THE ADVANTAGES OF THICK JUICE FILTRATION OVER STANDARD LIQUOR FILTRATION AT HAMILTON CITY

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Presented at
ASSBT 26th General Meeting
February 24 - 27, 1991
Monterey, California

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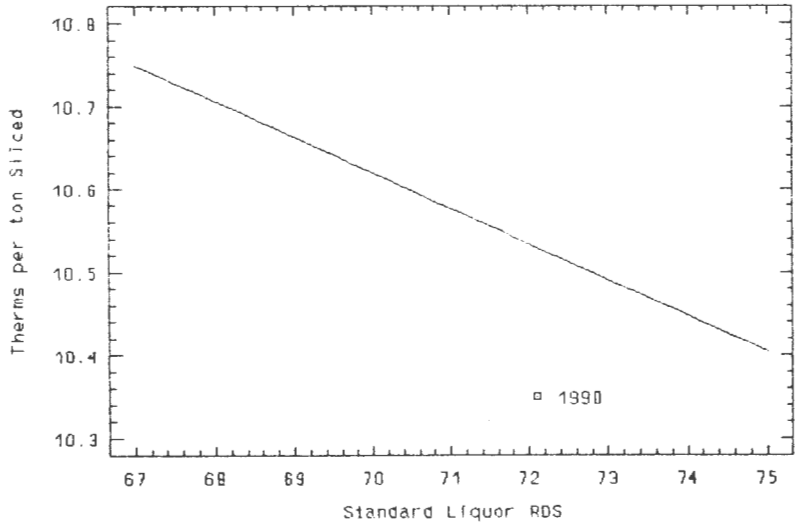
We have lowered our filtering costs and increased our filter capacity by filtering thick juice. This simple modification has also allowed us to decrease steam consumption to the white pans, through increased standard liquor density. These benefits have been achieved without a significant decrease in sugar quality.

By simply adding a few valves and a couple new lines we can use our filters for standard liquor or thick juice. Our flow diagram is shown on the back page. The lower flow rate and viscosity of thick juice gives three basic advantages: ***energy savings***, ***filter station capacity***, and ***filter aid savings***.

Energy savings is the greatest benefit of filtering thick juice. This simple change in the order of the final filtration allows us

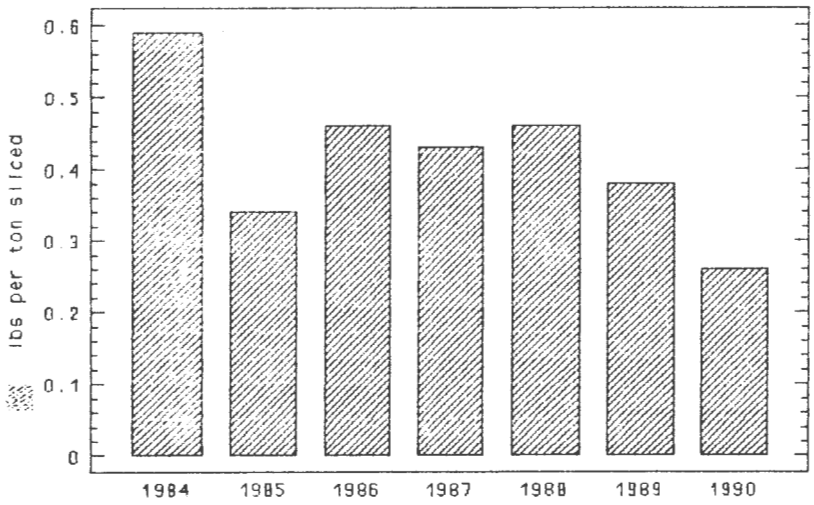
figure 1: therms per ton sliced versus standard liquor RDS for fall campaigns



to change other process variables. Because the viscosity of thick juice is much lower than standard liquor we can afford to increase the density of our thick juice. By increasing our thick juice density we use energy for evaporation where it is most efficient. In our evaporators. In figure 1 we increased the standard liquor density and our energy used per ton of beets decreased.

The reason for trying thick juice filtration was to increase our ***filter station capacity.*** When we are filtering standard liquor we use three to four filters with cycle times of two to four hours. While we filter thick juice we have two filters on line with cycle times of eight hours. There are two reasons for an increase in filter station capacity. First, we have reduced the flow by one third, when we bypass the sugar end recycle. Secondly, the viscosity is reduced by 50 to 60 percent. The flow through each filter increases with a reduction in viscosity. ***Filter aid reduction*** is an area where we can easily measure the success of thick juice filtration. Figure 2, for fall 1990 we used 0.26 pounds of filter aid per ton of beets. A *41%* reduction when compared to the average of 0.44 for the fall 1989 to 1984 campaigns. Because we had fewer filters on line we were able to cut the body feed to the filters by *fifty percent.*

figure 2: pounds of filter aid per ton sliced



Producing *high quality sugar* is a priority at Hamilton City. When considering how filtration affects sugar quality the *sediment, ash,* and *turbidity* are important. A possible increase in *mesophilic bacteria* in the sugar is an important consideration for thick juice filtration. Changes in centrifugal operation to produce the same quality sugar could affect *pan yield.* After asking several questions about sugar quality we have come to the conclusion that there was no significant change to our sugar quality while filtering thick juice.

Before going on to talk about *sugar quality* we should look over the flow diagram on the back page. While filtering standard liquor we go from the evaporators to the high raw melter, then through the blender to the filters, and on to the concentrator. When filtering thick juice we go from the evaporators to the blender, then through the filters and on to the concentrator. An important item on our flow diagram is the pan filter. It is our last chance to filter out any particles that may have entered the process stream between the filter station and the pans. Since we are not filtering juice coming from the high raw melter we installed a remelt tank, where we send all of the unfiltered juice on the sugar end. All juice and sugar entering the remelt tank is heated and mixed before pumping to the filter supply tank.

While filtering thick juice we saw a slight increase in the number of specks on our *sediment* patches. We were still at one part per million, which is average for our factory, so the slight increase was not significant. We measure unfiltered samples for *turbidity* optically at 720 nanometers. We usually have a turbidity of 99, but last fall we had a 100. This is an indication that our sugar was less turbid. Our *mesophilic bacteria* count did not increase this fall. We are filtering at a lower pressure and have a more consistent filter operation, so we should get better results. A reduction in *pan yield* could be caused by washing our white sugar with more water. We used a normal amount of wash water for our centrifugals to produce a high quality sugar with thick juice filtration. Our standard liquor purity was down last fall, so our *pan yield* was a bit lower than normal. Our first wash is standard liquor. We did not have problems with our sprays plugging while filtering thick

juice. This is an indication of how clean our standard liquor was.

During the fall 1990 campaign we changed over to thick juice after filtering standard liquor for two weeks. We increased the filtering capacity of our filter station and our filter aid consumption went down. We reduced energy consumption this campaign, and expect to improve as our operators become more familiar with the system. There was no significant decrease in the quality of our sugar.

figure 3: filtration flow diagram