Accepted Manuscript

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PII:	S0260-8774(18)30397-2
DOI:	10.1016/j.jfoodeng.2018.09.009
Reference:	JFOE 9396
To appear in:	*Journal of Food Engineering*
Received Date:	24 April 2018
Accepted Date:	10 September 2018

Please cite this article as: Nattawut Chaomuang, Denis Flick, Alain Denis, Onrawee Laguerre, Experimental analysis of heat transfer and airflow in a closed refrigerated display cabinet, *Journal of Food Engineering* (2018), doi: 10.1016/j.jfoodeng.2018.09.009

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Abstract

This study presents the experimental investigations on heat transfer and airflow in a closed refrigerated display cabinet. Air and product temperatures and air velocity were measured with thermocouples and a hot-wire anemometer, respectively. Temperature variation in the cabinet depends on the positions. The front areas contributed to higher temperature, whereas the rear areas were at a lower temperature. Benefits of doors were also examined by comparing the results of air and product temperatures with the case without doors. The cabinet with doors provided less temperature heterogeneity (ΔT_{max}= 2.1°C) compared to the case without door (ΔT_{max}= 4.9°C). The maximum air velocity in the air curtain of 0.6 m·s^{-1} was observed at the discharge grille. The horizontal air velocity from the perforated plate was low (< 0.2 m·s^{-1}) for all shelves. The loading percentage in the cabinet did not significantly affect the airflow rate through the perforated plate.

Keywords: Closed refrigerated display cabinet; Heat transfer; Temperature; Airflow; Velocity; Experimental study

Nomenclature

A	Area, m^{-2}
D_h	Hydraulic diameter ($D_h = \frac{4A}{P}$), m