

ALMOST AS SIMPLE AS ASKING “WHY”

Wort Boiling

by Mike Retzlaff

The commonly quoted reasons for the vigorous boiling of wort are:

- a. to promote necessary chemical changes and extract bitter and other substances from hops
- b. to precipitate unwanted nitrogenous material
- c. to terminate enzymic action
- d. to remove undesirable volatile compounds
- e. to sterilize the wort
- f. to evaporate excess water

Some experiments were conducted by the Brewing Industry Research Foundation in Surrey, England in 1971 to determine if the boiling of wort is actually necessary. It was thought that the above criteria could be met without the vigorous boil which has been commonplace for millennia. Post-fermentation bittering removes the need for hop isomerization in the kettle. One researcher was of the opinion that there is no relationship between bright worts at the kettle stage and good shelf life of the finished beer.

Another researcher felt that boiling tended to form a haze precursor which would carry over into the finished beer. Enzyme activity is stopped at temps below the boiling point. Volatile compounds are readily driven off during a vigorous boil but so are desirable volatile compounds. Sterilizing of the wort occurs below the boiling point. Large scale evaporation of water can be eliminated by manipulating the mash run-off.

The malt used in testing was commercially produced and mashed at a temp of 150°. A test batch was made in which the wort was held at 185° for 90 minutes while constantly agitated by stirring. Hop extracts were introduced into the wort during this rest period. The main difference between this batch and a normally boiled beer was a reduced shelf life – 12 weeks compared to 16 for the normally boiled wort beer.

Another test batch was made and the wort pH was reduced to 4.9 with an acid addition. This bumped the shelf life up to the normal 16 weeks.

Subsequent trials were made and even added hops to the steeping wort. The wort was raised to boiling and immediately allowed to cool to 185° for the remainder of the 90 minutes. This actually drove off some of the hop volatiles and reduced the shelf life. Another test held the wort at temp for only 15 minutes but the flavor was unacceptable.

The unboiled wort testing resulted in:

- a. Wort and resulting beer were slightly lower in color
- b. Slightly higher in total nitrogen
- c. Slightly lower in bitter substances
- d. When acidified, there was no difference in shelf life
- e. Flavor was different but sound in character

These trials showed that boiling of worts is not an absolute requirement for the production of stable beers of sound flavor.

This study apparently hasn't lead many brewers to abandon wort boiling but it is interesting to see what others have done and are doing when they simply ask “why” and have the resolve to deviate from “normal” to discover the answer.