What drives total emissions and emissions intensity in Merino businesses?

Written by Tanisha Shields
Agrista

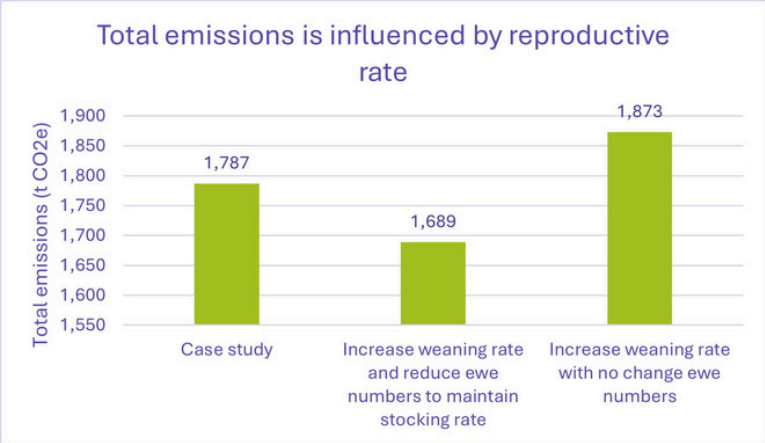
Last month, consultant Tanisha Shields attended the Leading Sheep forum focussed on navigating markets and equipping your business for the future. Leading Sheep is an initiative of Australian Wool Innovation and the Queensland Department of Agriculture and Fisheries, supported by AgForce. As part of this presentation, Tanisha took a deep dive into self-replacing merino businesses and what contributes to their carbon emissions profile.

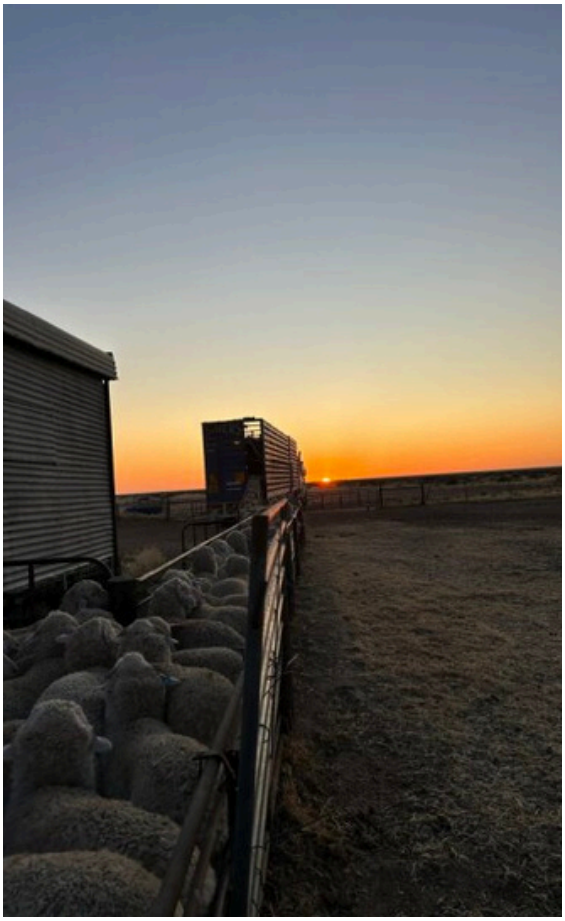
The case study business is a 50kg self-replacing merino ewe flock, joining 5220 ewes per year and weaning 67% lambs. Wethers from this flock are sold at 1 to 2 years of age and the average adult wool cut is 5.8kg greasy per head. The Sheep and Beef Greenhouse Accounting Framework (SB-GAF) Tools | Primary Industries Climate Challenges Centre (piccc.org.au) was used to generate a total farm emissions for this business of 1787 tonnes of carbon dioxide equivalent.

> What this means is that in one year, this merino business is emitting the equivalent of 770 return car trips from Sydney to Perth, 150 return flights from Sydney to London for 2 people or the equivalent of 100 typical Australian households!

