Malt versus Sugar – What are the issues in relation to nutritional content and health claims?

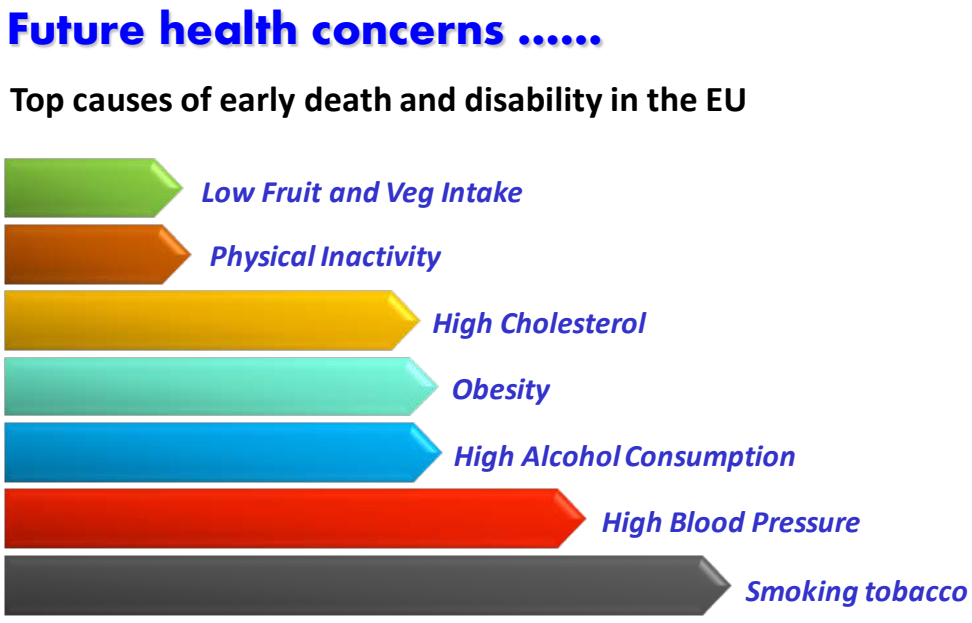
Dr Nigel Davies, Director of Technical and Sustainability, Muntons, UK

The Sugar Dilemma

There is a growing lobby of people seeking to control the amount of sugar included in a balanced human diet. Often when one component of the diet is singled out for attention those involved in nutritional or medical research take strongly entrenched views that are difficult to understand for those buying food products. Where advice seems most compelling it is often reinforced with legislation. However, we are all aware that advice can change quite dramatically over a short to medium term time scale. Currently there is talk or introduction of legislation in sugar in different countries around the world. The so-called sugar tax in the UK is a good example of this with a clear target of having a maximum of 5% free sugars in food for human consumption. For manufacturers making products which are covered by the legislation it would be easy to try to be defensive and look for alternative research that refutes the need for restricted use. However, for malted ingredients there is a much more positive message to publicise: that malt is healthy and wholesome, contains a natural source of sugar together with an impressive range of additional nutritive benefits.

Why is there concern over sugar content?

There is a definite and consistent rise in the number of those becoming diabetic due to an unbalanced sugar-rich diet. This is coupled with an increase in obesity, ranked fourth in predictions of future health concerns, together with all its related conditions.



Obesity globally runs at around 12% but is much more serious in countries like USA and within the EU, the latter reporting figures of 20% for males and 23% for females. Even countries which have had a traditionally lower sugar diet are reporting obesity issues, such as China where high salt, oil and calorie diets are worsened by diet lacking in vitamins. This is an area in which malt become particularly interesting in being able to deliver a better quality of sweetness along with essential dietary requirements.

Is Sugar to blame?

Legislation introduced in the UK (The Public Health Responsibility Deal) seeks to address a number of those key issues by limiting both fat and sugars and targeting in particular the free sugars, which must not contribute more than 5% to the calorific value of the food.

