

Pasteurization of commercial pale lager beers

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Executive summary

1. Twenty brands of pale lager beer offered for sale in the UK market were subjected to laboratory testing using an internationally-accepted method to determine if they had been pasteurized.
2. Eighteen of the 20 products were found to be pasteurized.
3. Two products – Camden Hells and Asahi Super Dry – tested positive in the laboratory assay indicating that they were not pasteurized.
4. Heating of beer in the pasteurization process has the potential to impact beer flavour. Since they are not pasteurized, Camden Hells and Asahi Super Dry are not at risk of heat-induced flavour changes resulting from such treatment.

Introduction

Heating of beer to kill microorganisms present in the product or package has been widely practiced for more than a century. The process, which is usually referred to as pasteurization, aims to reduce the risk of product spoilage resulting from growth of microorganisms. It is not intended to protect consumers from disease-causing microorganisms, since beer is generally not a source of human pathogens.

Notwithstanding the widespread use of pasteurization, not all brewers pasteurize their beers, since the process brings about chemical changes in the product which may impact flavour quality and freshness.

It is not straightforward for consumers to know if a particular brand of beer has been pasteurized.

Laboratory testing of beer can differentiate pasteurized beer from beer which has not been pasteurized. Tests rely on measurement of the activity of a natural enzyme derived from brewer's yeast. This enzyme, which is known as invertase, converts sucrose into glucose and fructose. Pasteurization destroys the ability of invertase to carry out this chemical reaction, rendering it undetectable in the laboratory test.

Unpasteurized beers have detectable invertase activity. Pasteurized beers do not.

An internationally-accepted laboratory method is available to measure invertase activity to determine if a beer has been pasteurized. We have used this method to evaluate a range of pale lager beers available in the UK market. The results are presented below.

Experimental

Beers were purchased in the retail market in South East England in March 2021. They were stored at 4 – 6°C for a maximum of seven days prior to testing. Samples of Camden Hells were provided by Camden Town Brewery. Invertase activity in each sample was determined using “*Method 11.6 Qualitative Assay for Invertase – 2004*” of the European Brewery Convention. In addition to the 20 test samples, further tests were performed to confirm the correct operation of the test procedure and the validity of the results obtained. In particular, checks were made to confirm the absence of added sugar in the beers, since this has the potential to interfere with the test results.

Results

Table 1 summarizes the results obtained. Invertase activity was detected in only two products: Camden Hells and Asahi Super Dry. Laboratory-scale pasteurization of Camden Hells eliminated detectable invertase activity, providing confirmation of the test performance.

Table 1. Invertase activity in packaged pale lager beers.

Product	Package type	Package size	Best before	Invertase result	Interpretation
Amstel Bier	Bottle	650 ml	28/02/2022	Negative	Pasteurized
Asahi Super Dry	Bottle	330 ml	03/02/2022	Positive	Not pasteurized
Birra Moretti	Bottle	330 ml	31/03/2022	Negative	Pasteurized
Budweiser	Can	440 ml	October 2021	Negative	Pasteurized
Budweiser Budvar	Can	330 ml	18/11/2021	Negative	Pasteurized
Carlsberg Export	Can	568 ml	01/03/2022	Negative	Pasteurized
Carlsberg Pilsner	Can	568 ml	22/03/2022	Negative	Pasteurized
Camden Hells	Bottle	330 ml	24/10/2021	Positive	Not pasteurized
Cobra	Bottle	330 ml	31/01/2022	Negative	Pasteurized
Corona Extra	Bottle	330 ml	March 2022	Negative	Pasteurized
Coors Light	Can	440 ml	30/11/2021	Negative	Pasteurized
Estrella Damm	Bottle	330 ml	06/11/2021	Negative	Pasteurized
Heineken	Bottle	650 ml	28/02/2022	Negative	Pasteurized
Pravha	Bottle	660 ml	31/07/2021	Negative	Pasteurized
Peroni Nastro Azzurro	Bottle	330 ml	January 2022	Negative	Pasteurized
San Miguel	Bottle	330 ml	07/12/2021	Negative	Pasteurized
Sol	Bottle	650 ml	August 2021	Negative	Pasteurized
Staropramen	Bottle	660 ml	28/02/2022	Negative	Pasteurized
Stella Artois	Bottle	330 ml	January 2022	Negative	Pasteurized
Tiger	Bottle	640 ml	February 2022	Negative	Pasteurized

Additional tests showed the following. (i) Camden Hells pasteurized in our laboratory (15 PU) tested negative for invertase. (ii) None of the samples contained significant concentrations of glucose and were therefore not “primed” or “back-sweetened”.

Discussion

Eighteen of the 20 pale lager beers in this study tested negative for the presence of active invertase enzyme, indicating that they had been pasteurized. Two products – Camden Hells and Asahi Super Dry – were found to contain active invertase. We conclude that these products were not pasteurized.

Conclusion

The vast majority of the pale lager beers tested in this study and available in the UK market do not contain active invertase, indicating that they are pasteurized during the manufacturing process.

The results showed that Camden Hells and Asahi Super Dry are not pasteurized and therefore not at risk of heat-induced flavour changes associated with this process.

Cara Technology Limited

Cara Technology Limited is a UK-based company that supplies brewing and beverage companies with products and services to assist them in improving the quality of their products and the efficiency of their production processes. The company manufactures reference standards used to train professional taste panels; trains professional drinks tasters; provides advice and consultancy to drinks manufacturers and other industry stakeholders; and supplies yeast cultures to breweries.

Cara Technology's Quality Management System is certified to ISO 9001. The company's laboratory operations are certified to ISO 17025, with all manufacturing carried out according to Pharmaceutical GMP standards. In 2016, the company won the Queen's Award for Enterprise in the category of international trade, recognizing the fact that more than 90% of its revenues are derived from sales to 170 countries.