Lochac Kingdom A&S Competition

Midwinter Coronation 2017

Category

From the 14th century C.E.

Entry

Recreation
of a plausible 14th C
North European / Scandinavian
hopped beer

By: Sir Asbjorn Pedersen
Aka: Martin Forest

Table of contents

One page summary

This beer is inspired by the quote “The income to the count from the toll charges on Hamburg beer made a sizeable contribution to his coffers. And the income may have risen after 1374 when Hamburg brewers shifted from exporting dark beer to a lighter one of higher quality."[1] In other words, Hamburg brewers produced dark beer commercially before 1374.

Ingredients

Hops

The current earliest written evidence of hops in beer is from Corbie, France, 822 C.E. By the 14th C hops was commonly used in beer brewing in northern Europe and Scandinavia. In fact, hops had become so important in Sweden that by 1350 theft of hops carried capital punishment”. By the end of 14th C there seems to have been a revolution of hops usage: “1378 Leuwen Brewers produce 77 times more gruit ale than hopped beer. 1407 Leuwen Gruit ale production 4.5 times greater than hopped beer . 1436 Leuwen Production was now exclusively hopped beer.” [2]

Malt

Malted barley (or other grains) has been used for brewing for thousands of years. We still don’t know how, where, or when it started but malt was produced in significant volumes during the 14th C.
I made the malt used in this beer myself. I tried to emulate two (of several) different types of drying options. One large-scale method for drying was using warm air flowing through the sprouted malt in a kiln. To simulate this method I simply used a fruit dryer. Another common method was direct heat. To copy this I used a small benchtop oven to dry the malt. The direct heat method created primarily “roasted” malt that we in modern terms tend to call Crystal malt, and is what gave the beer such a dark colour and a small hint of caramel.
What about smokiness? We often hear brewers talk about smoky beer. I have talked to a couple of brewers (laurels) and we seem to have a bit of a difference in opinion. It is possible for a grain kiln to produce smoked malt, although looking at the construction of these they seem to be specifically built to avoid this. Nor have I found any written or archaeological evidence of beer smelling and tasting of smoke. This question is something I’m keen to look into when my new brewery is finished. As I’m trying to recreate medieval beer, I’m limited to ingredients and flavours I have period evidence for.

Water

I’m using water from a bore. This water is free from normal tap water chemicals such as chlorine and fluoride. The water is also a bit acidic, and that is good for beer brewing. As such, I don’t need to do anything to the water other than filter iron and impurities in particle form.

Yeast

Years ago, I did some research into medieval yeast. Baking yeast was the winner and most likely the closest we can get to medieval yeast. It was not uncommon for a bakery and breweries to be close, if not neighbours and it appears they were sharing yeast. A frequent question in relation to baking and brewing is what about sourdough bread? The answer is that there is no great difference between baking yeast and ‘wild’ yeast. In reality, commercial bread yeast when left alone starts to produce lactic acid for protection. This acid is what is we taste in sourdough.

Bottling

There is no added sugar in the beer. Even though it is unlikely medieval beer were as fizzy as modern beer, I’ve generated the CO2 naturally by saving some of the wort and using that for priming as a hat-tip to modern tastes.

[1] Beer in the Middle Ages and the Renaissance, page 61.
[2] Beer in the Middle Ages and the Renaissance (Uytven 1973)

Inspiration

When I was working on my hops research document, I came across a really funny story about a Dane that got so drunk on “Trave beer” that he had to be tied to a wagon wheel until he sobered up. This took place in Denmark in 1281. The Trave beer he was drinking was exported hopped beer from the Lubeck region.

Another inspiration is from Hamburg, 1374. “The income to the count from the toll charges on Hamburg beer made a sizeable contribution to his coffers. And the income may have risen after 1374 when Hamburg brewers shifted from exporting dark beer to a lighter on of higher quality."[3]

The quote above is a clear indication that during the 14th C, brewers definitely had the ability to control how dark or light you wanted your beer. Personally I am convinced brewers have been able to control the darkness for hundreds if not thousands of years before the 14th C. However, this is the first historic mention of dark beer that I’m aware of.

During the medieval period there seems to be more and more regulations and controls put in place to control both ingredients and methods in beer brewing. After all, a lot of tax was collected from beer brewing so it does make sense the authorities were interested in safeguarding the quality of the beer and thus maximise taxation from it.

The table below shows examples of taxation from various areas starting in the 14th C. (Taxes were collected before then but this is the first written information about it I have found.)

