



University of Zabol
Management of graduate education
Faculty of Agriculture
Department of Food Science and technology

The Thesis Submitted for the Degree of Master of Science
(In the field of Food industry science and engineering)

Title:

Foam mat drying of ostrich egg white using hot air and microwaves

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Abstract:

Foam mat drying is a process by which food products are converted into a stable foam and then dried at relatively low temperatures with hot air. In this research, the production conditions of ostrich egg white foam were optimized in order to predict the density and stability of the foam. For this purpose, ostrich egg white at speed conditions (1000 and 2000 rpm), different times (4, 5 and 6 minutes) and different concentrations of xanthan gum (0.125, 0.25, 0.375, 0.50 and 1%) were stirred. The results showed that the optimum conditions for the production of foam are stirring at a speed of 2000 rpm for 5 minutes and adding gum at a concentration of 0.375. The optimized foam was dried using three types of dryers (oven, microwave and combined) at three different temperatures (50, 60 and 70 °C) and with two thicknesses of the foam (2 and 4 mm) and the characteristics of the powder (Moisture content, Water activity, water absorption, density (bulk, taped, particle), Solubility and porosity) was investigated. The results showed that the drying method had a significant effect ($p < 0.01$) on all physical properties of ostrich egg white powder. Temperature or power had a significant effect ($p < 0.01$) on other properties, except for flowability. The thickness of the foam also had a significant effect on all characteristics except water activity. Increasing the thickness of the foam caused an increase in moisture and water activity and a decrease in solubility, water absorption, adhesion and flowability. Taped, particle and bulk density as well as solubility and water absorption increased with increasing temperature and vice versa moisture and water activity decreased. The highest amount of porosity was obtained from the combined dryer at an oven temperature of 70 °C and a microwave power of 540 W. Also, combined drying increased the percentage of ostrich egg white moisture. However, drying with an oven led to an increase in the density of taped, particle and bulk. In general, the results showed that the powder produced with a thickness of 2 mm and a microwave drying power of 540 W had the lowest density (bulk, taped and particle) and also the highest amount of adhesion and Carr index (CI).

Keywords: drying, foam mat, ostrich egg white, microwaves, hot air