

# National cranberry assignment



**ASSIGN  
BUSTER**

Case Study: “ National Cranberry Cooperative” Question 1: “ Draw a Process Flow Diagram of Receiving Plant 1”. For each step in the process indicate the resource pool, number of resources in the pool, total capacity of the pool.

There are actually 27 holding bins, some of which can hold either dry or wet cranberries. Total Destoning machine capacity is 4500 bbl/hr Total Dechaffing machine capacity is 1500 bbl/hr dry and 3000 bbl/hr wet cranberries Total Dryer capacity is 600 bbl/hr of wet cranberries Total Separating capacity is 1200 bbl/hr

Question 2: “ What is the maximum long-term achievable throughput of RP1?

” There are actually two limitations on throughput for Receiving Plant 1. For wet cranberries, throughput of RP1 is limited by the Dryer capacity to 600 bbl/hr. In terms of total throughput of RP1, the limitation is on Separating

capacity at 1200 bbl/hr Question 3: “ Plot the inventory of berries (trucks and

bins) over time for a peak day where 19, 000 bbls of berries arrive over an 11 hr period. Will inventory be depleted in 24 hrs? 0/30 (wet/dry) mix is 13,

300 bbl wet and 5, 700 bbl dry berries Uniform delivery over 11 hr period is

1210 bbl/hr arrival of wet and 520 bbl/hr of dry Wet berries can be processed at 600 bbl/hr (limited by Dryer capacity) With a 1200 bbl/hr Separator

capacity, this indicates that dry berries can be processed at 600 bbl/hr while 600 bbl/hr of wet berries are also being processed. Therefore, wet berries will

accumulate at  $(1210-600= 610 \text{ bbl/hr})$  Dry berries will not accumulate at all

(processed as fast as they arrive  $600 > 520 \text{ bbl/hr}$ )

Inventory will build up at 610 bbl/hr until it reaches 6710 bbl when trucks

stop arriving after 11 hrs. After deliveries complete, the accumulated

inventory is processed at 600 bbl/hr (still limited by Drying capacity). Note

that the holding bin capacity for wet berries is only 3200 bbls, so halfway through the day, trucks with wet berries will have to wait to unload (the complaint of the cooperative members). However, all berries can be processed in approximately 22 hrs, meeting the requirement to allow 2 hrs per day of cleaning and maintenance.

Although not asked in the assignment, the question of the effectiveness of the purchase of two additional driers is worth considering. Two additional driers would increase the processing throughput for wet berries to 1000 bbl/hr. This would allow 200 bbl/hr to be processed concurrently. With these rates, on a peak delivery day wet berries would accumulate at  $(1210 - 1000 = 210 \text{ bbl/hr})$  and dry berries would accumulate at  $(520 - 200 = 320 \text{ bbl/hr})$ .

After 11 hrs of delivery, the accumulation would be 2310 bbl of wet and 3520 bbl of dry cranberries, all within the holding bin capacity. Therefore, no trucks would have to wait to unload. The inventory would then be processed based on utilizing the 1200 bbl/hr Separating capacity to process the wet and dry berry inventories in proportion to finishing both at the same time (710 bbl/hr dry and 490 bbl/hr wet). This would allow the entire days input to be processed by 16 hrs from the first delivery vice 22. hrs in the case without purchase of the additional 2 Dryers. If this model were followed, you could also avoid the conversion and cost of additional bins to handle both wet and dry berries. A 16 hr day may also allow you to operate in 2 shifts, vice having a single shift with a high amount of overtime. There is not enough data on labor costs and availability to further develop the business case, but it would be a worthwhile effort for the NCC management.