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Applying Simulation in the Produce Grower Shipper Industry

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ABSTRACT

The agricultural business has significant impact on the California economy. The societal emphasis on eating healthy has driven Produce growers and shippers to grow their business at a strong pace for the last 10+ years. At the same time, the use of simulation within this industry is sporadic at best. This significant increase in business size has created a many opportunities for process flow simulation to add value. In this presentation, we will review three of these opportunity areas, and use a simulation project of a Produce Cooler to further the understanding of how simulation can be used in this business.
We will first discuss the areas where simulation makes business sense for a grower-shipper. Then we will provide a detailed review of which of these areas has the highest potential for payback initially; Produce Coolers. The last part of the presentation is a review of lessons learned about how to best model a simulation cooler, and the benefits achieved

1 PRODUCE COOLER SIMULATION

In California's Central Coast and Central Valley there exist many Produce Cooler operations. For each producer, during the harvest season, the challenge is significant to ensure that the "time to cool" is less than 60-90 minutes. For one such Produce Cooler operation, a simulation model was developed to first understand the root cause of the system's bottleneck, and then what to do about it.

This was a traditional discrete event simulation problem, and the software chosen was ProModel. ProModel provided the necessary ease-of-use while allowing the level of flexibility needed for this project. At the same time, to be fair, there are a number of other leading simulation software packages that would have served this problem well also.

The models were developed, verified and validated (when doable), before they were utilized for experimentation. The following are the highlight of key findings for this project:

1) Cooling mechanisms should be designed for a smaller capacity than is currently believed. This will facilitate quicker movement of product into the cooler.
2) Product that do not need to use "outside" cooling process should be moved directly to the cooler, and bypass sitting in the Shade Bay area.
3) Current cooler capacity is sufficient, and some of the Shade Bay area should be utilized for incoming cooling equipment

Technically, this project forced me to further refining my logic for modeling the "decision to choose between a 2 pallet and a 12 pallet forklift. The final solution was not elegant but did the job.

Personally, this project helped me develop a greater appreciation for the opportunity to add value, through simulation, to the Produce Growers and Shippers of the Western United States.

2 ADDITIONAL OPPORTUNITIES TO APPLY SIMULATION FOR PRODUCE FARMING

As I continue to learn and understand the grower shipper business, I have identified additional opportunities for utilizing simulation.

1) Outside of the production areas, in addition to cooling facilities, processing facilities would be a good place to use simulation. Where cooling facilities operate like a traditional warehouse, processing facilities operate like a traditional manufacturing line. Significant investment is required for these processing lines, and, often, they are overbuilt.

   Simulation would allow the owners of these processing lines to more effectively manage their investment.

2) On the production side of produce farming, the processes are very intricate; more so for organic farmers. Each day, the farm management team needs to determine how to most effectively align the resources available to them.

   These resources include the acres to be farmed, the crews available, and the tractors and implements available. In addition, the activities required (tillage, irrigation, weeding, etc.) based on how each block is used, and is affected by weather conditions.

   Simulation can be a useful tool here for testing out various resource allocation strategies, and identifying optimal strategies for varying demand by ranch block.