Of the total emissions for this business, 90% is methane released as a byproduct from the sheep converting pasture into product – meat and wool. The amount of methane released is related to how much the sheep are eating. This is important to understand when considering possible actions for emissions reductions, as small changes in the efficiency of this conversion can lead to big changes in emissions.

Possible changes to this business were analysed to determine what is driving the emissions of this business. The first change was to increase the reproductive rate of the ewes. If weaning rate is increased to 80%, without any change in ewe numbers, total emissions also increase. This is due to the ewes needing to consume more pasture at higher reproductive rates. If the same increase in reproductive rate is achieved, but ewe numbers are reduced to maintain stocking rate, a reduction in total emissions occurs. Changes to wool production had no impact on total emissions.



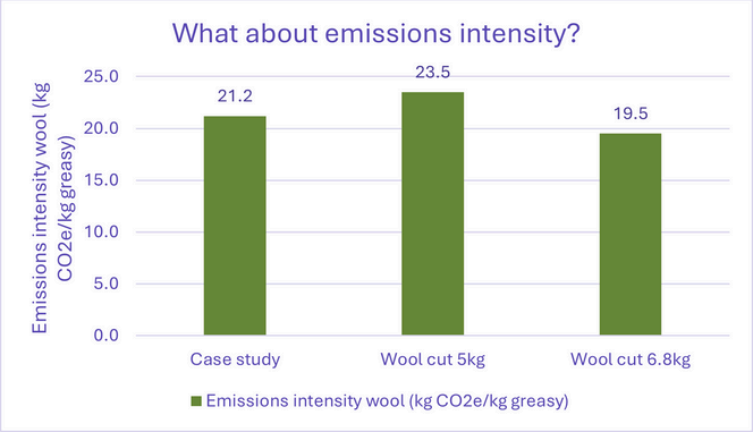


Emissions intensity is a measure of efficiency. It is simply the total emissions for an enterprise, divided by the total amount of product from that enterprise.

Emissions intensity is often used to benchmark emissions between businesses, and also track efficiency within a business over time. The lower the emissions intensity, the better that business is at turning emissions (or methane) into product.

For a merino enterprise, there are two products, meat and wool. Emissions are allocated between these two products using a protein mass allocation method. This involves calculating the amount of clean wool produced (which is assumed to be 100% protein) and applying a constant of 18% protein content to meat (or liveweight). The relative proportion of protein between the two products is then used to apportion the emissions to each product. This article will focus on the emissions intensity of wool produced.

Any change to the amount of wool produced per head has an impact on the emissions intensity of the wool product. A 0.8kg reduction in wool cut per head, leads to an increase in emissions intensity by 11%. A 1kg increase in wool cut per head improves emissions intensity by 8%.



Liveweight or frame size of ewes is a key data input in carbon accounting analysis. How big the ewe is influences how much she needs to eat in order to maintain her bodyweight, and then produce product. As intake is directly correlated with methane emissions, it is important to understand how heavy your ewes are – a 5kg increase in weight of ewes increases emissions by 6%.

In summary, the factors which drive emissions in self-replacing merino flocks are wool production, reproductive rates, growth rates and the weight of ewes. To improve the carbon footprint of merino flocks focus on efficiency gains, such as wool cut per head, reproductive rate and ensure that your sheep are efficient for their size. The good news is that those businesses with the lowest emissions intensity tend to be the most profitable.

ABOUT TANISHA SHIELDS

Tanisha is a local to the Western NSW region, with over 5 years' experienceproviding advice to rangeland producers.

Tanisha has strong technical skills in farm performance analysis, livestock production systems, carbon accounting, grazing management of extensive pastures, extension, and industry development.

Tanisha works with clients to identify opportunities and implement strategies to make improvements to operational performance and increase financial returns.

Tanisha has knowledge and experience developing and delivering red meat industry training programs in the rangelands, including Profitable Grazing Systems, Producer Demonstration Sites and EDGE packages. She has existing networks with stakeholders across a range of industries, including extensive livestock, grains and cotton.

Tanisha has over 5 years' experience in extension program development and delivery, from small local events to regionally focused programs. Tanisha is passionate about developing and delivering projects that are relevant andspecific to different agricultural production systems.

Tanisha has been a consultant with Agrista for the past two years.