The Australian Wine Research Institute

Fact Sheet

Understanding methane-reducing tannins in enteric fermentation using grape marc as a model tannin source

Project purpose

- Understanding the variability of tannin that exists in grape marc, naturally and across production and processing stages.
- Exploiting the variation in grape marc tannin for lab-based and animal feeding experiments to understand the relationship between tannin chemistry and methane production.
- Identifying 'types' of tannin that are most effective in reducing methane emissions from livestock.

Background - tannin and methane

Methane (CH_4) produced by ruminant animals is responsible for 65% of Australia's agricultural greenhouse gas (GHG) emissions and approximately 10% of total emissions (National Inventory Report, 2013). There is an opportunity to reduce these emissions by supplementing livestock feed with tannins or tannin-containing feed, which has been shown to reduce the production of methane.

In general, there is a near-linear relationship between the amount of tannin fed to livestock and reductions in methane, although tannins from different sources have been shown to have differing impacts on CH_4 production, likely due to tannin type and composition. To date, very little work has been performed linking tannin composition (size and shape) with methane production. Additionally, tannins have the ability to bind with protein and can act to increase animal productivity by rendering protein inactive in the rumen and releasing it post-rumen for use by the animal for meat or milk production.

The Australian Wine Research Institute

Fact Sheet

Understanding tannin and methane

Compositionally, very little is known about the tannin in grape marc. The AWRI has developed methods for analysing wine tannin composition which are now being applied to grape marc. The differences between grape skin tannin and grape seed tannin make grape marc a useful medium for understanding how tannin composition affects methane production as there is considerable scope for evaluating large variation in size and shape in a single product.

The AWRI project *Understanding methane reducing tannins in enteric fermentation using grape marc as a model tannin source* aims to gain a thorough understanding of grape marc tannin and apply this knowledge to reduction of methane emissions and improvements in productivity in the livestock industry.

The project commenced in September 2012 and will run until June 2015. It involves three major stages:

Stage 1 – Develop methods for analysis tannin in grape marc and apply these to understand the variation in tannin that exists across grape marc production and processing.

Stage 2 – Use grape marc parcels with differing tannin concentrations and chemistry to investigate the link between tannin chemistry and methane production in lab based fermentation experiments. Use the results of these experiments to uncover any other potential methane mitigants present in grape marc.

Figure 1. Red grape marc in rumen fluid at the start of fermentation experiments.

Stage 3 – Use grape marc parcels with 'methane reducing tannin' in animal feeding experiments to confirm that the effect carries over to real-world situations.

Why is the AWRI involved in this research?

The project is designed to assist both the wine industry and the livestock industry. Climate change is a key issue for the Australian grape and wine industry, with many potential impacts in Australian grape growing regions. The AWRI operates in an industry that creates a tannin rich by-product with diverse tannin chemistry and provides the opportunity to study the link between tannin chemistry and methane production. The AWRI's expertise in tannin chemistry is also an essential component of the research and has provided a new avenue for the livestock industry to access high-level understanding of tannin.

Acknowledgement

The AWRI project *Understanding methane reducing tannins in enteric fermentation using grape marc as a model tannin source* is part of the National Livestock Methane Program (NLMP), supported by funding from the Department of Agriculture and managed by Meat & Livestock Australia. The project is also supported by Pernod Ricard Winemakers.

The Australian Wine Research Institute

Fact Sheet

Reference

Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, 2013, Australian National Greenhouse Accounts, National Inventory Report 2011, Volume 1. Accessible from: http://www.climatechange.gov.au/publications/greenhouse-acctg/~/media/climate-change/emissions/2012-12/AUS_NIR%202011%20Vol%201.pdf

Contact

For further information, please contact:

Josh Hixson, Research Scientist

Phone 08 8313 6600 **Fax** 08 8313 6601

Email josh.hixson@awri.com.au

Website www.awri.com.au

Address Wine Innovation Central Building, Corner of Hartley Grove & Paratoo Rd, Urrbrae (Adelaide), SA 5064

Australian Government
Australian Grape and Wine Authority

mla
MEAT & LIVESTOCK AUSTRALIA