BREWING BEER IN THE MIDDLE AGES (750-1500): BEER PRODUCTION AND PRODUCT DIFFERENTIATION IN MEDIEVAL NORTHERN GERMANY. PART II

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Medieval beer ingredients

Flavouring

One of the most interesting and frequently discussed issues in regard to Medieval brewing is the flavouring. This is so, because medieval beers were produced with more variety in flavouring than has been the case for the last century and because hops have been attributed with revolutionising the beer industry due in part to their anti-microbial properties. From a product differentiation perspective, flavouring is also of profound interest, because the use of a variety of flavouring will result in a variety of beer types, ultimately resulting in product differentiation.

Furthermore, in beer production flavouring adds more than spice and durability, which is an important point often forgotten. Beers without flavouring tend to be quite 'malty' in aroma and flavour, which can be perceived as dull and heavy and within a rather short timeframe becomes unpalatable. Therefore, flavouring poses an obvious advantage as it balances the beer. Furthermore, when added during the boil, flavouring help remove the volatile, foul smelling dimethyl sulphide (DMS), provided that boiling is efficient. They also stabilise the haze of the beer, in other words, help clear the beer, by precipitating proteins and polyphenyls at the bottom of the boil kettle as well as forming a sieve. On a biochemical level, they destroy malt enzymes, which would potentially compromise the fermentation, kill unwanted microorganisms, and provide flavour stability and preservation.1

Gruit and Bog Myrtle

Medieval brewers spiced their beers with a variety of different herbs, fruits, and berries.² However, identifying exactly which flavourings were commonly used continues to be an issue. Archaeobotanical evidence reveal that several different kinds of herbs and vegetable matter were grown and consumed in the Northern German towns, but there exists no evidence in the Northern German area today which reveal the variety of additives that were used in brewing.3 From archaeobotanical evidence and historical sources only two types of common beer additives have been identified: hops and bog myrtle. A third spice, the concoction gruit, had significant importance in the Low Countries and most likely contained bog myrtle, although the exact recipe of gruit remains unknown.⁴ Therefore, gruit beer and bog myrtle beer will be discussed together in this chapter.

From archaeobotanical evidence it can be derived that bog myrtle was used to spice beer in certain areas due to the monumental abundance of remains from the plant in those regions. For instance, in the Danish towns of Viborg and Ribe, where bog myrtle beer was common, more than 1,000 fruitlets of bog myrtle were uncovered, some originating from as early as the 8th century till the 13th century.⁵ Furthermore, remains have been found at seven different sites in the Low Countries dated to the Iron Age, which suggests that bog myrtle was used regularly in brewing from the Pre-Roman Iron Age in that area.⁶

What is quite noticeable about bog myrtle finds is that they often remain within the area of its natural distribution, being found at most up to 60km away,⁷ suggesting that it was not traded over long distances. It was quite possibly a common beer spice in Northern Germany, as it grows naturally in many places throughout the area. Phillips has also noted that English ale, usually brewed with gruit or bog myrtle, was sometimes traded between England and Flanders on a limited scale in the Early Middle Ages (although he does not provide a source) and this suggests that gruit beer or bog myrtle beer did travel over smaller distances.⁸ Furthermore, the finds of bog myrtle declined throughout the Middle Ages, while hop finds increased, which corresponds with the notion that hops out-competed bog myrtle as the most popular beer spice.

From historical evidence, we know that almost all beers brewed in the Low Countries were made with gruit, due to their particular tax system on beer, and beer with bog myrtle was common in Denmark in the Middle Ages. The earliest reference to gruit as *materiam cervise* is found in a charter issued by Emperor Otto II in 974 AD, in which brew rights are transferred to the Church of Liege.⁹ In 999 the word 'grut' is mentioned for the first time by Emperor Otto III when he bestoved the domaine of Bommel and the trade in gruit to the church of Utrecht.¹⁰ From here on plenty of references to gruit can be found in the Low Countries as lords and later town officials traded in gruit and gruit rights.¹¹

In the Northern German area, brewers most likely brewed with bog myrtle or a concoction similar to gruit as in neighbouring regions. They were, however, not restricted to brew only with gruit, as in the Netherlands, and more likely experimented with their beer ingredients. They were possibly also the first to limit the use of bog myrtle in favour of hops and certainly the first to create a thriving industry with hopped beer.¹² But what did the bog myrtle or gruit add to the beer other than subtle spice?

