Design and development of a mechanized *Chhana* ball forming machine for medium scale applications

Subhash Prasad

Received March 9, 2017 and Accepted June 10, 2017

ABSTRACT : Kneading and ball forming are the major steps to prepare round shaped *Chhana* based sweets like *Rasogolla, Kheer mohan* etc. Earlier studies conducted on this to eliminate the drawbacks of manual handling could not handle mass production of product with uniform quality included manual handling between two separate unit operation and whole process was energy intensive. For this an attempt was made to design and develop an integrated scale-up model for kneading and ball forming for radium scale application (for kneading capacity of 9-36 kg *Chhana*/h and ball forming capacity of 3600 *Chhana* balls/h) at Amul, Anand. Studies on kneading were conducted at three different screw speeds (30, 40 and 50 rpm) with varying gap between conical barrel and kneading element (1.5, 2.0 and 2.5 mm). Similarly, studies on ball forming were done by introducing different sizes (8, 9, 10, 11 and 12 g *Chhana* pieces) *Chhana* balls from two different dies (circular and square) into two different hollow cylinders (400 and 600 mm length) when the ball forming unit was operated at four different peripheral speeds (35, 42, 49 and 56 cm/s). The performance of kneading unit was evaluated by determining the upper limit of mass flow rate of kneaded *Chhana* through the kneader in relation to various sensory parameters. Similarly, performance of ball forming unit was evaluated by measuring sphericity of *Chhana* balls of all size. The best results were obtained for kneading unit upto mass flow rate of 34.9 kg *Chhana*/h and for ball forming unit maximum sphericity of 0.98 were obtained for the 9-10 g *Chhana* balls when circular die along with 600 mm long hollow cylinder was used and peripheral speed of ball forming unit was maintained at 42 cm/s.

Key Words : *Rosogolla*, *Chhana* ball, machine, medium scale.