Extending the ‘shelf life’ of a winery waste product

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Introduction

Grape marc has potential as a supplementary feed additive for livestock. However, in commercial farm settings its use has been limited by issues with handling and storage, in particular mould growth causing deterioration. Mould inhibitors and large-scale storage practices have been trialled and proved effective at reducing on-farm deterioration and maintaining nutritional content.

What limits grape marc as a feed additive?

- High moisture content and fermentable sugars make it susceptible to mould and bacteria growth
- It is crumbly and does not clump together, making it difficult to handle
- Microbial activity can cause heating that reduces the nutritional content
- Reductions in feed value can lead to decreased palatability of the feed product and reductions in animal performance
- High moisture content (50-75%) means high costs associated with freight

Inhibiting mould growth

When used on-farm to feed livestock (known as ‘feed out’), grape marc is exposed to aerobic conditions until the feed is consumed, which can lead to mould growth. Mould in animal feeds can be prevented using a number of commercial additives. Several of these were applied to a series of bench-scale silos for an extended anaerobic period followed by a short aerobic period (mimicking ‘feed out’).

Key results:

- Organic acid mixtures used to acidify the marc proved most effective at inhibiting mould
- A top-layer spray of one of these mixtures (Selko-TMR, diluted 1:1 with water) was particularly effective, providing a barrier between marc and air (see photographs below).
- None of the additives had a detrimental effect on nutritional properties or fermentation potential, except for caustic soda.
- Anaerobic storage alone prevented mould storage prior to the ‘feed out’ phase.

On-farm storage and management

Anaerobic storage was the only condition needed to preserve grape marc during storage. The lack of oxygen limits microbial activity, reducing heating events, and thus preserving the feed. When marc is stored in loose piles rather than being compacted and ensiled, heating is seen over the first few days of storage until the oxygen has been consumed (see graph below).

Moving to real-world scenarios, intermediate- to large-scale storage techniques (10-100 tonnes, shown below) proved effective in preserving grape marc for more than six months. Clock-wise from top left: marc in underground bunker; establishing a polyethylene grain bag; lack of mould in ensiled marc; opening a polyethylene grain bag.