Bog myrtle, marsch or wild rosemary, myrtle, and coriander¹³ which are sometimes mentioned as possible ingredients in gruit beers or as specifically typical regional beer flavourings,¹⁴ have repeatedly been revealed to have strong antimicrobial properties against a variety of bacteria, just like hops.¹⁵ Modern experiments with myrtle and hops as natural food preservers have shown that both plants have a strong inhibiting effect on so-called gram-positive bacteria with little effect on gram-negative bacteria, making them effective on the same overall sort of bacteria.¹⁶ Myrtle, bog myrtle and hops have independently been recommended as natural food preservers, which could potentially replace chemical conservation methods in future food production without reducing a products' shelf life by modern food scientist.¹⁷ Importantly, no direct comparison between bog myrtle's and hops' preservative qualities has ever been performed and therefore it is by no means certain that hops have better preservative qualities than bog myrtle.

What is noticeable about this is that there has been formed a general opinion amongst beer historians that hopped beer was far superior to bog myrtle beer with specific reference to hops' antimicrobial properties. Therefore, it often seems deemphasised that both gruit and bog myrtle ought to have prolonged durability significantly if we take modern day's revelations into account. Also, any sort of flavouring which decomposes into smaller particles during boiling, like plant material generally does, would help remove volatile compounds in the wort during boiling and foster a clearer beer during conditioning. Therefore, the addition of bog myrtle or gruit to beer would have heightened the quality of the beer as opposed to not adding any flavouring. However, beer brewed with gruit, bog myrtle, or other additives did seem to decline after hopped beer increased in popularity in the 13th century and throughout the Medieval period in Northern Germany.¹⁸

Hops

As mentioned many times before, the presumable longer durability and possibly improvements in taste supposedly made the hopped beer superior to the old ale and, most importantly, made beer a product which 'could compete successfully against locally brewed beers in distant [markets.]'.¹⁹ The late thirteenth century has been pinpointed as the period when hops changed the course of the beer industry as hops became the defining new technology which made Northern German towns, such as Wismar, Hamburg, and Bremen, able to sell their beer outside regional borders.²⁰ However, I find that there is considerable evidence that hops were used regularly in beer production centuries before Northern German towns specialised in hopped beer. When examining the history of hops, it is noticeable that before the late 8th century hops are completely absent in Northern Europe. There exists neither archaeobotanical evidence of hops beyond what is naturally found in nature nor historical evidence of hops.²¹ But from the late 8th century, hops appear frequently both in written evidence and archaeobotanical evidence. Notably, the excavations of the settlement of Haithabu in Schleswig have revealed 70 different finds of a total of 3.321 hop plants which originates from the period from the late 9th to the early 10th century.²² Such a monumental amount of hop finds suggests an extensive hop production beyond what would have been needed for medicinal uses and, hence, have been most likely used for beer production.

Furthermore, plant remains on the Gravenay ship, which shipwrecked off the coast of Kent in the 10th century, contained an abundance of remains from the female hop plant (used for brewing) on the inside of the boat which 'seems seriously out of keeping with the rest of the Graveney fossils'.²³ Pollen from hops were absent from the outside of the boat, which make it evident that the Gravenay boat were carrying a cargo of hops.²⁴ This in turn suggests a long distance trade in hops, which can only be associated with hops in beer production, as there are no other known uses for hops in such high quantities that they cannot be grown locally or collected from the forests.

Sources from the late 8th century reveal that humolariæ, that is hop gardens, began appearing in Europe in this period.²⁵ For instance, Emmens and Hallema have found documents originating from Hallertau, which is still a hop producing region today, dated to 736 which mention a Wendish prisoner who cultivated a hop garden near Geisenfeld.²⁶ In another example, in a deed from 768 Humlonarias cum integritate is recorded as a gift to the Abbey of St. Denis by Pepin le Bref.²⁷ Annual records from the abbey of Freisingen between 859-875, which mention hop gardens, have also been highlighted by Unger. While these documents are not direct evidence of a relationship between hops and brewing, they do reveal a sudden growth in hop production from the late 8th century, which in turn suggests that hops were consumed more frequently thereafter which would most likely be due to new applications e.g. beer production.