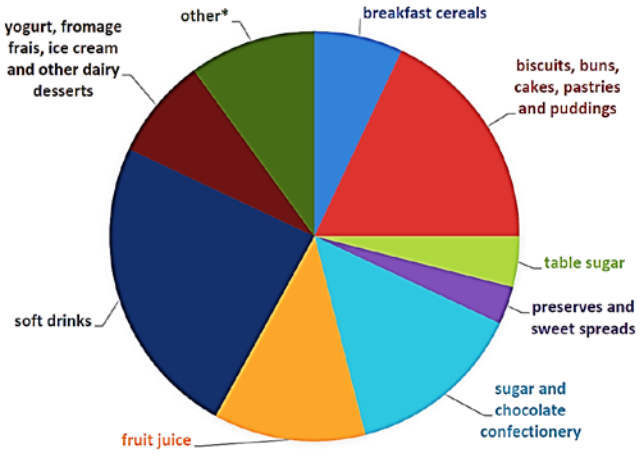
Public Health Responsibility Deal

- *Calorie reduction*
- *Less than 5% calories from free sugar*
- *Reduced FAT*
- *Reduced SUGAR*

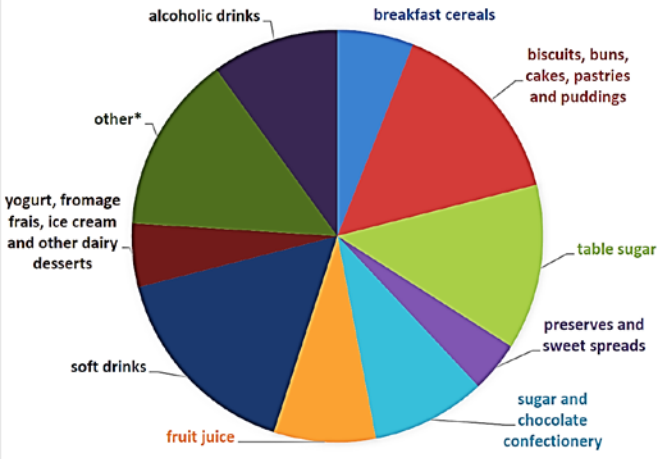
The media often reports on sugar tax being all about sweet soft drinks, but there are other parts of the diet where sugar contributes significantly and whilst these change slightly with age the range of products that will ultimately be affected by the new tax on sugar is wide.

Although sugar taxes are starting with drinks – more foods may be included in the future ….

Contributors to sugar intake in the UK – children aged 4 to 18 years



Contributors to sugar intake in the UK – adults aged 19 to 64 years



**Other includes savoury sauces, baked beans, soups, powdered beverages*

Source: Public Health England Oct 2015

Manufacturers are given guidance as to what best practice will look like in determining if their response to health concerns is being taken seriously. In 5 areas specific examples are given to show what a real target is, some of which is already happening now.

Reformulation	• **"We will reduce sugar by 5% by 2020"**
Portion Size	• **Slimline can; no single serves >250 calorie**
Low calorie option	• **Lite product range**
Encourage healthy lifestyle	• **Only advertise low sugar options; remove POS impulse buy high calorie options**
Balanced menu	• **Range adaptation**

What food functions does sugar impact on?

Sweetener
Maillard reaction
Solubility
Texturiser
Caramelisation
Antioxidant
Freezing point
Boiling point
Fermentation
Cost reduction
Shelf life extender

It has to be appreciated that sugar is not just added for sweetness (see box, left) hence any reformulation has to address a number of aspects of product performance

- **Food safety**
- **Taste, texture and appearance**
- **Clean label and/or naturalness**
- **Shelf life performance and stability**
- **Ingredient functionality**
- **Ease of manufacture**
- **Cost**

The specific group of sugars that are said to impact in health are the free sugars, also previously referred to as the non-milk extrinsic sugars. ***Free sugars are* any mono or di saccharides *added* to the process e.g. Glucose, Fructose, Sucrose, Maltose, Galactose but not Lactose.**[1]

