 - e.g. „sweeteners are unhealthy“
 - others

„cognitive effect“

- + Functional ingredients
- + Antioxidative substances
 - e.g. Resveratrol, Anthocyane, Flavonoide
- + Vitamins
- + Minerals, trace elements
 - e.g. Ca^{2+} , Mg^{2+} , Zn^{2+}
- + Organic acids
 - e.g. lactic acid, gluconic acid
- + Probiotics
 - e.g. lactic acid bacteria

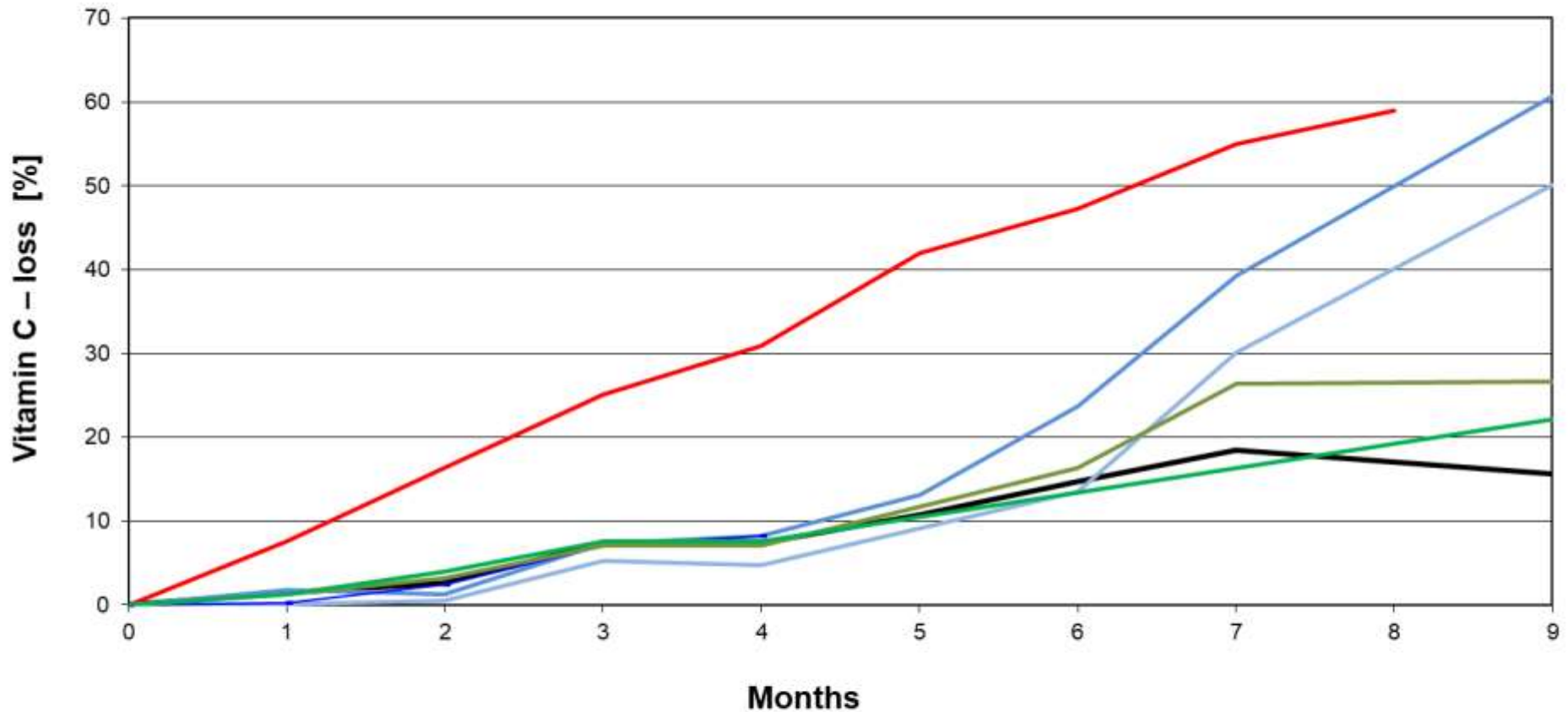


Example: Vitamin C content in orange juice

- + Typically between 200 and ~500 mg/l
 - <https://www.fachzeitungen.de/pressemeldungen/ist-genug-vitamin-c-ist-in-handelsueblichem-orangensaft-hessisches-landeslabor-hat-76-saefte-untersucht-103616/>