The earliest written evidence which reveal a connection between beer brewing and hops comes from monaster-

ies. The most famous and significant are the statutes issued by the Abbot Adalhardus from the Corvey monastery by the river Weser. In one statute from 822 the abbot exempts the miller from making malt and collecting firewood and hops,²⁹ which can be associated with brewing. In a slightly later statute from Abbot Adalhardus, he states that a tithe of malt should be delivered to the monasteries' porter, who also kept the malt he made himself and that this should also apply to hops: 'De humlone quoque, postquam ad monesterium venerit, decima ei portio ... detur' and if this was not enough for the production of beer, then the brewer had to obtain the necessities for brewing elsewhere: 'Si hoc ei non suffit, ipse ... sibi adquirat unde ad cervisa suas faciendas sufficienter habeat'.³⁰

In a slightly later, but more famous example, Hildegard von Bingen noted in her Physica that beer brewed with oats is prepared with hops.³¹ She also noted that it's bitterness prevented early spoilage. That Hildegaard should choose to specify hopped beer is important to notice because it suggests that hops were commonly used to spice beer. We must bear in mind that all sorts of plants could be used to flavour beer, yet hops, and sometimes bog myrtle, are the ones which are highlighted suggesting that they were used commonly and recognised as typical beer ingredients. The same logic can be applied to the statutes from Abbot Adalhardus, which in keeping with the archaeobotanical evidence from the period strongly suggests that hops were commonly used in beer brewing from the 9th century.

In light of the evidence that hops were a known beer ingredient, centuries before towns like Bremen and Hamburg gained their reputation for brewing good hopped beer suitable for export, why are hops then highlighted by historians as a defining innovation and turning point in commercial brewing? The issue is critical to resolve, because it constitutes an important piece in the puzzle of how the beer industry changed during the Middle Ages and how beers were differentiated.

It seems that beer historians' strong emphasis on hops can partially be explained by a bias of repeating previous studies while recognising that almost all modern beers are brewed with hops combined with an expansion of the hop industry from the 13th century and an emphasis on sources from the 'Gruit Recht area'.³²

One very important link is the naming of export beers from Northern Germany, which in the area of gruit rights became labelled as 'hoppenbier' as opposed to 'ael'. A century later the former was adopted in England and France and subsequently shortened to 'beer', first recorded in Flanders in the 13th century.³³ The distinction between old 'ale' and new 'hopped beer' seems to have encouraged the belief that the hops were the game changer in the beer industry.

The term 'hoppenbier' was coined in the Netherlands as a result of brewing rights. According to Unger, the town of Dordrecht brewed beer with hops in 1322 and taxed significantly less than gruit. To distinguish between the privileges of brewing with gruit and brewing with hops they named the 'new' product, which resembled the popular Northern German beers, 'hoppenbier'.³⁴ In the 'Gruit Recht area', they clearly felt that hopped beers were significantly different to gruit beers, as noticed by Emperor Charles IV, who granted the right to brew with hops in 1364: 'Novus modus fermentandi cervisiam, videlicet per appositionem cujusdam herbæ, guæ humulus vel hoppa vacatur',³⁵ a new type of beer - with hops. Noticeably, however, outside the Gruit Recht area, variations of the naming 'Hoppenbier' or specific indications that this was a new method of brewing do not appear.

This is an important consideration. If we consider the area of Gruit Recht, where only one type of additive was legal and this additive was usually mixed in with grains in equal amounts in all beers,³⁶ the options for product differentiation in this area was particularly scarce compared to other areas, including Northern Germany and Scandinavia, where there appears to have been no regulations on additives. Certainly, as they could not brew with hops, the imported beers from Bremen, Hamburg, Wismar etc. would have seemed monumentally different and this is reflected in the source material from the area, as we have seen. In Scandinavia and Northern Germany, on the other hand, the export beers are simply recorded as 'Ostersches bier', 'Dudesches Bier' or beer from a specific town.³⁷

The issue seems to be that while it is probably true that in the Gruit Recht area, beers were brewed only with gruit in the 10th to late 13th century and then with hops, which seemed to be a new innovation to the brewers in those areas, this was not the case for the remaining Continental Europe. But the narrative from Eastern Germany, the Low Countries, and Northern France have wrongly been widened to include all of Europe, ignoring what seems to be the case that hops were used throughout the Middle Ages and did not spur long-distance trade in beers before the late 12th century. This implies that something other than hops made the Northern German beer worth exporting or, rather, something in combination with hops made them palatable to foreign markets.

