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Estimating Feed on Offer (FOO)

What is Feed on Offer (FOO)?

Feed on Offer (FOO) is a measure of the amount of pasture available for grazing animals at any one time and is measured in kilograms of dry matter per hectare (kg DM/Ha).
FOO is an indicator of predicted animal performance as well as pasture production traits such as utilisation, persistence, species composition and ground cover. Assessing FOO regularly allows producers to understand what feed is available for livestock and what their predicted growth rates at their stage of production will be. Similarly, understanding stocking density aids producers in determining the amount of residual pasture to be left post grazing.

Why is Assessing FOO important?

The main reason for assessing FOO is so that you can calculate the predicted energy intake for your animals. Knowing this information allows you to determine if your stock are in energy surplus or deficit at their given stage of production. If pasture FOO is low, or quality is low, then it is time to move animals to a paddock with higher FOO (and quality) (if you have a paddock available) or you need to start supplementary feeding. Understanding the energy deficit allows you to develop an appropriate supplementary feeding strategy with the feed you have available.

For example:
It is the 1st of March. I have 60kg sheep that have been joined for the past 30 days. I have measured FOO at 1000kg DRY @ 40% digestibility (using the photo standards booklet).

My sheep energy requirements are ~9.7 MJ ME/head/day. Grazing that pasture, my sheep intake is ~ 2.7 MJ ME/head/day. Therefore I am deficient 7MJ ME/day.

Understanding if your livestock have a surplus or deficit of energy is vitally important to maintain production and growth. It will also aid you in making informed feeding decisions which can save you significant money if you are both under or over-feeding.

Assessing Feed on Offer (FOO)

There are two ways in which FOO can be measured:

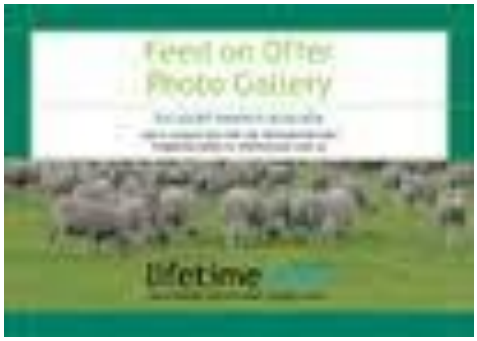
1. Comparing what you see in your paddock against photo reference samples
2. Taking a calibration cut, weighing and drying to determine FOO

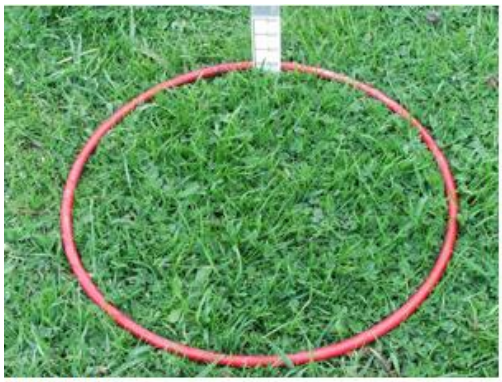
1. Using photo standards

Using photo standards for visual assessment of FOO in your paddock is a quick and simple subjective assessment. This method involves comparing what you see in the paddock with reference photos of known FOO from a book. When assessing FOO in the paddock there are a number of things that should be considered.

1. The density of the pasture
2. The height of the pasture
3. Composition of the pasture
4. Stage of maturity
5. % ground cover
6. Grazing intensity

The lifetime wool project has developed booklets that are available for producers. These have been published in collaboration with Rural Industry Skills Training (RIST) and are available from Livestock Logic, RIST or Australian Wool Innovation (AWI) (see below).




1500 FOO

Recently, a more comprehensive picture booklet encompassing more pasture species at different growth stages from across the country was developed. Go to www.feedonofferlibrary.com (see example below).

	Green	Dead
Feed On Offer (kg/ha):	0	4,400
Digestibility (%): Equivalent to	NA	58
Metabolizable Energy (MJ/kg):	NA	8.4
Sheep Intake (MJ/day): 50kg dry, Condition score 3	0.7	
Crude Protein (%):	NA	5.0
Pasture Height (cm):	0	8
Ground Cover (%):	100	
Legume (%):	0	
State:	VIC	
Location:	North Central	
Climate Zone:	Cool Temperate	
Major Species:	Perennial ryegrass	

Comments	No summer rainfall. Samples taken 2.5 months after pasture dried off.