Investigations at VLB Berlin – Vitamin C loss in orangejuice



— Glass 0,0%

— PET - no scavenger 0,0%

— Scavenger A 4,0%

— Scavenger A 5,0%

— Scavenger B 2,0%

— Scavenger B 3,0%

“post-ingestive effect”

- + The sensation of „stomach-fullness“ and the time until the stomach feels relieved again (emptying of the stomach)⁽³⁾

Osmolality

- + Beverages that are hypertonic are being absorbed slower in the intestines than isotonic beverages
- + → this has a direct effect on the „post-ingestive effect“ in the concept of drinkability
- + → this can have an indirect influence on the „cognitive“ effect in the concept of „drinkability“

“post-absorptive effects”

- + Beverage ingredients being absorbed at the intestinal tract. This includes the effects of alcohol to our organism but also of dissolved substance being metabolized by the consumer
- + Complex reactions of the metabolism like the glycemic index (GI)

organic acids and DRINKABILITY

- + Balance between sugars and acids → Sensorical Aspect
- + Organic acids as such have relatively high flavor threshold
- + Positive effects of lactic, gluconic and glucuronic acids on digestion*
→ “cognitive” aspects
- + Anticancerogenic effects of gluconic and butyric acids**
→ “cognitive” aspects

*Asano et al. (1997) Digestion, absorption and intestinal residue of various gluconic acids in rats. J. Jpn. Soc. Nutr. Food Sci. 50: 287–294.

**Kameue et al. (2004) Dietary sodium gluconate protects rats from large bowel cancer by stimulating butyrate production. J. Nutr. 134 (4): 940-944.

Organic acids and DRINKABILITY of beer

- + Succinic acid (as well as maleic acid, which is almost non-existent in beer, though) is known to be a potential stimulant of gastric acid secretion.⁽⁵⁾ This can lead to “heartburn”/acid reflux.
- + Considering the influence of stomach acidity on consumer decisions, succinic acid can serve as a key indicator for ingestive drinkability

Organic acids and DRINKABILITY of beer

- + All anaerobically fermented beverages contain succinic acid
- + Fermented beverages with low succinic acid concentration can be assumed to be “stomach-friendly”
 - improved “drinkability”
- + In alcoholic fermented beverages succinic acid concentration is highly dependent on the yeast strain
 - “drinkability” can be improved by the right choice of the yeast strain or lowering the levels of succinic acid ⁽⁵⁾

The glycemic index of food and beverages

The glycemic index (GI) is the area under the curve of the blood-sugar answer (IAUC: incremental area under curve) to 50 g carbohydrates in a certain food, expressed as percentage of the same area when consuming glucose.