Hops as part of a picture

The answer is, possibly, that the beer brewed in Northern German towns was, in fact, a significantly differentiated product from traditional beer types. Certain favourable economic circumstances in Northern German towns, combined with a period of innovation within the beer industry, led to the invention of products, which only became affordable and/or legal to produce elsewhere about a century later.

In the Northern German towns of Wismar, Hamburg, Lübeck etc. brewers were able to avoid strict restrictions on industrial activities from the authorities and, hence, enjoyed more liberty in regard to production and trade than what was custom in, for instance, one of their largest markets, the Netherlands.³⁸ They, therefore, enjoyed more freedom to experiment with ingredients and quantities. In many ports, particularly in Holland, German merchants also payed lighter taxes on beer and products in bulk.³⁹ Hence, the brewers had far more incentive to innovate, invest in better equipment, specialise and experiment with their products and gain advantages from economies of scale than in other towns. Furthermore, the urban brewers worked in close proximity and, hence, had easy access to share knowledge, experiences and even investments in better equipment such as copper kettles. Combined, this made it possible for the Northern German brewers to innovate and sustain a better product.

If we take a look at the period from the early 13th century into the 14th century, the early period of Northern German beer exports, it is noticeable that many significant innovations came into being as emphasised in the previous section: fixed minimum fermentation periods and generally longer periods in the barrel made exported beer more harmonious, reduced off-flavours, and

contributed with more flavour from the oak. Heating had become more efficient through statutes on firewood and physical innovations throughout the period also reduced off-flavours. Water supplies had become more easily accessible which made it easier to produce beer in bulk and clean the equipment afterwards. Good quality copper kettles of sizes up to 1,000 l became common in professionalized urban breweries in the second half of the 13th century, perhaps as a result of the increase in exports.40 Mashing and boiling were separated at the latest at the beginning of the 13th century in those breweries which had capital to invest in more tuns, kettles, and pans and continuous work made improvements from experience more likely. Professionalisation of the trade made the brewers full time specialists in the Northern German towns leading to progress and competition between brewers may also have been a factor. In sum, a multitude of factors contributed to creating conditions for product improvement and invention from the middle of the 13th century in certain Northern German towns, which other towns did not enjoy to the same extent until about a century later.

One particular innovation of the Northern German brews, which relates to the use of hops, concerns alcohol content and subsequently malt quantities. Beer brewed with hops taste harmonious and full bodied even at a quite low alcohol content.⁴¹ Therefore, it is most likelv that the beers from the Northern German towns would have been 'lighter' than the traditional ales, simply because the brewers could save money on malt quantities. However, beers with a lower malt content are also more vulnerable to off-flavours and infections, due to the lower alcohol content and more subtle flavour from the malt. Therefore, the innovations that Northern German brewers invested in, as well as their skill, would have been key to produce this kind of beer, something not possible to copy in areas where the same inventions, technology, and skills were not attained.

In expression, the lighter export beers would most likely have seemed more refreshing, somewhat bitterer due to the ratio between malt and hops and have gained positive flavours from the longer time on oak, fermentation periods, and other factors, which will be explained further in the following sections. In sum, the Northern German brewers were able to create a product which was so markedly differentiated from the old that it even required a clearer labelling, hence a new name, not due to the adaptation of hops, but because it seemed a new type of beer, nowhere more so than in the Gruit Recht area, where it was named Hoppenbier.

Ultimately, we may draw two significant conclusions. Firstly, that previous assertions that hops were the defining innovation which made export beers possible is unsupported by evidence. In the equation of why Northern German beers became so popular and competitive over long distances there are simply too many unknown factors, due to simultaneous inventions and reorganisation of the industry, to which we can isolate hops and conclude that they were the defining innovation. Particularly, because hops were not an innovation of the 13th century, but rather of the 8th. More likely, it seems that the transformation in the beer industry was due to the accumulation of many innovation as well as economic circumstances important to those towns. Secondly, that the beer the brewers in some Northern German towns exported was significantly different from other types of beer and not just because of the addition of hops.

