Technical notes

Transforming Riverland food loss and industry waste

The AWRI, in conjunction with the South Australian Research and Development Institute (SARDI), is working to map, understand and exploit food loss and industrial waste from across agricultural sectors in the Riverland, Murraylands and Murray Mallee areas. This collaborative venture has been funded through the South Australian River Murray Sustainability (SARMS) Industry-led Research Sub-program (IRSP), and is supported by a range of industry partners.

Food loss and industry waste

In this work, food loss is defined as cultivated primary products that do not make it to the consumer. This includes edible products that are under-grade, or damaged during harvest, transport or packaging. Industry waste, on the other hand is waste that is created through the processing of a primary product, such as grape marc, yeast lees or almond hulls.

When it comes to food losses, the Food and Agriculture Organization of the United Nations (FAO) has estimated that across North America and Oceania roughly 52% of all fruit and vegetable production is lost or wasted (FAO 2011, Figure 1 right-hand side). While a significant proportion of this occurs at a consumer level, the majority happens pre-consumer. Twenty percent of production is lost on-farm through mechanical damage, spillage or sorting, a combined 5% post-harvest through degradation or spillage during storage, transport or processing, and 9% of the production weight is lost during distribution and retail.

While those figures represent a bigger picture encompassing North America and Oceania, the estimation of 20% of on-farm losses aligns well with Australian data gathered by Rogers et al. (2013) for several different vegetable crops (Figure 1, left-hand side). Across the 11 crops investigated, an average on-farm loss was deemed to be 25%, or 278,000 tonnes nationally which was valued at $154 million at the time of the report. Among the highest of the losses observed was cauliflower, where 37% of the product did not leave the farm.

In addition to the vast quantity of grapes grown in the Riverland, the Murray-Darling region is responsible for nationally significant crops, such as mandarins (27% of national production), oranges (33%), almonds (21%), brussels sprouts (54%), onions (22%) and potatoes (17%) (Australian Bureau of Statistics 2015). Small percentages of food losses in these large crops can create significant economic losses for producers as well as the associated inefficiencies in land and water use. Industry wastes, on the other hand, may have costs associated with their disposal, but do not cause a loss in production. Additionally, wastes such as grape marc, almond hulls

and citrus pulp are not associated with the loss of a potential foodstuff for human consumption. In the Riverland, intensive production and processing of wine-grapes, citrus production and juicing facilities, and almond production, means that this area is responsible for large volumes of agricultural industry waste. Recently, AusIndustry (a division of the Department of Industry, Innovation and Science) surveyed 36 food manufacturers and/or processors to extrapolate the extent of the waste, producing a figure of 200,000 tonnes of under-valued waste, or that which was going into low value applications (landfill, animal feed) that could be better used (Department of Industry 2015).

Wine industry waste streams and potential applications

The key types of waste generated in the wine industry include: vineyard prunings, grape marc (skins and seeds), vineyard posts, stalks, lees and waste water. There is a wide range of potential applications for these waste streams including fuel sources for energy production, extraction of components for food additives, supplements or cosmetics, compost/mulch materials and biotechnology processes. More details are available in Hixson et al. 2016.

Some of these have well-established value-add pathways, particularly through recovery systems like those used for grape spirit or tartaric acid. Less frequently accessed options include use of grape marc in animal feeding or waste water for biogas production. Not all waste streams are well used, and few are viewed with the aim of maximising the value of the waste or components of that waste.

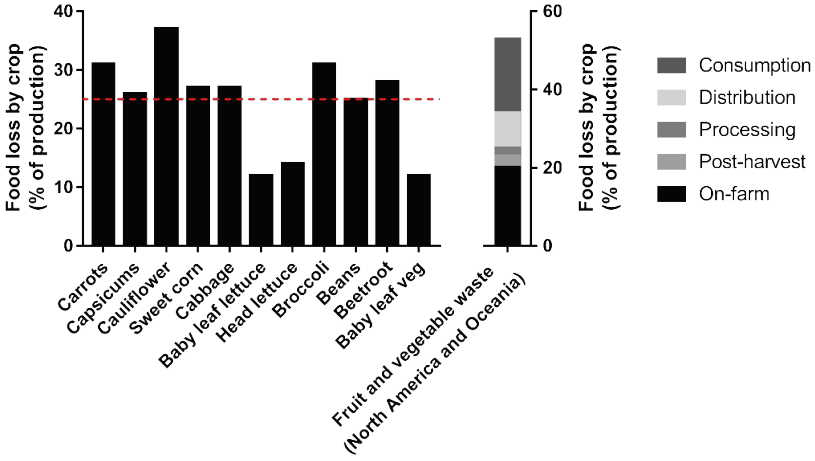

Figure 1. Estimations of food loss. Left-hand side: On-farm food losses by crop in Australia as determined by Rogers et al. (2013), with the average across all crops studied shown by the dotted line. Right-hand side: Fruit and vegetable loss in North America and Oceania throughout the supply chain as determined by the FAO (2011).

While many of the potential applications could stand alone in the wine industry, especially when high-value applications such as nutraceuticals are a proposed end point, many of the components that could be exploited in wine industry waste also appear in the waste streams (or indeed food losses) of agricultural sectors within the same region. The combining of waste streams among different agricultural sectors can have many benefits including achieving economies of scale, reduced infrastructure requirements or, for applications like energy production, allowing year-round operation.

Objectives of the project and expected outcomes

The current investigation into Riverland and Murraylands waste intends to build on the previous survey by the AusIndustry to better understand waste production, investigate potential re-use applications, discover aggregation possibilities across industries, and recommend infrastructure required to transform waste into valuable products.

The four key activities currently being undertaken are:

- A survey of agricultural producers and processors to produce a regional waste map. This will identify and quantify food loss and industry waste, including seasonality, current uses and value.
- Bioprospecting of lost foodstuff or waste streams to determine the concentrations of target bioactives, or potential value-add compounds and identify opportunities to transform food loss and industry waste into higher value products.
- Audit waste transformation infrastructure in the region, or identify additional infrastructure required to transform waste into higher value products.
- Investigate market opportunities/impediments for higher value products derived from industry waste, and identify routes to market for key products.

Results of the work will highlight investment, trade and industry development opportunities, including recommendations on future research options and possibilities for promoting waste transformation activities in other regions.

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Innovation Australia; Citrus Australia–SA Region; and Swisse Wellness. The AWRI is supported by Australia's grapegrowers and winemakers through their investment body Wine Australia with matching funding from the Australian Government. The AWRI is a member of the Wine Innovation Cluster in Adelaide.

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