

LAND APPLICATION – How much is manure worth?

Recycled organics (specifically animal manure) can be a valuable resource as an agricultural fertiliser and soil conditioner. However, calculating the real value of manure can be a difficult task. This is because there are many different factors to consider, including nutrient content and availability, the value of trace elements and the value of improvements to soil structure that increase pasture and crop yield. Also, transport and spreading costs are higher than for inorganic fertilisers and this should be taken into account.

There are different recycled organics available in the Condamine region, including feedlot manure, piggery spent bedding, piggery sludge and layer manure. These products may be available fresh, stockpiled or composted. Each has different characteristics and nutrient composition (see 'Typical Composition' fact sheets in this series).

In the Condamine region recycled organic products are generally sold for between about \$4 to \$60/t. The main drivers of price are;

- Product quality
- Handling (the lowest prices known of involve collection of manure using your own labour and equipment)
- Timing / supply – at times manure needs to be moved 'on demand' from an animal production facility and this usually reduces the price
- Proximity to major users
- Processing – screened manure or compost usually sell for higher prices.

This fact sheet uses stockpiled feedlot manure as a case study to look at how to value a recycled organic product, but the principles for valuing other organic products are the same. The total value of the product 'as spread' will influence the sale value per tonne or m³ and also the distance a product can be carted before it is not economically viable.

Valuing animal by-products

The first step to estimating the value of a recycled organic product is to calculate the nutrient content. Table 1 provides a sample nutrient analysis for stockpiled feedlot manure. The analysis values

provided are indicative only and may vary from one batch to another.

Table 1. Average composition of stockpiled feedlot manure in the Condamine region

Amounts given on a DM basis	Average
pH	7.7
Dry matter %	73
Nitrogen (N)	2.2
Phosphorus (P)	0.8
Potassium (K)	2.2
Calcium (Ca)	1.6
Magnesium (Mg)	0.9
Sulphur (S)	0.4

Watts et al. 1994

This analysis is not comprehensive, and further information can be sourced from the 'Composition of Feedlot Manure' fact sheet. Most recycled organics do not supply nutrients in the right ratios for crop or pasture needs. It is recommended that they are used as part of a fertiliser program including other fertilisers to account for plant needs. One management option is to apply a recycled organic product at a rate equal to phosphorus requirements and supplement the level of nitrogen to meet crop or pasture needs.

It is possible to roughly estimate of the value of stockpiled feedlot manure by comparing the amount of N, P and K available with the cost of commercial inorganic fertilisers (see Table 2). However, it should be understood that the value of these nutrients will need to be spread over 2-3 seasons as they become available to plants.



Table 2. Value of nutrients in 1 tonne of stockpiled feedlot manure compared to commercial fertiliser

	Manure analysis (% dry basis)	Manure analysis (% wet basis)	Inorganic fertiliser product & \$/t	Manure value (wet) (\$/t)
Moisture content	0%	25%		
N	2.2	1.7	Urea (46%N) @ \$485/t	17
P	0.8	0.6	Triple super (20.7% P) @ \$510/t	15
K	2.2	1.7	Potash (50% K) @ \$590/t	19
Total value of manure per tonne				\$51

The dollar value in Table 2 is calculated assuming the manure is 25% moisture, meaning the actual amount of nutrients is 25% lower than the dry analysis value. Because of the variable moisture content, animal by-products are sometimes sold on a volume basis (m³) rather than tonnes. This needs to be converted into tonnes to work out the amount of nutrients that are being supplied.

Example: Stockpiled feedlot manure at 10t / ha

Feedlot manure cost:

\$10 t manure
 \$15 t delivery and spreading
 = \$25 t or **\$250 / ha**

At 10 t / ha this supplies approximately **165 kg of N, 60 kg of P and 165 kg of K.**

Fertiliser cost:

If the equivalent amount of nutrients were applied as Urea, Triple super phosphate and Potash this would amount to;

360 kg Urea = \$175 (\$485/t)
290 kg Triple super = \$148 (\$510/t)
330 kg Potash = \$195 (\$590/t)
Total = **\$518 / ha**

At this value of N, P and K, it may be economic to apply feedlot manure at prices above **\$40/t** delivered and spread when compared to the price of inorganic fertiliser. This means the product could be purchased for a higher price or carted further to the farm while still being economically viable.

In addition to the value of N, P and K, there are significant amounts of calcium, sulphur and trace elements that may be highly valuable when required on the application area.

For example, layer hen manure has a high amount of calcium which could offset the cost of spreading gypsum or lime. The value of the calcium can be worked out in the same way as shown above. The trace elements in some animal manure include magnesium, boron, copper and

zinc. These trace elements can be expensive to apply as inorganic fertilisers if required, making a recycled organic product a cost effective alternative. Animal manures are valuable as a soil conditioner because of the beneficial effects on water holding capacity and soil structure. These values have been reported by research and farmer observations but are difficult to measure in dollar terms.

Nutrient Availability

Nutrient availability is an important consideration when valuing recycled organics. The availability of nutrients will vary depending on a large number of factors, and may range from 0 – 80% of the nutrients applied during the first year. This will not affect the total value of the product provided the nutrients are still available to crops or pastures in the following years.

To calculate the dollar value of a recycled organic product for the first year, the nutrient content can be multiplied by an estimate of the available nutrients. Using stockpiled feedlot manure for example;

1 t feedlot manure (as applied) = 17 kg N, 6 kg P and 17 kg K (from Table 2).

If **60%** of these nutrients are available in the first year the \$ value = **\$30**.

The low availability of some nutrients supplied in an organic form may be of benefit to some systems as these nutrients can act as a slow release fertiliser. This can increase plant nutrient usage and reduce the risk of nutrient losses. It also means that higher application rates can be used in a two year cycle to reduce spreading and management costs.

Some other fact sheets in this series:

- Typical composition – Layer hen manure*
- Typical composition – Feedlot manure*
- Typical composition – Piggery spent bedding*
- Application – How much should I apply?*

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