

## **Production planning for a dairy product: a case study in Jaffna**

**J. Sharachie<sup>1\*</sup> and W.B. Daundasekera<sup>1,2</sup>**

<sup>1</sup>*Postgraduate Institute of Science, University of Peradeniya, Sri Lanka,* <sup>2</sup>*Department of Mathematics, Faculty of Science, University of Peradeniya, Sri Lanka*  
*\*sharujeya31@yahoo.com*

Dairy industry has a mature market within Sri Lankan economy. This study investigated the distributions of the demand of dairy production and prices of raw-materials to find the optimum amount of the dairy production which gives the maximum annual profit. A dairy industry which is located in Jaffna was chosen for this study. Despite having a variety of products which are manufactured in this industry, *lolly* which is a type of sweet ice juice made of milk, was selected due to its popularity among customers and it is considered as a strategic product to the industry. The collected data consist of customer demands, selling price, requirements of ingredients, raw-material prices, labour charges, electricity cost, holding cost and shortage cost. Data were collected in the time period from January 2011 to December 2015. The industry was looking for a production planning strategy which helps to gain a considerable annual profit. The collected data are analyzed in order to explore the distribution of the monthly demand for *lolly* and distribution of raw-material prices. Simulation technique was used to estimate the demand and raw-material prices considering their probability distributions. Monthly unit production cost, shortage cost and holding cost were calculated. This information was used to formulate a linear programming model for aggregate planning in which the optimum production for maximum annual profit could be obtained. The Solver built-in optimization tool of Microsoft Excel was used to find the maximum profit. The decision variables are required to be integer. Therefore, the number of products obtained could be approximated to integer quantities without affecting the implementation. The study showed that the implementation of the results can increase the net profit by selling *lolly*. Monthly demand follows a *normal distribution*. Raw-material price follows a *uniform distribution*. Findings from this work could serve as useful information to the management of the industry in the formation of production strategies for its *lolly* dairy product.