

A guide to valuing supplementary feeds

It is important to be able to compare the true value of a range of purchased feeds such as cereal grains and pulses against other feeds such as crops grown at home, or purchased in feeds including PKE, hay, silage and baleage.

Feeds can be valued in at least four different ways:

1. Wet weight or as-fed basis.
2. Dry matter (DM) basis.
3. Megajoules of metabolisable energy (MJME) basis.
4. The true nutritional value of a feed (e.g. comparing on a starch, protein water soluble carbohydrate and fibre basis).

Determining the value of a feed on a true nutrition basis can be detailed and is generally done using diet formulation software. However it is not that difficult to calculate the true cost of a feed on a DM and MJME basis in the field. All you need is a calculator, paper and a little more information about your feeds:

1. On a “wet weight” or on an “as-fed basis”

Both of these terms essentially mean the same thing. They mean quite literally the weight that might show up on a silage wagon with scales, or the weight of a bale of hay or silage averaged over a truckload or weighed on the back of a ute over a weighbridge. This term takes no account of the DM content of that feed.

Grain, pulses and dry by-products like Palm Kernel Expeller Extract (PKE) are often discussed and valued on an as-fed basis. For dry feeds such as grain or PKE this is generally acceptable as the DM will be relatively consistent over a narrow percentage range. Grains can be slightly more variable than PKE, with most grains and pulses ranging from 86 to 90% DM (14 to 10% moisture (Refer to table in Appendix 1)). There is an increased risk with valuing wet feeds such as silage on an as-fed or wet weight basis because the dry matter % can be extremely variable.

Baleage for example can vary in dry matter from 30% to 65% DM. You must be careful when purchasing feeds that potentially contain a lot of water – this can be an extremely expensive way to purchase water. You should always test baleage for DM% and quality before committing to purchase of baleage.

2. On a dry matter (DM) basis

Ideally it is of value to calculate the cost of all feeds on a dry matter basis but it is especially important in the case of silage, baleage or other wet products because the DM% of these feeds can vary greatly. You can manually calculate the cost per kgDM of any feed by doing the following:

Examples of how to calculate the value of feeds on a DM basis are shown below:

Pasture baleage example

Pasture baleage can be purchased at \$90 per bale. How can this be valued on cents per kgDM basis?

- a) Weigh the bale = wet weight of bale or average the weights of the bales over a truck load. E.g. 600 kg wet weight.
- b) Take a sample for DM% assessment, or estimate DM% (if you are confident to do so – but laboratory testing is a much better idea). E.g. 40% DM (or 0.4).
- c) Each bale contains 240 kg of DM (600 kg wet weight x 0.40 DM = 240 kg of DM).
- d) Each bale cost \$90. Divide \$90 by 0.24 tonne DM (240 kg of DM per 1000 kg) = \$375 per tonne of DM.
- e) Each kg of DM costs 37.5 cents (\$375 divided by 1000 kgDM).

Barley grain example

If barley grain is \$320 per tonne this is as-fed or wet weight not dry matter. Grain does contain some water.

- a) Barley at \$320 per tonne.
- b) Barley will typically be around 86 to 90% DM (to put this another way 14 – 10% moisture).
- c) Calculate the cost of barley on a DM basis: $\$320 \div 0.86$ works out to \$372 per tonne DM if the barley is 86% dry matter.
- Each kgDM costs 37.2 cents ($\$372 \div 1000$ kgDM).

Don't forget a processing cost. The key thing to remember for grains and pulses fed to cattle (barley, wheat, maize, oats, peas and faba beans) is to include a processing cost. Even if the client is processing their own grain, allow around \$30 per tonne for example or (2 to 3 cents per kg of wet weight) for rolling the grain, to allow for repairs and maintenance, depreciation and debt servicing on the mill.

PKE example

If PKE is \$320 per tonne, the same calculation as for barley applies, but remember that PKE contains a lot more dry matter than baleage and typically slightly more DM than barley. Repeat the above calculation but use 90% DM. This works out with PKE costing 35.5 cents per kg of DM.

Table 1: Typical dry matter % for a range of feeds*

FEED TYPE	DM%
Pasture baleage	35-40
Pasture hay	85
PKE	90
Soybean and Canola Meal	90
Barley	86-90
Wheat	86-90
Maize	86-90

*These are indicative DM% only for a range of feeds – ideally feeds should be tested at a laboratory for DM% to help more accurately allocate feeds to stock.

3. Valuing feeds on a cents per MJME basis

This is the next step to valuing feeds, with most dairy farmers and feed suppliers now valuing feeds in this way. Using cents per MJME to value feeds DOES still have limitations because MJME does not account for many aspects of feed quality, including protein, starch, water soluble carbohydrates, fat and fibre (NDF) levels.

Take the previously calculated (cents per kgDM value) and divide by the MJME of that feed.

- Pasture baleage, at 37.5 cents per kgDM. Divide the kgDM cost by the MJME of an average bale (about 9 MJME/kgDM): $37.5 \div 9 = 4.17$ cents/MJME
- Barley grain, at 37.2 cents per kgDM (unprocessed), divide by average MJME of barley (12.5 MJME/kgDM) = 2.98 cents/MJME
- PKE at 35.5 cents per kgDM, divide by MJME of PKE (11 MJME/kgDM) = 3.22 cents/MJME

Table 2: Typical MJME analysis for a range of feeds

FEED TYPE	MJME/kgDM
Pasture baleage	8.5-10.5
Pasture hay	8.0-10.0
PKE	11.0
Soybean and Canola Meal	12.0
Barley	11.5-13.0
Wheat	12.0-14.5
Maize	13.0-14.5

4. Valuing feeds on a cents per kg of crude protein (CP) basis

This is another step to valuing feeds that has become more topical over the last season or two. Many dairy farmers (particularly higher input farmers feeding higher rates of supplements) are now valuing protein-containing feeds in this way. Using cents per kg of crude protein (CP) **DOES** still have limitations because this approach does not take into account the CP profile [what proportion of CP is rumen degradable (RDP) or undegraded dietary protein (UDP or rumen bypass protein)]. As well, this approach tells us nothing about the amino acid profile of a protein meal nor the potential digestibility of amino acids in that feed. Ideally you should consult with a qualified nutritionist for more detail about protein nutrition, the following is simply a basic guide.

Take the previously calculated (cents per kgDM value) and divide by the CP value of that feed. Examples include:

- **PKE at 35.5 cents** per kgDM, divide by crude protein of PKE (16% CP or 0.16kgCP/kgDM) = \$2.22 per kg of protein (\$2218 per tonne of crude protein). Note that the protein quality of PKE is relatively poor (both in terms of amino acid profile and amino acid digestibility) and PKE is rarely used specifically as a protein source to correct a dietary CP deficiency.
- **Peas** at e.g. \$600 per tonne landed = \$690 per tonne DM (87% DM) or 69.0 cents per kgDM. Divide by the crude protein value of peas (e.g. 28% CP or 0.28kgCP/kgDM) = \$2.46 per kg of CP (\$2463 per tonne of CP).
- **Soybean meal** at e.g. \$1000 per tonne landed = \$1111 per tonne DM (90% DM) or \$1.11 per kgDM. Divide by the crude protein value of soybean meal (e.g. 48% CP or 0.48kgCP/kgDM) = \$2.31 per kg of crude protein (\$2315 per tonne of crude protein). Even though soybean meal appears more expensive than PKE, the superior protein quality of soybean meal means that we'd choose soybean meal over PKE as a way to balance a cows diet (if it is protein deficient) every time.