Other Additives

Apart from hops and bog myrtle, a variety of different herbs, berries, and spices were added to Medieval beers before beer purity laws and similar regulations in the Modern Period ended the tradition. Medicinal texts and books on fauna and flora from the entire continent refer to herbs, spices, and berries recommended for beer brewing, not only as flavouring agents, but also for medicinal purposes. Most books, which survives to today are, however, from the Early Modern Period, but they do reveal a tradition of using various ingredients as beer additives. The general trend from the 17th century until very recently has been uniformity towards hopped beer and, therefore, we can expect more variety and playfulness within Medieval beers than what is the case today.

Statutes from the Middle Ages regarding beer brewing only regulates the types and amounts of malts in beers and it seems that flavourings were the decision of the individual brewers in Northern Germany.⁴² Some were more commonly used than others. The fern Hart's Tongue or Lingua Cervina seems to have been once regularly added to beers, although the tradition has since been forgotten.⁴³ Behre has conservatively listed some of the ingredients, which appear in medicinal and herbal books as specific beer additives from the Early Modern Period. Amongst them we find recognisable aromatic herbs such as bay leaves, rosemary, oregano, thyme, sage, and parsley, which would have contributed with their specific, palatable flavour. Other additives could be gathered from the country side, some of which would have added more tannic, spicy, perhaps even bitter qualities including spruce, heather, and various kinds of ferns. Very specific aromatic plants also appear, such as fennel and anise, which would have added a licoricey flavour, and spearmint. Flowers like iris, blue anemone, and lavender also appear. Finally, raspberries, blackberries, cherries, wild strawberries, and sloe are listed, which would have added acidity and their own particular flavour.44 Lambic brewers still produce wheat beers today with berries as their main additive.45 Other ingredients such as cinnamon, cardamom, caraway and even lemon also appear in Behre's list, but they would not have been either available or affordable as beer ingredients in the Middle Ages.

In essence, the vast amounts of very different kinds of additives would have resulted in much wider differentiation in beers than what we know today.

Yeast

The discussion of yeast as an ingredient is a particularly misconceived area in beer history. Still, yeast poses an interesting potential for explaining the Northern German brewers' success and has been discussed frequently, though it has previously been analysed with problematic terms and, consequently, misinterpreted.

While scholars have tried to explain why Northern German beers became so popular and resulted in a professionalized industry, they have not only focused on hops as the key factor, but also turned their eye to the possibility of a superior Northern German yeast type. From the earliest discussions of beer brewing in the Middle Ages, historians have fiercely debated whether Northern German beers were brewed with a specific type of yeast, which made them more adept to travelling and/or tastier. But they have interpreted the medieval brewing process on the basis of a modern constructed division of yeast strains between so-called bottom fermenting and top fermenting yeast, which has resulted in a myriad of misconceptions.

In the early 20th century Bing argued that Northern German beers brewed for the local markets were produced with a top fermenting yeast, while export beers would have been brewed with a bottom fermenting yeast due to their storage in cooler cellars before export.⁴⁶ Today, most historians are, however, of the opinion that bottom fermenting yeast only developed in Southern Germany in the 14th century and that all other beers were top fermented until modern science began cultivating yeast strains.⁴⁷

The central point, which historians have been missing, is that the division of bottom fermenting yeasts and top fermenting yeasts is a modern construction based on the ability to choose specific yeast strains, which are particularly adapted to ferment at specific temperatures to create particular flavours (typical for top fermenting veast), or absence of flavours (typical for bottom fermenting yeast), which have characterised how we today divide beers into either ales or lagers. The ability to choose a specific yeast strain and recognise and provide it with its optimum temperature throughout the fermentation process only became available in the 19th century and only from then on does it make sense to divide beers into pure lagers or ales. In reality, the yeast the Northern German brewers used was neither a bottom nor top fermenting yeast, but a mix of several different strains of wild yeasts and other micro organisms.

