Exploring Methods to Filter Foam and Debris from Honey

Funders/Collaborators: ABC & AB Agriculture and Forestry Food Processing Centre

Background

the Alberta Beekeepers Commission (ABC) submitted a project to the University of Alberta's (U of A) fourth year Mechanical Engineering design class. The design team was tasked to explore processing options and/or redesign the spin-float in order to reduce foaming during the separation process. One options presented was to replace the spin float with a decanter centrifuge. This was an attractive option as a decanter centrifuge can operate continuously at a higher throughput capacity than a spin float. To test this premise, the ABC contacted the Food Processing Development Centre (FPDC) in Leduc. The ABC provided two 45 gallon barrels of honey in need of cleaning (one 'dirty' and one 'foamy') The dirty barrel had a significant amount of debris (wax, wood, dirt, dead bees, etc.) contaminating the honey. The foamy barrel contained honey trapped in and around thick foam structures as well as some debris.

Methodology

Preliminary bench-top testing determined an appropriate set of conditions for work at a larger scale. Conditions including warming temperatures, screen sizes and the degree of separation achievable through centrifugation were evaluated. Finding a balance between warming the honey to achieve a viscosity that could be pumped and passed through a screen, while not melting the wax/foam or causing the honey to darken, was critical. Ultimately the honey barrels were heated (via barrel heating blankets) at 45°C for one week prior to the start of cleaning. The heated honey was passed through a vibrating screen separator with screen sizes of 6, 12 and 20 mesh (3.36 mm, 1.68 mm and 0.84 mm respectively) before centrifugation with a decanter. The decanter centrifuge could not be used without first passing the honey through the screens because it requires a pump which would be damaged by large particulates. In addition, the high forces within the decanter could cause breakdown of the debris into smaller particle sizes and end up being counter-productive. The two types of honey behaved differently at each step of the process.

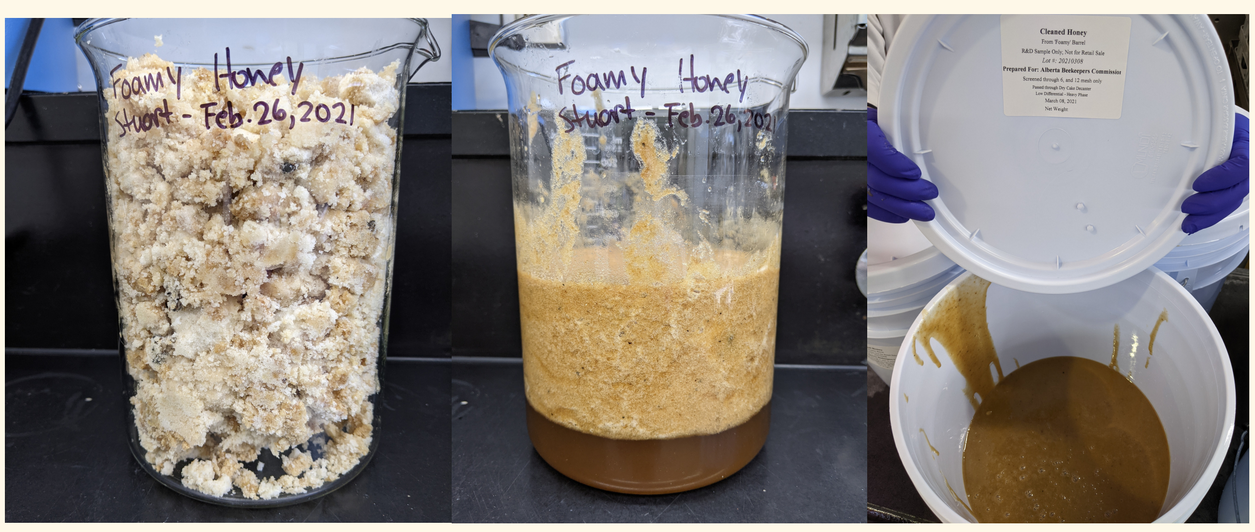
Dirty Honey Barrel

The dirty honey warmed to a consistency that was relatively easy to work with. A large degree of separation occurred in the barrel with the majority of the debris rising to the top. The dirty honey went through all three screen sizes quite well. Some visible debris remained in the honey after it was passed through the screens. An attempt to remove the remaining debris was made using a decanter centrifuge. Unfortunately this was not successful. While some portion of the debris was removed, it was difficult to achieve bulk separation between the thick honey and small particles in the centrifuge. The final product was improved compared with the input product, but may require further cleaning for most applications.

Stages of the Dirty Honey throughout the cleaning process

Foamy Honey Barrel

The foamy honey barrel was much more of a challenge. This barrel did not warm to the same consistency or separate within the barrel. While there were pockets of liquid honey throughout the barrel, the majority of the honey remained trapped by the foam. This foam-honey matrix was very difficult to pass through the screens and ultimately only made it through the mesh 6 and 12 screens. Because the foam has less bulk density than the honey the decanter was unable to achieve any significant separation between the two phases.



Stages of the Foamy Honey throughout the cleaning process

Conclusion

Overall this trial found that a decanter centrifuge is of limited use for cleaning honey. The pumping requirement of the decanter prompted a pre-screening procedure which ultimately did most of the work and demonstrated potential for future application. A screen separator of this type is also far less expensive and much easier to operate than a centrifuge. Use of a smaller screen size may provide sufficient cleaning for some applications, particularly for 'dirty' rather than 'foamy' honey, provided an acceptable flow rate can be maintained. Special thanks to FPDC Processing Technologists Mohannad Badawi and Gibson Hewlett.

ALBERTA BEEKEEPERS COMMISSION