Yeast Harvesting Improvements in a new Fermentation Cellar

Darren Day *Technical Brewer*

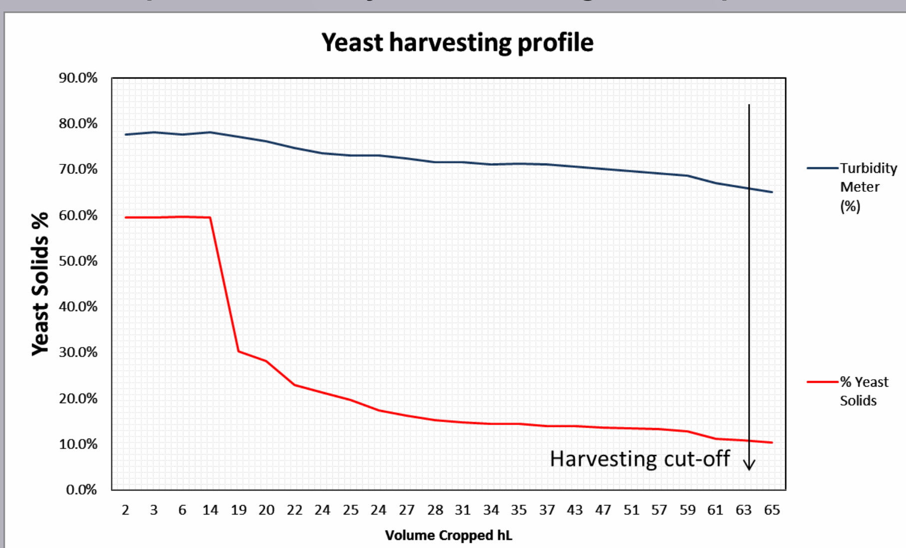
Boag's Brewing, 69 Esplanade Launceston Tasmania

INTRODUCTION

After a cellar upgrade in 2013, yeast harvesting volumes were increased to allow for extended pipework. Harvesting control was managed by in line turbidity meter measurement. Late in 2014, extract loss investigations showed higher than expected losses into sales yeast. Trends also showed that yeast pitching volumes were increasing.

This poster presents the investigation undertaken and the solutions implemented to reduce extract loss and pitching volumes.

Graph 1: Profile of yeast harvesting before optimisation



METHODS

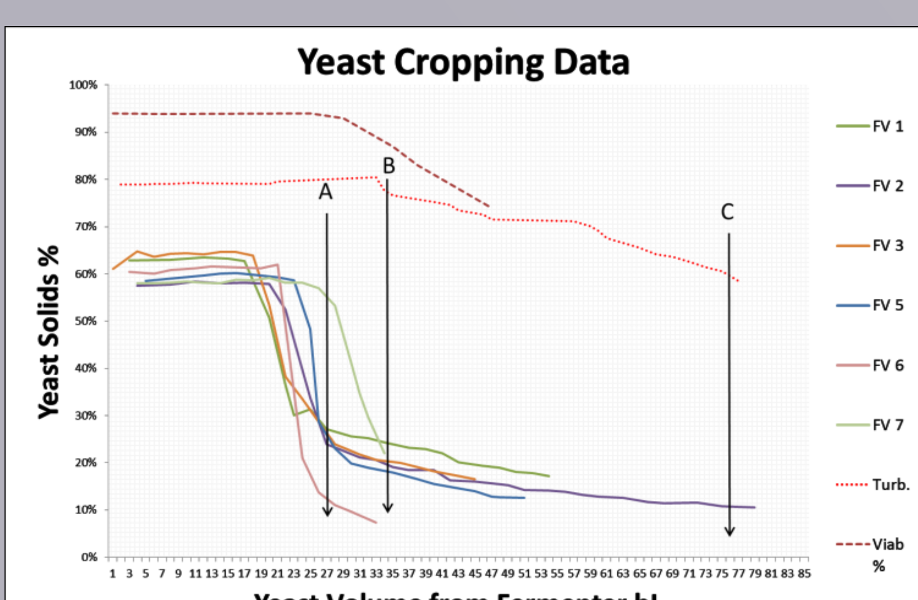
1. ***In-Line Turbidity*** – In-line turbidity measurements were carried out by a Sigrist Phase Guard in-line interface monitor.
2. ***Yeast solids:*** These measurements were performed on yeast samples centrifuged at 3000rpm for 10min. solids % by weight.
3. ***Volume measurements:*** Volume measurements were taken from an Endress+Hauser Promag in line flow meter.

RESULTS AND DISCUSSION

Samples were taken from a number of 1500hL fermenters across all brands using the same yeast strain.

Sampling occurred approximately every 3hL during cropping, volume and in-line turbidity were recorded for each sample. The samples were then measured for % solids and viability.

Graph 2: Profile of yeast harvesting



Observations from Graph 2:

Yeast thickness dropped sharply at the yeast/beer interface, which can be clearly seen at **Marker A**, between 20 and 30 hL of crop volume.

Yeast viability reduces during this period and continues to drop over the length of the harvest. The pre-project expectation that yeast viability collected early in the harvest would be low and then increase was found to be incorrect.

Data collected using the in-line turbidity meter did not have a strong correlation with manually sampled solids. Although a drop at 33-35hL of approximately 3% (**Marker B)** was observed on average using in-line readings, data collected showed that this occurrence was too variable over successive events to be used as a cut off for yeast harvesting in practice.

Turbidity was also expected to clearly indicate the yeast/beer interface. Automation for the turbidity meter was set up using a set point of 60% (**Marker C).** As can be seen, the yeast solids at this turbidity are 12-15%, resulting in lower overall yeast thickness in storage and higher extract losses into the sales yeast stream.

As a result of the investigation, Marker B was chosen as the new harvesting and sales yeast cut-off point. The 35 hL mark was the best compromise between volume, viability and optimum thickness of the yeast.

The turbidity cut-off point is now used as a backup, and harvesting is done by volume. Yeast viability, yeast thickness and extract loss measurements are monitored to trigger review and continuous improvement of the process.

The post adjustment results are shown in Table 1.

Table 1: Post Adjustment Results

Average values*	Change after optimisation
Cropped Yeast thickness % solids	25% increase
Cropped Yeast Viability %	6% increase
Cropping volumes hL	46% decrease
Pitching rate - L/hL wort	31% decrease

* 138 yeast harvests and pitchings

CONCLUSION

The new set point has had the following benefits:

- Lower extract loss for yeast not collected for re-pitching. The thicker yeast is being sent to sales yeast, while the thinner yeast is processed by a centrifuge for extract recovery.
- Yeast storage and pitching viabilities increased. Not harvesting a large volume of low solids, low viability yeast meant that the storage viabilities showed an increase and hence the pitching rates were lower overall.

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