For materials like malt it is often thought that because their sugars are naturally made that products can be said to be natural, but that isn't the case. The official labelling declaration is that they contain '***naturally occurring sugars***', because it makes no difference to nutrition whether the free sugars are made naturally or added individually. Using malt may however enable the product to fit into one of the categories where claims can be made:

- **REDUCED SUGAR (> 30% reduction);**
- **SUGAR FREE: < 0.5%;**
- **LOW SUGAR: < 5% solid; <2.5% liquid**

[1] A definition of free sugars for the UK Gillian E Swan*, Natasha A Powell, Bethany L Knowles, Mark T Bush and Louis B Levy - Public Health Nutrition: doi:10.1017/S136898001800085X https://www.cambridge.org/core/journals/public-health-nutrition/article/definition-of-free-sugars-for-the-uk/2A2B3A70999052A15FD157C105B3D745

Natural or not?

Definitions of naturalness are quite different in terms of what most people would consider a natural process (boxes, right). These definitions come from the UK Food Standards Agency: "Criteria for the use of the terms Fresh, Pure, Natural in food labelling".

NATURAL

Dehydration
Baking
Roasting
Sieving
Washing in Water
Fermentation[1]

NOT NATURAL

Fermentation[1]
Pasteurisation
Freezing
Sterilisation
Concentration
Bleaching
Oxidation
Hydrogenation

[1] Some foods naturally ferment and others are made to ferment by processing – thus a dual category for this term

Manufacture of malt is clearly natural using just heat and water, whereas using that malt to make malt extract could be construed as not natural because it involves concentration by evaporation even though no other 'unnatural' additives or process steps have been made other than milling it and mixing it with water to allow the natural enzymes to convert starch to sugar.

There is a standard that defines naturalness less specifically (ISO/TS 19657). Under this definition it could be considered that malt extract is indeed a natural product because the process generates only those materials found in nature.

Article 7 Regulation (EU) 1169/2011 explains more generally that food information shall not be misleading in the claims made for the characteristics of the food nor its inherent properties. Under this rule malt extract can be considered as rich in nutrients, vitamins and natural sugars.

Which of these makes most sense to you – should it be based on how a material is processed or the naturalness of the food constituents. The latter would seem more persuasive, but local definitions have to be recognised hence in the UK malt extract is not able to be classified as natural.

ISO / TS 19657: Definition of naturalness

Food ingredients shall be considered as natural provided the following technical criteria are fulfilled.

a) The source material shall consist of one or more of the following: plant, algae, fungi, animal, microorganism, mineral deposits or sea water.
b) Fossil fuels shall not be used as a source.
c) Food ingredients shall be obtained from source materials by physical and/or enzymatic and/or microbiological processing. ***Enzymatic and/or microbiological processing shall not be used to deliberately produce substances that do not occur in nature. pH adjustment may be used in those processes.***
d) In order to meet food safety and/or regulatory requirements, when no physical and/or enzymatic and/or microbiological processing techniques are available, ***other processes may be used provided that the constituting component/s of the food ingredient/s is/are not altered.***

In the case of compound food ingredients, each food ingredient shall meet the technical criteria of this document to be considered as natural.

The use and incorporation of water during the production of a food ingredient does not preclude the food ingredient from being considered as natural.

The intentional removal of one or more constituents from a food ingredient during processing does not impact consideration of the food ingredient as natural.

What are the great nutritional benefits of malt?

Malt is low fat and a valuable source of fibre, complex carbohydrates (slow release of energy), protein and vitamins and is a healthy wholegrain option even in the malt extract form.

Malting is a natural process which converts hard cereal grains into easily milled malt. Barley is usually the grain of choice for malting because it is bred specifically for the ability to process easily and generate a cascade of natural enzymes that are used in later processing to convert starch (flour) into sugar and proteins into amino acids, all of which are highly nutritious when used in brewing, distilling or food manufacture. The entire process is inherently natural using just fresh water and clean hot air to produce a unique range of colours and flavours that cannot be reproduced by any other means. It is an ideal ingredient for introducing wholegrain claims into the ingredient declaration.

