

Effect of thawing conditions and corresponding frying temperature profiles on the formation of acrylamide in French fries

ABSTRACT

This study attempted to determine the effects of thawing conditions and corresponding frying temperature profiles on the formation of acrylamide in French fries. Frozen par-fried potato strips were thawed under three different conditions, at room temperature, using a chiller, and using a microwave. Unthawed par-fried potato strips were used as the control samples. Thawed (or unthawed) par-fried potato strips were deep-fat fried in palm oil at 180 ± 5 °C for 3.5 min. The temperature drop was monitored every 15 s for a total of 6 min; 3.5 min of frying time plus an additional 2.5 min until the oil temperature returned to 180 °C. The acrylamide content, oil content and colour of the French fries were measured. The frying temperature dropped substantially (more than 30 °C) from the initial temperature in the first 45 s of frying for all thawing conditions. After 90 s of frying, the smallest temperature drops were observed for French fries thawed using a microwave (20%), and the largest temperature drop prior to recovery was seen with the control sample (24%). At the end of the frying period (after 210 s), French fries thawed using a microwave had reached the highest final temperature (154 °C), and the control sample had reached the lowest final temperature (145 °C). The acrylamide contents of the French fries were found to be in the range of 77.4–106 ng/g, whereas the oil contents ranged from 16.4 to 20.5%. The lowest lightness, highest redness and highest yellowness were found for French fries thawed using a microwave. Although the thawing conditions did not significantly affect the formation of acrylamide, microwave thawing was found to be the best thawing method due to the resulting (relatively) low acrylamide and oil contents of the French fries and their desirable colour attributes. The results of this study can be used to recommend that the manufacturers of frozen par-fried potato strips specify the use of a microwave for thawing as part of the frying instruction on the packaging.

Keyword: Thawing; Temperature profiles; French fries; Acrylamide; Colour; Oil content