Therefore, the central issue is to interpret how wild yeasts in Northern German beers affected the products. This can be done from analysing how wild yeast reacts in wort, when subjected to external circumstances that characterised medieval brewing in urban breweries as opposed to rural breweries. This in turn will reveal how urban breweries had more favourable conditions for brewing durable, well-tasting beers.

Concisely explained, based on an analysis of the medieval brewing process, the 'small beers' in rural households would probably have suffered from insufficient boiling and too short a fermentation time with the temperature varying greatly depending on the time of year. If the wort was left outside to ferment, it would stale in winter and the yeast would die or mutate during hot summers, so most likely the fermentation took place

inside. Therefore, fermentation temperatures would probably lie between 18 - 24 C° depending on the time of year and day. Temperature changes between day and night would greatly influence fermentation due to the smaller batches. As a result, the beers would ferment quickly, which explains why they were often drinkable within a day or two, but they would suffer from resilient fusel alcohols, which in low alcoholic beers would resemble the flavour of paint thinner, but bear better in stronger beers. Strong smelling esters, which can resemble solvent, apples or banana notes, would form in greater amounts and buttery Diacetyl would form due to the temperature changes and contamination. Lastly, the yeast would not be conditioned to kill foreign bacteria and transform offflavours by the end of the fermentation cycle.⁴⁸ The end result would be short-lived and highly dependent on aromatic flavouring to hide the off-flavours.

In urban breweries, where conditions were better for boiling, where temperature changes would be subtler due to larger batches and dedicated storage rooms, where fermentation temperatures could be kept lower if the storage rooms were underground and beers were allowed a minimum of 72 hours to ferment, the end results would be much improved. By allowing the yeast to rest in the days where most flavour compounds are produced, the beer would have far less off-flavours from fusel alcohols and esters. If the beers were kept consistently below 22 C°, off flavours could be kept in check and Saccharomyces would multiply and create alcohol, fighting off other fungi and bacteria. The yeast cells would continue to evolve as previously explained in the section on fermentation and the flavour and durability would improve.

This insight is of central value, because it reveals that export beers, which were subjected to more efficient boiling and a colder, more stable fermentation period of at least three days, followed by a period at sea, may have gained from the transportation time rather than deteriorated. Certainly, improvements in fermentation alone would have resulted in a much different product to the local beers brewed and drunk within a week or so.

Malts

The most common grain types for beer production were barley, rye, wheat, and oats. The composition depended largely on availability, price, season, and traditions.⁴⁹ Naturally, availability of grains was key to producing the best beers and throughout the Middle Ages, availability of grains, and subsequently price, changed significantly.

The Middle Ages was a period of slow innovation and expansion within agriculture. It is estimated that c. 1050 merely 10-15% of the land in Europe was used for crops, but from then onwards the forests were cut down and grains planted. By the 12th and 13th centuries, when beer production began to expand, cultivated land had tripled and quadrupled, respectively.⁵⁰ In the Southern Baltic area rye, barley, oats, and wheat grew well and abundantly. By the North Sea, sturdy rye and barley grew relatively well and in good years, wheat could also be cultivated.⁵¹ Thus, the Northern German seaport towns were well positioned to import and export the vital grain supplies to the increasingly urbanised and consumer-based Northern Europe.⁵²

Rye was the easiest crop to grow in Northern soils and was a fixed part of the Northern German diet.⁵³ In the growing urban areas, where an increasing part of the population became consumers, rye which could be imported cheaply from Eastern Europe or grown locally became the most important commodity for the poorer town dwellers.⁵⁴ Hence, in times of high prices and cheaper beers, rye may have been a common ingredient.

Oats were also used in brewing, but it was always in high demand as horse feed. It has frequently been stated that the supposedly superior German beers from towns such as Hamburg and Wismar were brewed with less oats than elsewhere and for this reason, their beers were also better.⁵⁵ The idea is based on a Bremish Chronical from 1307, in which the author decries that Bremish brewers brewed with oats, a grain he considered less nourishing. Had it not been for the use of oats, he argues, the beers from Hamburg and Wismar would not have had an advantage.⁵⁶ Unfortunately, source material from Hamburg and Wismar from the same period does not confirm that those towns brewed without oats.