[3] **Beer in the Middle Ages and the Renaissance, page 61.**

TABLE 11. SHARE OF TOWN INCOME FROM TAXES ON BEER, FOURTEENTH THROUGH SEVENTEENTH CENTURY

Year	*Town*	*Share in percentages*	*Remarks*
1370–1387	Hamburg	4.6	Average
1391–1392	Delft	24.6	
1391–1392	Leiden	17	
1399	Leiden	47–53	
1413	Leiden	58	
1426	Leiden	42	
1427	Leiden	53	
1429	Dordrecht	14.8	
1433–1434	Leiden	59	
1437–1438	Haarlem	88.5	
1440–1443	Haarlem	35.1	Average
1449	Leiden	78	
1450	Dordrecht	13.2	
Fifteenth century	Mechelen	50	Approximate average
1452	Ghent	5	
1465–1466	Ghent	24.5	
1465–1496	Hamburg	8.6	Average
1490	Hasselt	33	
1492	Breda	52	
1502	Dordrecht	39.9	
1515	Hasselt	60	
1522	Dordrecht	39.3	
1528–1610	Ghent	41.3	Average
1530–1543	Antwerp	53.7	Average
1549–1560	Hamburg	11.9	Average
Sixteenth century	Leuven	39.3	Average
1552	Amsterdam	55	
1556–1558	Dordrecht	37.8	Average
1567–1568	's-Hertogenbosch	51	Approximate
1556–1560	Haarlem	65	
1575–1600	Lier	30.2	Average
1595–1599	Haarlem	23.3	
1600–1609	Haarlem	27.2	
1610–1612	Dordrecht	28.8	Average
1622	Hasselt	70	

Sources: Bing, *Hamburgs Bierbrauerei*, 308; Eykens, "De brouwindustrie te Antwerpen," 82; Hallema and Emmens, *Het bier en zijn brouwers*, 84–85; Martens, "Bier en stadsfinancien te Hasselt," 243; Soly, "De brouwerijenonderneming van Gilbert van Schoonbeke," 339, 1179–81; Soly and Thys, "Nijverheid in de zuidelijke Nederlanden," 47; Unger, *A History of Brewing in Holland*, 60–61, 69–71.

Not long after the 14th C, in 1447 in Munich, Germany, we see an early version of the Reinheitsgebot: I.e. regulating beer brewing to use only malt, water and hops.[4] It is interesting to note that yeast is not considered an ingredient.

[4] (Huber 1959)

The end result

The finished beer is a medium hoppy, dark amber beer. The mashing process gave the beer a slight hint of pine. The alcohol level is about 5%. The body of the beer is quite heavy, which is the reason for the relatively low alcohol level. Personally I find it nice and very drinkable. Overall, I deem this experiment a success, and a plausible recreation of a 14th C beer. There are a number of areas where I intend to experiment further, and I have described these in the detailed text below.

My ingredients

Water

The water in this beer is from our property. It comes from a 15m deep bore. The water is slightly acidic with a lot of iron in it. We do have a iron and particle filter (1 micron) to remove most of the iron and any possible particles in the water. There are no other chemicals in it such as chlorine or fluoride.

Malt

The malt in this beer is home made. Please see the next chapter about how I made the malt.

Hops

The hops is 3 year old pacific hallertau, with a low acid level. Please seen the next chapter regarding the choice of this old hop variety.

Yeast

Stock standard fresh baking yeast. (not dried).

About 10 years ago, I did a small research project into yeast as I was looking for a medieval yeast for my brewing. At the time, I did not find much about the yeast itself. Most of the information I did find was related to the relationship between breweries and bakeries. Bakeries and breweries were often located close to each other, if not next door. I also got the impression that they often shared the yeast. This is quite likely as yeast spores are quite active and hard to control.

I have had various discussions about how this can be due to the fact medieval bread was based on wild yeast, producing sourdough bread. Because the wild yeasts are slower to work, the proofing of a sourdough bread takes longer. To protect itself from harmful bacteria or other microbes, the yeast produces lactic acid. This gives sourdough bread its distinctive flavour. But the yeast itself is not all that different from modern baking yeast. This area warrants further investigation in the long run, but for now I will stick with baking yeast.

Methods

Malting

For malting, I bought a 25kg bag of barley from an animal feed place. I used this barley to make my malt:

.

- Cleaning the barley. A lot of straw and other impurities had to be removed.

- 8 hours of soaking (all grains covered)
- 2 hours of rest, drained from water.
- I kept repeating the soaking and resting for little over 2 days until I could see sprouting on most of the grain.

- While resting the barley was spread out evenly, in a layer about one inch thick
- A couple of times per day I turned the barley and added a little water every now and then to keep it moist.

- After a few days I stopped when the germination had sprouted inside the grain to about ⅔ of the length of the grain. Some of the grains also had long shoots well outside the grain.

- Drying. I did two types, to simulate a couple of methods of medieval grain drying, warm air and direct heat.

Warm air.

To simulate a medieval grain kiln, I used a modern food dehydrator. This works by forcing warm air through the grain. I tried to keep the temperature between 35 and 52, temperatures we know today create good standard/pale malt.

Direct heat

I also tried to simulate some direct heat grain drying. Direct heat to wet germinated barley will literally cook the grain and cause caramelization. This malt will not be capable of producing usable/fermentable sugars but will create a dark and sweeter beer with a hint of caramel. I had originally planned to do this over a wood fire outside, but when I was working on this we had endless days of rain and so I had to use a benchtop oven.

