

History of Base Malts

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A “base malt” can comprise the bulk or, in some cases, entirety of the beer, and retains enough enzymes to convert its own starches into sugars.

Modern kilned pale malt is relatively recent, but its thought that the earliest beers were likely made with pale malt that was dried in the sun or wind:

- Wind malt was pale, but laborious to make, requiring manual turning for days until it was dry [1 p.8]
- Sumerian beer was probably made from barley, spelt, einkorn, emmer, made into a sort of biscuit with moist green malt, mashed with more green malt to make beer [1 p3]
- A Roman brewery from AD 179 near modern Regensburg, Bavaria has what's thought to be the oldest malt kiln in the world - it was indirectly fired and likely produced relatively pale malt [1 p7]

However, direct fire kilns were commonplace at least by the 9th century, as evidenced by the brewery at the Benedictine Abbey of St. Gall in Switzerland [1 p.8]

- A mid 13th century Anglo-Norman poem, *Le Tretiz*, references floor-malting in an attic and grain-drying in a direct-fire kiln called a “torrail” [1 p.10] - torrail comes from Latin *torrere* (to roast) and also gives us the word torried
- Production of ale or beer was entirely domestic prior to a devastating outbreak of the plague through Europe in 1348-1349, making it hard, along with lack of surviving documents, to know what it was like then. [3] p28

Smoking Out the Smoke

Drying fuels for direct fire kilns were varied and included: wood, straw, coal, fern, and peat.

- In *Description of England* (1577), author William Harrison gives domestic malting / brewing details and says wood and straw were used for drying malt, but straw was preferred. [3] p21
- Wood was becoming scarce in England in the mid 16th century and coal became more widely used for everything except the drying phase [3 p21]
- Smoke was usually “unwanted, if not entirely avoided”. A description from 1542 by Andrew Boorde of desirable properties of ale: “*it must be freshe and cleare, it must not be ropy nor smoky*” [3] p30
- Woods used in England included “oak, hornbeam, ash, or beech” [5 p15]

Kiln design was another factor, designs in the early 1600s would prevent contact between smoke and malt.

- A 1615 treatise references a “French kiln” that burns “*any kind of fuel whatsoever, and neither shall the smoke offend or breed ill taste in the malt, nor yet discolor it, as many times it doth in open kilns.*” [3] p30
- Also references another “*West Country kiln made at the end of a kitchen range or chimney, which dried the malt by hot air, with no smoke.*” [3] p31
- In 1635, Sir Nicholas Halse filed a patent for a mostly smoke-free kiln, “*for the dryinge of mault and hops with seacole, turffe, or any other fewell, without touching of smoake.*” [3 p.22]

First brewing related patent in the 17th century was in 1634, 14 appear by the end of the century, 13 of which have to do with fuel and heating problems

- Therefore, clearly, smoke was a great nuisance in drying, and they considered beer and ale brewed from it “*unsavoury and unwholesome*” [3] p31
- It also shows that smoky-flavored brown-colored ales were probably common in pre-industrial Britain, and many brewers and presumably consumers disliked smoke and sought to remove it
- It's thought there was a range of expression: tarry or creosote-like, piercing phenolic note, others included a pleasant earthy woody taste [3] p32

Straw was the preferred fuel for the taste, but produced a more volatile, difficult to control flame, which made it more prone to starting fires

- A regulation meant to prevent fires in London in 1189 talks about the preference for wood [3 p 19]

Have a Coke With Your Malt

In 1713, a British iron master, Abraham Darby, patented a procedure for heating coal in the absence of air to drive off volatile compounds, like sulfur, leaving behind almost nothing but clean carbon, referred to as “coke” [1 p.10] - a process similar to making charcoal from wood.

- Darby didn't necessarily think of the brewing industry for his invention, but it was a highly suitable fuel for malt kilns. It was used for fancy, expensive beers, while Porter used cheaper brown malt dried with traditional fuels [1 p.10]
- But coke was hard to come by & cost prohibitive if any distance for shipping was involved [3] p22
- *“The malt from the Northern counties was excellent, owing to the use of coke in the drying kilns. In the south-east straw was used and in the West Country wood, the former being difficult to control [and] the latter imparting a most ungrateful taste”* [3] p22

Despite the availability of coke, maltsters in England at this time were separate businesses from brewers, and they kept the smoke in malt for a while longer, for economic reasons:

