Simulation Modeling of an International Tomato Supply-Chain Distribution System: Analyzing the Impact of Food Quality Technology on all Supply-Chain Players

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Supply-chain alignment- and distribution-system conditions have a substantial impact on produce-supply chains, especially when these supply chains cross international borders. After harvesting, distribution-system conditions are the primary determinants of food quality for highly perishable commodities such as tomatoes. In addition, based on food-marketing surveys, food quality for highly perishable commodities is becoming one of the most important issues in today’s food markets. This project will identify potential food keeping quality improvements and their marketing implications in Puerto Rico and the U.S. tomato supply chains after temperature-controlling technology is adopted within this distribution system. A simulated tomato supply-chain distribution model, including tomato packing, shipping, distributing and wholesaling, will be developed using discrete-event-simulation software (SIMUL8). This model is used to analyze the changes of tomato keeping quality with the help of the equation of keeping quality and its reaction rate on temperature and to estimate the associated costs and benefits for each player in this supply chain (i.e., from tomato grower to wholesaler) and also for the overall supply-chain performance. The preliminary result shows that lowering the temperature in the ethylene room from 68°F to 56°F has substantially positive impact on increasing tomato keeping quality.

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