

A new engineering method for understanding extrusion cooking process

Hongyuan Cheng and Alan Friis

Food Production Engineering, National Food Institute

Technical University of Denmark

Søltofts Plads, Building 227 1sal, DK-2800, Lyngby, Denmark

A new engineering method is proposed to understand extrudate expansion and extrusion operation parameters for starch based food extrusion cooking process through dimensional analysis principle, i.e. Buckingham pi theorem. Three dimensionless groups, i.e. pump efficiency, water content and temperature, are suggested to describe the extrudate expansion. Using the three dimensionless groups, an equation is derived to express the extrudate expansion. The model has been used to correlate the experimental data for whole wheat flour and fish feed extrusion cooking. The average deviations of the correlation are respectively 5.9% and 9% for the whole wheat flour and the fish feed extrusion. An alternative 4-coefficient equation is also suggested from the 3 dimensionless groups. The average deviations of the alternative equation are respectively 5.8% and 2.5% in correlation with the same set of experimental data.