- The big producers were driven by need for profits, and therefore used the most cost effective fuels to compete [3 p34-35]
- The production of “quality malt” often wasn't an easy sale due to production cost, and taxation made coal and coke expensive. Some maltsters apparently managed to make relatively smoke-free malts, anyway [3 p.36]
- Even though coke or straw were clearly preferred, it seems clear that most brown malt was dried over a wood fire, lending the smoky character to Porter, which was very popular at the time. [3 p.44]

Base Malts in Any Color You Like As Long it's *Not* Black

For a long time, beers *usually* were made with one kind of malt, and diastatic malts could be pale to brown with any shade in between

- Ale / Beer was usually made with 100% of its respective color base malt: this is how we get brown ale, pale ale, amber ale in the 18th century [10]
- Brown malt was the cheapest to produce, requiring less control than paler malts, and usually comprised 100% of the grist for Porter [2 p15]
- *“Up to 1817 the darkest malt available was brown malt dried over a fierce hardwood fire. This malt might have had a smoky flavour which faded slowly on storage. Any attempt to take the malt to a darker colour led to a runaway reaction that turned the malt into charcoal.”* [2 p7]
- Pale amber malt was also called “Scotch malt” in England, and “Porter Malt” in Ireland in the 19th century [2]

This practice changed with the invention of the hydrometer, which revealed the false economy of using brown malt, starting the decline of the smoky character in Porter [3 p.37]

- Process improvements led to the use of non-diastatic “blown” malt, dried with coke and then torried over a roaring fire, which could be produced much more quickly [3 p58]
- Blown malt was first described in the the 1743 edition of *The London and Country Brewer* as “‘ready to burst’, and many of the grains ended up with ‘a bitterish, brown, burnt flavor’” [5 p15]
- Brown malt got less smoky from the process improvements, and brewers were *also* using it less in porters, as a result of John Richardson's 1785 treatise on the hydrometer [3 p.52]

In 1817 Daniel Wheeler patented the drum malt roaster which allowed roasting malt to any color, *including* black, but without enzymes [2 p.7]

- Before that, Porter producers used burnt sugar, molasses, and other additions to color the beer darker [3 p.54]

Burton IPA in the 1820s was produced with an even paler malt, called “white malt” or “East India Malt”, kilned to about 1.5L [2 p.6]

- It originated at Allsopp's Brewery and was apparently very similar to today's Pilsner malt [6 p.71]

Mechanization to Modernization

The invention of the steam engine in 1781 led to many mechanical innovations, which transformed the process of malting:

- In 1842, Scottish maltster Patrick Stead invented the process of pneumatic malting with mechanically blown air in a multi level malt house with trap doors to move the malt through the stages [1 p11]
- Patents by Nicolas Josef Galland in 1874 and his assistant, Jules Saladin, in 1883 led to the use of mechanically-turned drums, one of which was installed at Weyermann in 1899 [1 p.12]

Modern “Munich” and “Vienna” malt were invented by two brewers who went on a trip to England during the next hop harvest, and discovered the secrets of British malting

- Gabriel Sedlmayr (Spaten, Munich) and Anton Dreher (Klein-Schwechat, Vienna) met while both apprenticing at the Simmering Brewery (Vienna) [7]
- They were introduced to the saccharometer and concept of attenuation by David Booth, and conversely contributed information about German beers to his 1834 book *The Art of Brewing* [7 p. 10]
- Sedlmayr brought the saccharometer back and it was still in use in 1874 at Spaten “when other German and Austrian brewers had adopted the Balling system.” (Long’s saccharometer measured SG) [7 p.13]
- They went many times to the largest brewer at the time, Barclay Perkins, to observe the modern, mechanized operation, but visited at least 20 breweries, sometimes stealing samples of wort to measure with the saccharometer [7 p11]
- They returned home and applied their knowledge, meeting up in 1834 to brew some test batches of beer, including a top-fermented beer that some visiting Englishmen thought was similar to real English Ale [7 p14]
- Sedlmayer expanded his brewery and introduced steam powered mechanization, but Dreher was slower to apply his knowledge due to a lack of funding and support until he took over the Klein-Schwechat brewery outright in 1839 [7 p.15]

Indirect-heated kilns were first introduced in Munich 1818 but took until around the 1840s to become ubiquitous. [7 p23]