Wheat was used for bread, especially in the higher sections of society, and at festive occasions due to its cost.⁵⁷ Wheat did not grow as easily as barley and rye in the local areas and therefore making beer with wheat could be expensive, as bakers also wanted the grain. Hence, barley must have been a common choice and usually part of the recipe.

It can be rationalised that in rural households of the Early Middle Ages beer was brewed with grains that could be locally sourced, and for the most part that would be rye. With urbanisation and increasing grain trade, more options became available and consequently more options for product differentiation and quality improvements for the professionalized brewers.

Certainly, the Northern German towns benefited from access to grain from Eastern Europe by their position near the sea and to trade routes. Several scholars point to Hamburg as possibly the most influential seaport with respect to its import and export of grain from the beginning of the 13th century.⁵⁸ Several customs tariffs reveal that grains were traded by the Elbe, amongst them, a custom tariff dated to 1236, which reveals that wheat and rye were exported westward from Hamburg.⁵⁹ Another from 1278 reveals deliveries of rye and wheat to Lüneburg from Hamburg.⁶⁰ Furthermore, a declaration from Johann I and Gerhard I of Holstein, which secures the duty rates and mentions 'Kaufleute' from a variety of destinations coming to Hamburg, indicates the importance of Hamburg as a trading town in 1262.⁶¹

As a result of the favourable trading position of certain Northern German towns, the constraints of limited grain availability may have been less tight compared to other areas in the beginning of the export period. Therefore, the Northern German towns could have had a market advantage with easier access to the critical ingredient for a time period. But as demand increased with rising beer exports and more urban-based consumers and producers, who depended on grains for international trade but certainly also for their own survival, competition between the towns over grain supplies intensified.⁶²

Grains were, furthermore, not readily available to brewers and could not be bought at any time. Authorities regulated when, where, and in what quantities brewers could procure malts (and how much they could brew and sell, and at what prices, as well as quality-prove the products) to control the trade and acquire taxes, which meant that the brewers had to adapt their planning.⁶³

But what grains did the Northern German brewers prefer to brew with? Malt which has been liquified and consumed cannot be identified or analysed by archaeobotanical methods and so we rely almost exclusively on sources for possible grain bills.⁶⁴ Very little evidence remains, but there are some exceptions.

A statute by a cathedral chapter regarding the amounts of bread and beer, which were to be given to the 'Domherren' in Ratzeburg, includes a specification on the amounts of grain in beer. This 'recipe' for Trave beer from 1301, that is Lubecian beer with water from the river Trave, reveals that the beer was made with 4/8 of oats, 2/8 of barley and 2/8 of wheat which produced 18 barrels of beer.⁶⁵ Notably, in that recipe oats are the main ingredient and wheat and barley are secondary. Furthermore, rye is not included. Unfortunately, it is impossible to calculate the starch content of medieval grains or the efficiency of the brewhouse and therefore the expected alcohol percentage cannot be calculated.⁶⁶

In addition to the Ratzeburg cathedral chapter another statute has survived to confirm that Lubecian brewers did indeed use wheat, barley and oats in their brews. In a statute from Lübeck, 1363, brewers are restricted to a maximum weekly amount of grains, which can be either 1/8 of oats and 7/8 of barley or 1/8 of oats and 7/8 of wheats:

Dortmer scal nen bruwer mer bruwen in der weke, wen eynes, und schal nicht mer bruwen wen ene last ghodes moltes, alse hir vor ghescreven steyt, alse seven dromet gherstenes moltes oste wetens und eyn dromet haverns moltes. [Furthermore, shall no brewer make more brews a week than one and shall not brew more than just one measure (ghodes) of malt, as is here stated in writing, all of seven parts (dromet) barley malt or wheat and one part (dromet) oats malts.]⁶⁷

The statute indicates that from the middle of the 14th century at the latest wheat and barley were present in higher amount in the beers due to the ratio described and, quite possibly, that Lubecian brewers may have brewed with either wheat or with barley from 1363, thus limiting the grain bill to two types of malt.