Malt is highly nutritious and can be used in many forms. For brewing it is milled and mixed with hot water which enables the starch to be digested to sugars that subsequently are used by yeast to produce alcohol. The protein also within the malt creates amino acids that are key to flavour development and yeast nutrition. During malting levels of vitamin B9 (folate) can increase up to 4mg/kg. The box shows that just 100g of malt extract provides significant levels of vitamins relative to daily intake guidance.

Malt …
a multi-vitamin and mineral ingredient

Just 100g of malt extract provides relative to the RDI

Vitamin B1 (thiamine)	56%
Vitamin B12	34%
Vitamin K	19%
Vitamin B2 (riboflavin)	15%
Vitamin B3 (niacin)	15%
Vitamin B9 (folate)	13%
Vitamin B6	13%
Vitamin A	7.5%
Vitamin E	1.6%
Vitamin C	0.63%
Selenium	91%
Chromium	40%
Phosphorus	24%
Potassium	16%
Magnesium	15%
Copper	14%
Iodine	13%
Manganese	5.5%
Iron	5.1%
Zinc	3%

Glycaemic index – Malt is LOW

Glycaemic index (GI)This ranks foods according to how much the raise blood sugar and malt extract is in the low category due to its mix of slower release sugars. It is thus a much preferred sweetener than free sugars in this regard.

The GI ranks foods according to how much they raise blood sugar

Foods ranked from 0-100

<55	Low
56-69	Medium
>70	High

Glucose	*96*
Sucrose	*64*
Molasses	*55*
Maple Syrup	*54*
Malt Extract	*42*
Honey	*30*
Fructose	*22*
Xylitol	*7*
Stevia	*<1*

Antioxidant source

Antioxidants are substances that may protect your cells against the effects of free radicals: molecules produced when your body breaks down food or is exposed to tobacco smoke and radiation. Free radicals may play a role in heart disease, cancer and other diseases.

Expressing antioxidant in a different way still sets malt extract apart from other syrups:

Syrup type	ABEL-RAC/mg
Light Malt extract	5872
Manuka honey	742
Lime honey	377

Malt extract even in its lightest colour provides more than 8 times the antioxidant capacity as Manuka honey

Malt Extract is a source of antioxidants

Black Molasses	5.5
Date Sugar	4.5
Malt Extract	2.1
Brown Rice Malt Syrup	1.0
Maple Syrup	0.5
Light Brown Sugar	0.4
Honey	0.2
Agave Syrup	0.03
Corn Syrup	0.01
White Syrup	0.005

Levels expressed as FRAP mmol/100g (FRAP: Ferric reducing ability of plasma)

Malt as a sweetener

Malt is often viewed as simply a sweetener. Already in this article it has been demonstrated that it has much more to offer. However, where it is used for sweetness it is less sweet than the addition of pure sucrose. Sweetness is measured with reference to Sucrose which is assigned a value of 1.0. On that basis malt extract has a value of 0.65 , which means that addition of 1g of malt extract in place of sucrose reduces the relative sweetness by 35%.

The artificial sweeteners of course deliver far more sweetness than any of the free sugars or malt preparations but some of these have undesired side effects on the gut and their inclusion on an ingredient label isn't seen as positively as using a food product name such as malt, malt extract or barley syrup.