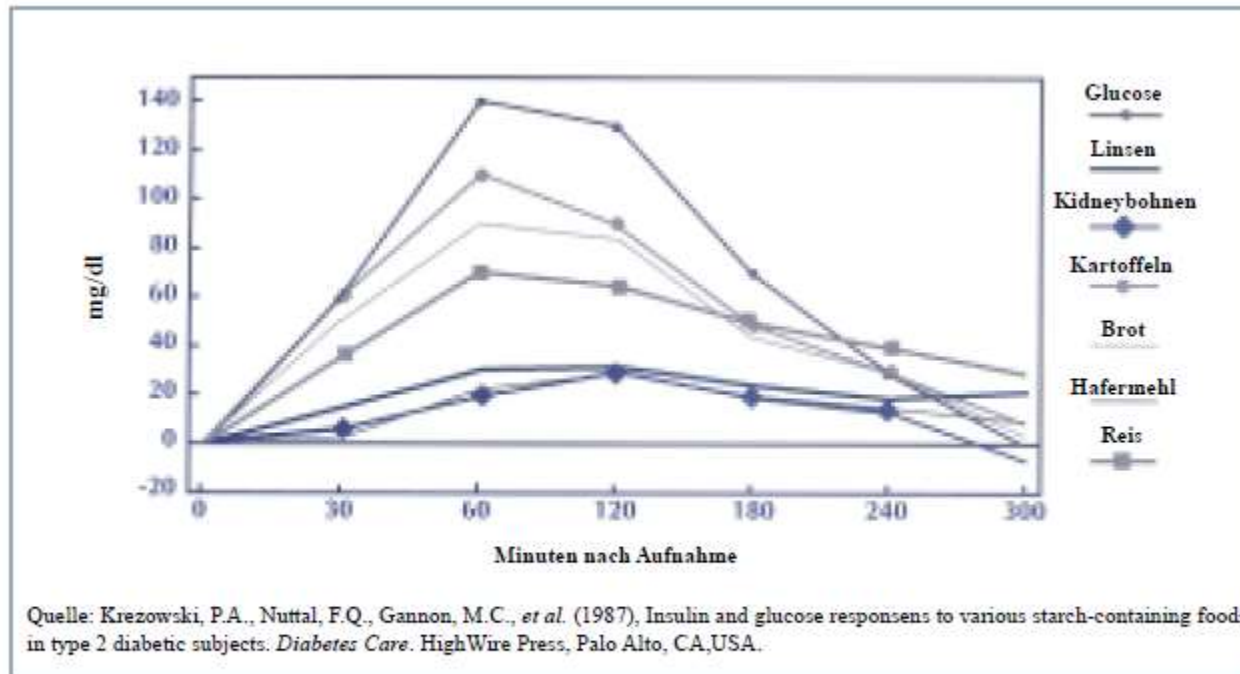


Abb. 1: Verlauf des Blutglucosespiegels nach Aufnahme von 50 g verwertbaren Kohlenhydraten mit verschiedenen Lebensmitteln

The glycemic index of beer

- + Krahl* calculates the GI of beer to be 65,8
 - According to „Wikipedia“ this serves as a „medium“ GI (high: > 70, low: < 50)
- + the GI is calculated as an average of the sugars, weighting the single sugars according to their specific GI
 - $GI = (100 * \text{Glucose} + 20 * \text{Fructose} + 66 * \text{Saccharose}) / \Sigma \text{ sugars}$
 - basis was a total sugar content of appr. 0,45 g/l
- + such low sugar contents make the concept of GI inapplicable for beer, as it is hardly possible to take up 50 g of sugar
- + *Krahl and Back, BRAUWELT, Nr. 15-16 (2009)

How to measure DRINKABILITY



Physical measurement of post-ingestive effect

- + Aiming to clarify the post-ingestive effect of beer on drinkability, Nagao et al. measured the volume of the stomach (using ultra sonic) and correlated the data with sensory evaluation of beers. Subjects were instructed to urinate every 30 min for 3 h, and urine volume was measured ⁽³⁾.

„drinking“ tests

- + A system introduced by Parker* works with consumers being visited in their homes.
- + Samples were to be evaluated for general acceptance and overall flavour impression.
- + After each glass of sample the consumers were asked for
 - „Drinkability“
 - Stomach fullness
 - Thirst
 - If one would like to change to another beer/beverage after drinking the sample

*Parker, European Brewery Convention 2009

“session test”

Brewing technology students, drinking session, form to be filled out every hour, weekly for 4 weeks, Lehrstuhl für Technologie der Mälzerei und Brauerei TU Berlin, appr. 2000

Total Number of Tasters	
Name	
Date	
Time	
How many beers have you drunken so far?	
Quality of Taste	
Quality of smell	
How do you feel?	

Further investigations

- + Of course it is possible to follow medical aspects by clinical studies
 - e.g. release of gastric acid
 - e.g. insuline response
 - e.g. stomach wall irritation
 - ...

Thank you for your Attention!

VLB Berlin

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