Mashing

From the malting process I now have the malt needed for the beer.

Mashing was typically done in a half barrel. A hole in the bottom was used for draining and a round staff was closing the hole. There was also a false bottom in the barrel to create a void between the actual bottom and the false bottom. Confer, typically Juniper or spruce was used as a filter over the false bottom. I have planted both juniper and spruce trees at home but they are still tiny and can not be used. I had to come up with a substitute. To decide on this, I made 3 cups of conifer tea: spruce, juniper and pine. As expected, they were all slightly different in both strength, color, and flavour but still quite similar.

We have a lot of pine trees at home so for this experiment I decided to use pine for my mashing filter. One of the most amazing effects of using conifer for mash filter was the throughput. My mashing was significantly faster than normal and for some strange reason, much clearer than I'm used to.
The image below shows my mashing tun with the pine needles at the bottom.

My mashing:

- 7.5L * 600Gr = 4.5Kg home made pale malt
- 800ml of home made dark/crystal malt
- Hot water, approx 65C
- 2 hours to allow enzymes to convert starches in the malt to fermentable sugars.
- Drain the wort into pot.

End result 15 litres of wort ready for boiling.

Hops selection

Based on recent swedish research, it appears that hops today is not directly genetically related to medieval hops. The high acid levels we see in modern hops is not what we find in populations of “wild” hops in Sweden (hops from abandoned settlements dating back as far as medieval times) . There are places in Sweden that are now cultivating some of these older hops varieties but we don’t have access at this time. From what I can tell, the best modern substitutes we can find is hallertau low acid level hops. However, we can still improve the effect of the hops by controlling the age and amount used in a brew.

Boiling

For a small batch like this, I used a large pot on the stove. This has the same effect as cooking over fire, direct bottom heat. As a minor but added bonus, our cook top is a gas cooktop so in reality, I’m able to use a gas fire rather than wood fire.

After the mashing, I transferred the 15L of wort to a large pot for boiling.
I brought the wort to a boil.
I added 30Gr of old hallertau hops to the pot
I boiled the wort for about an hour with the hops.

There were no further hops added.
I have not found any period / medieval information about staged hopping during boiling. It is my understanding that staged hopping (where you add more hops every now and then) and dry hopping (adding hops at the end or even after the boil) are both modern methods.

Cooling

I have not found any period / medieval information about cooling regarding beer brewing in the medieval time. In modern brewing science we know that the faster you can cool the beer the better the odds for a clearer beer (there is a chemical reaction that takes place during fast cooling, called cold break where some proteins coagulate). In this case, the pot I used does not fit in the sink so I had to take a little more time in our bath tub to cool it down. Consequently I don’t think I got a cold break.

Fermentation

For hygienic reasons I’m using modern fermentation equipment that can be properly sterilized. This small batch was fermented in a small modern plastic 25L fermentation bucket with a lid and water lock.

Bottling

It is possible to achieve a light fizziness in a barrel but that increases the risk for leakage… However, medieval beer and ale were most likely flat or close to flat. Today, we are so used to fizzy beer that for most people, a flat beer would taste bad. For this reason, I am making most of my medieval beers fizzy.
I did not add sugar to the bottles to achieve this. Instead, the fizziness can be achieved by freezing some of the boiled wort and add some of it (thawed) to the bottles during bottling.

Aging

This beer was bottled 3 weeks ago. It will last for several months, as the hops act as a preservative.

Summary of substitutes, shortcuts, and workarounds

Kiln

Modern oven and fruit drier used to simulate medieval kiln and direct heat drying.

Hops, variety and amount used.

Medieval hops is no longer available. Sweden is trying to resurrect old, pre-modern hops varieties they have found in the wild but they are not yet available. Instead I used a 3 year old low acid level hallertau hops, to simulate the lower-acid content of these types of hops.

Mashing tun

I used a plastic rather than a wooden mashing tun.
I used blankets rather than hot rocks to keep the wort warm during mashing.

Boiling, direct heat.

I used a gas fire (cook top) rather than a wooden open fire.
I used a modern pot rather than a medieval (metal, copper?) boiler.

Fermentation

I used a plastic fermentation bucket rather than a wooden barrel.

Bottling

I use modern plastic bottles rather a wooden barrel to store the beer.
I also created fizziness in the bottles to adjust for modern tastes.

References

Beer in the middle ages and the renaissance, By Richard W. Unger,
To hop or not to hop - Early medieval beer brewing in Scandinavia and continental Europe, Martin Forest, 2017
Karl-Ernst Behre, The History of Beer Additives in Europe - A review, Niedersachsisches Institut fur historische kystenfforschung, 1998
Jens Heimdahl, “När grönskans prakt till mull och stoft förtvinat”, article in Sources to the History of Gardening, Sveriges lantbruksuniversitet, 2014