

Accepted Manuscript

Heat and mass transfer modeling during foam-mat drying of lime juice as affected by different ovalbumin concentrations

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PII: S0260-8774(18)30264-4

DOI: [10.1016/j.jfoodeng.2018.06.014](https://doi.org/10.1016/j.jfoodeng.2018.06.014)

Reference: JFOE 9297

To appear in: *Journal of Food Engineering*

Received Date: 23 October 2017

Revised Date: 4 June 2018

Accepted Date: 11 June 2018

Please cite this article as: Dehghannya, J., Pourahmad, M., Ghanbarzadeh, B., Ghaffari, H., Heat and mass transfer modeling during foam-mat drying of lime juice as affected by different ovalbumin concentrations, *Journal of Food Engineering* (2018), doi: 10.1016/j.jfoodeng.2018.06.014.

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2 **affected by different ovalbumin concentrations**

3
4 Abbreviated Running Title:

5 **Heat and mass transfer modeling during foam-mat drying of lime juice**

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13
14 **Abstract**

15 This study evaluated the effect of ovalbumin concentration as a foaming agent (2, 3 and 4%) on
16 foam-mat drying of lime juice at 60°C with foams of 5 mm in thickness. The process was also
17 simulated to investigate the effect of ovalbumin concentration on temperature and moisture
18 distributions. The model was validated by matching the data obtained from the model with
19 experimental data. An increase in ovalbumin concentration led to a decrease in the powder's
20 bulk and tapped density and an increase in its water absorption index by 11.22%. Changes in
21 bulk and tapped densities were in the 0.336-0.4 and 0.511-0.598 g/cm³ range, respectively.
22 Changes in color parameters of the hue angle also had statistically significant differences in
23 ovalbumin concentrations of 2 and 4%, while there was no significant difference in
24 concentrations of 2-3% and 3-4%. The results showed a good correlation coefficient of over 0.90
25 between the experimental data and data obtained from the model. The uniform temperature and
26 moisture distributions during foam-mat drying improved the qualitative characteristics of the
27 final product in terms of the uniformity of the resulting powder's moisture content ultimately
28 leading to a higher quality lime juice powder.

29
30 **Keywords:** Foam mat drying, Lime juice, Heat transfer, Mass transfer, Modeling, Computer
31 simulation

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