Interestingly, by comparing the recipes from 1301 and 1363, it is clear that the amount of oats has decreased. In another source from 1335, making malts from oats and using oat malts are forbidden in Prussia.⁶⁸ In combination with the statement of the Bremish Chronicler,

who believed that the downfall of Bremish beer exports was due the use of oats in beer, it appears certain that oat malt was used less and less in the Middle Ages. This tendency may be partially due to the poor reputation associated with oat malts, as the Chronicler seems to believe it to be of worse quality, but it may also be due to a higher demand for oats for horses. Otherwise, it seems strange that it should be banned to make malt from oats in Prussia, as oats are by no means dangerous or un-nutritious as malts, and there are no indications that this should have been believed. It seems more likely that the oats would be prioritised for horse feed.

Another dimension of the statute from 1263 is that it comments on the quality of the malt, issuing that,

... de bruwere hebben ghut molt, dat nicht brandich si und nicht kymich sy, und dat id reyne stovet und reyne ghemaket sy'

[the brew should have good malt that is not burned and not infected and that is clean from dirt and cleaned to be pleasant]⁶⁹

thus decreeing that the malt should be of good quality, not burned or off, dusty or dirty. Thus, while we have previously noted that the medieval malsters must have known how to kiln at different temperatures in order to make red beers, they were also conscious not to make the beer taste too burnt. This may be why references to red beer can be found around Lübeck, but not to black beer, as they would require a high degree of kilning and consequently be rather 'brandich'[burned].

It is also quite interesting that the Lubecian brewers decided against brewing with the cheaper rye and, apparently, had to be very conscious of burnt tastes. Rye is spicy and contributes a dense, hearty feel as known from ryebread.⁷⁰ In connection with their resistance to a roasted or burnt taste, this indicates that the Lubecian beer probably aimed at a light, clean, and biscuit-like flavour in the grain bill.

From the scarce source material, it does seem like Northern German beers were aimed at a lighter body with more wheat and barley, rather than rye, which is also very palatable with aromatic hops or herbs. One last aspect, in regard to flavour, which should be considered is the issue of smoked malts. The earliest examples of kilns in Northern Germany, where the smoke is diverted away from the malt, is from the 16th century and are found in Wismar and Lübeck.⁷¹ On the one hand, this opens up the possibility that earlier constructions made unsmoked malt production possible in the Middle Ages. In conjunction with the Lubecian brewing statute, which revealed a dislike for burned tastes, it would be expected that brewers tried to limit the amount of smoke which came in contact with the malts. On the other hand, since no similar constructions have been found in the area before the Early Modern Period, it makes it unlikely that completely unsmoked malts were the custom. Most probably, Medieval beers would have had at least a touch of smoke, similar to modern day's Landbiers.

Water

Water supplies became an issue for urban brewers. Indications such as the creation of new occupations like water carriers, testaments, statutes on water rights, and large-scale innovations reveal how severe the conflict over water was. Disputes between citizens over local water rights are frequently documented in the source material.⁷² Issues related to water rights are highlighted as important and was tried at court.⁷³ Water was needed by many occupations, which sometimes led to some interesting verdicts. In one example, a brewer and his brothers are given water rights specifically for brewing activities, but also asked to notify the butcher beforehand,⁷⁴ which reveals both the struggle producers had to endure to gain water, but also the annoyance of contamination from production.

In regard to access to water, the town of Lübeck poses an interesting example; water pumps and pipes were constructed as early as 1291 which transported water from outside the town directly to the breweries.⁷⁵ Fronzek has attributed the reason for this large-scale innovation to the lack of sufficient amounts of water in the town wells, with calculations indicating that up to 10m³ of water was used in a single brew.⁷⁶

The quality of the water is another issue worthy of discussion. While the brewing process may have killed most bacteria, brewing with water which was contaminated by textile or meat manufacturing would translate into the beers. The alkalinity and hardness of the water would also affect the beer. Frontzek has made some observations regarding water profiles in Lübeck. He suggests that the well water in Lübeck was too brackish while the water from Trave was also too hard and salty and so the brewers may have preferred the softer water from the river Wakenitz.⁷⁷

No written evidence, however, reveal discussions of water quality or what kind of water was best suited for brewing until the Modern Period. From a brewer's perspective, we may assume that the qualitative difference between brewing with soft, fresh water or hard, minerally water would be easily observable. For this reason, and because water supplies are so often mentioned in the sources, it can be argued that Northern Germen brewers did have a preference toward softer, fresher water if they could get their hands on it.

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