Relative Sweetness

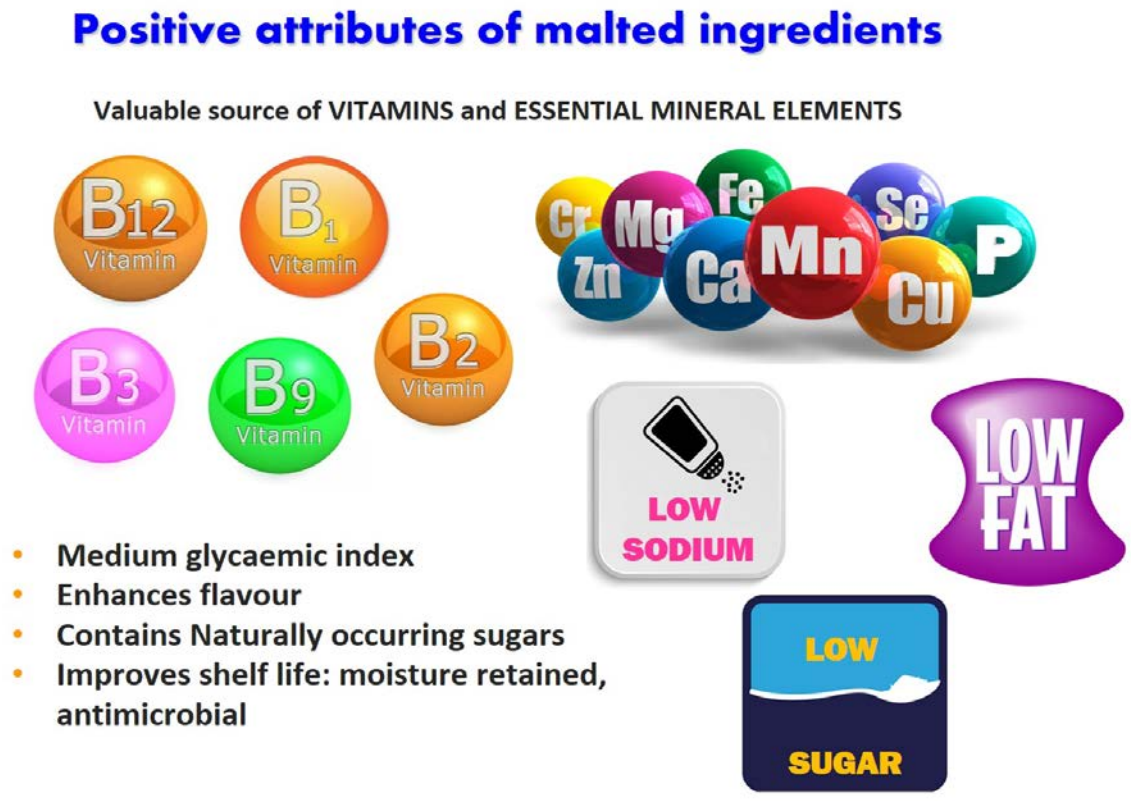
Advantame	up to 47,000
Neotame	up to 10,000
Thaumatin	2,500
Alitame	2,000
Neohesperidine	1,600
Sucralose	600
Saccharin	500
Steviol	up to 250
Acesulfame K, Aspartame	200
Cyclamate	30
Fructose	1.2
Sucrose, Xylitol	1.0
Glucose	0.8
Sorbitol	0.7
Maltose	0.5
Galactose	0.4
Lactose	0.2

The Malt dilemma!

It seems that at the moment sugar has been declared 'public enemy number 1' due to the increasing numbers of diabetics and the increased incidence of obesity. Malt is approximately 8% simple sugars and 10% fibre hence if eaten directly it does not qualify as a low free sugar product. In practical terms though, it is only used in relatively small amounts in foods at anything up to 5% hence the contribution from it's natural free sugars is small and it delivers the additional nutritive benefits.

So, the dilemma is not that real in practice because there is far more beneficial in malt than just reflecting it's free sugar content. There is a great message to promote malt as a natural, wholesome and healthy product delivering an impressive array of key factors important to health and avoiding some of the pitfalls of adding these through other chemical additions.

There are many food manufacturers now realising they need to introduce malt in its many forms into their new product development options that will help them deliver an improved product range that addresses current health concerns and often creating improved customer experience with reduced ingredient costs. Intrigued? That's another article in itself, but the final box below is the take home message that there is a strong health promoting alliance by introducing malted ingredients into your formulations.



Muntons has been producing malt and malted ingredients for almost a century. The Company is a significant international player in the supply of malts, malt extracts, homebrew kits for beer and wine, flours and flakes and many other malted ingredients relevant to the food and drinks industry, exporting around half of its production.

For more information on our range of healthy products and our drive to do this sustainably please visit our websites by clicking on the logos.

Muntons
Passionate about malt

P.S. Practical Sustainability
it's no afterthought