- Spaten was one of the first breweries to use an indirect-heated kiln [7 p.101] and in 1841, made a Lager with the new Munich malt that became the prototypal modern “Marzen” - a term that previously meant a stronger beer brewed at the end of the brewing season
- Klein-Schwechat previously used old style smoke kilns, but Anton Dreher replaced them, and created Vienna malt and the Vienna lager in 1841, with kilning trials in 1840. Originally, Vienna malt was probably closer to Munich malt at ~6L [7 p.100]
- Industrialization and his success led to other breweries switching to making lager within a few years and beer becoming much more popular in Austria than it had been previously [7 p26]
- The Burgher’s Brewery of Pilsen was founded in 1839 and hired Bavarian brewer Josef Groll who brewed the first Pilsner in 1842 [7 p.57]
- It’s said that they possibly could have produced Pilsner malt on the same kind of kiln as Vienna and Munich malts, but the limitations in humidity extraction made them more suitable for higher dried malts. [7 p.101]

Breeding Better Barley

Barley varieties went from less uniform local land race varieties to ones that were bred for uniformity and yield.

- In Scandinavia, 6 row completely dominated until the end of the Middle Ages, and even in the 19th century was the most common type [9 p.49]
- Farmhouse Ales in Belgium most often used 6 row winter Escourgeon barley in the 19th century, unevenly kilned to an amber color [8 p.102]
- In the highlands and islands of Scotland, farmers use local land race barley called *bere*, an ancient barley adapted to the climate that grows quickly, sometimes called “90 day barley”, still used in Orkney [9 p.50]
- Farmers were sowing non identical grains which grew to different heights and were visibly different, sometimes even appearing black instead of yellow [9 p.51]

- Landrace grain often ripened unevenly in the field, and bundling into shocks allowed them to mature before the grain was collected [9 p.55]
- This changed when landowners in Germany, France, and the UK started choosing grain more systematically, e.g. British Chevallier, which was grown in many countries in Europe [9 p.53]
- Systematic cross breeding was pioneered in Sweden in 1888, with the first variety from the effort launched in 1916 [9 p.53]

Where There's Smoke, The Bathhouse Might Be on Fire

Small farmhouse brewers in Scandinavia and the Baltics create some unique, characterful base malts from their traditional methods, and give us a window into some malting and drying techniques from the past.

- The danger of fire was always a concern through accounts of drying malt with fire, wooden kilns often were built outside the farmyard itself. Danish insurance laws would take this into account and charge more [9 p.60]
- Most common drying method in Norway and Sweden is the *badstu* (Norwegian), or *bastu* (Swedish), literally “bath cottage”, which used to be used much like a Finnish sauna [9 p.67]
- They burned what they had to: “*in Orkney and western Jutland there was little firewood, so people were forced to use peat*” [9 p. 64] and sometimes they would cover the malt while the fire was lit, and let the smoke escape once the fire was out to minimize smoke exposure [9 p.69]
- They wanted wood that burned evenly without too many sparks to minimize fire risk, so no coniferous trees *except* in Gotland, where they had kilns with a long stone channel that mitigated the risk [9 p.64]

Many were also dried directly with smoke, like Rauchbier, in “såinn” (SO-inn) or “kjone” (SHUH-nuh) kilns that were prone to burning down, styles today include Stjørdalsøl (SHUR-dahl-suhl), using Alder-smoked malt, and Gotlandsdricke, using Alder or Birch [9 p.73-74]

- Heavily smoked malt was common in southern Sweden, the Swedish island of Gotland, southeastern Norway, and most of Denmark except northern Jutland [9 p.74]
- Some even used hot lava rocks, which may have been widespread in earlier times. In parts of Norway, they used a “turkebrye” (drying trough) into the 19th century made from a hollowed out, sealed log. One person would stir the malt while heated stones were added and malt was said to let off steam and smoke [9 p 77]

Some methods would produce relatively pale malt, without smoke, but in smaller quantities.

- Along with wind malt, some small batches would be dried using drawers under or above the stove, producing relatively pale unsmoked malt [9 p.63]
- Some dried malt in an iron pot, constantly stirring over a slow fire, but this was limited in scale [9 p.77]

References

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- [3] Larsen, Geoff & Daniels, Ray: *Smoked Beers*
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- [5] Cornell, Martyn: *Porter & Stout*
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- [10] <https://barclayperkins.blogspot.com/2008/08/early-18th-century-british-beer-styles.html>