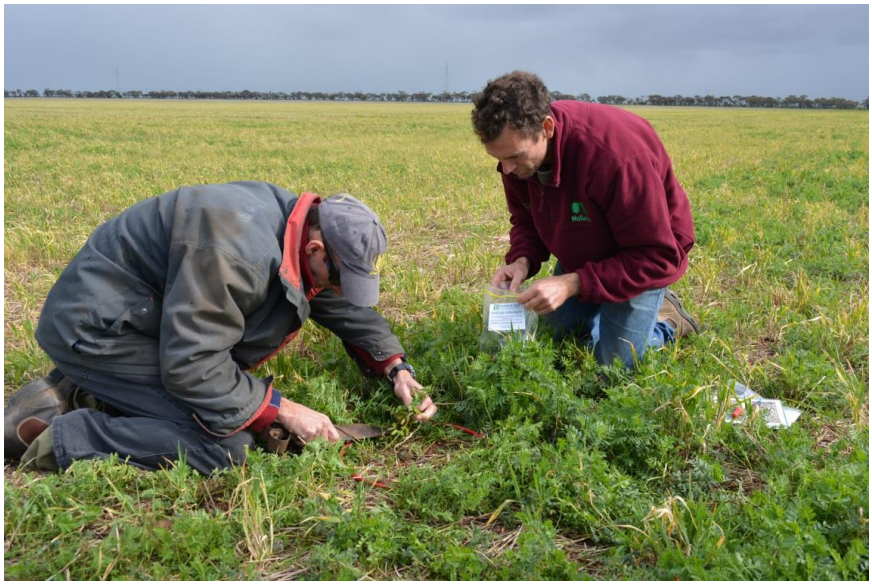
In the paddock, it is best practise to drive across the paddock and measure FOO in 10 different locations to work out the average. This involves estimating FOO from the ute, rather than getting out 10 times.
Sometimes, it is not always possible to find a representative picture in the book of what you are seeing in the paddock. In this case, taking a calibration cut will be required.

2. Calibration cuts

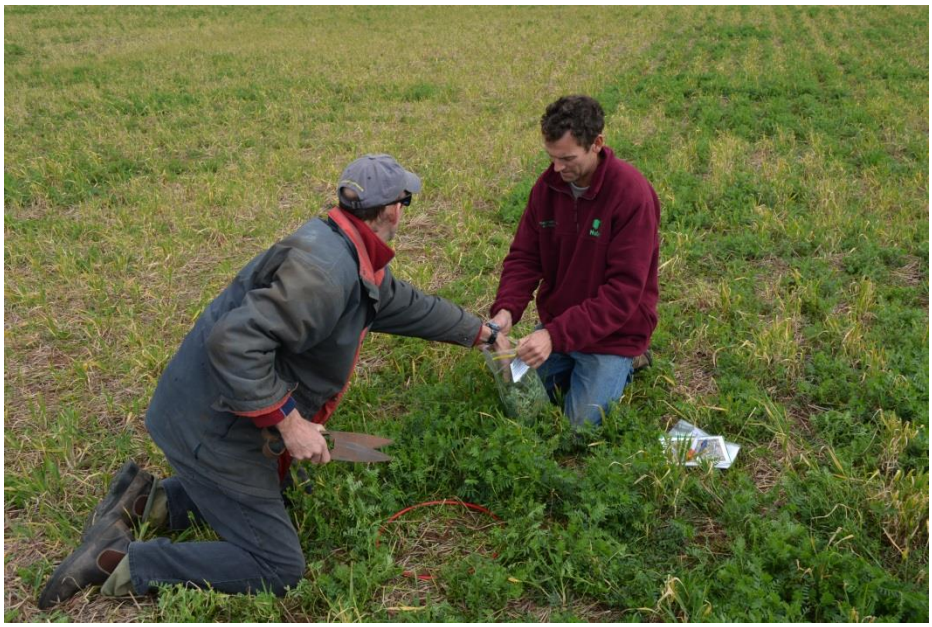
When you cannot visually determine FOO using photo standards, it is necessary to take a calibration cut. A calibration cut requires you to find "an average" area in the paddock that represents average paddock species composition, height and density and then placing a calibration ring on the ground and harvesting the sample with a set of shears to as close to the ground as possible.

A green pasture sample, harvested as close to the ground as possible with a set of shears.

The calibration ring is $0.1m^2$ in area, and a simple mathematic formula can be used to derive FOO on a hectare basis. I have these available in the office to buy or borrow.



Members of Steve's Warracknabeal Lifetime Ewe Management (LTEM) group harvesting green vegetative vetch sample from calibration ring to determine FOO. Note this sample was oven dried for FOO determination.



The sample is harvested inside the calibration ring down to ground level and placed in a plastic bag for immediate analysis. In this instance, a representative FOO photo could not be found in the book.

The harvested sample is collected in a bag and can then be weighed, before being oven dried at 100^{o}C and re-weighed to determine FOO (kg DM/ha). It is necessary to benchmark your guesses from time to time using this method to ensure your estimations are within acceptable limits. Usually, sheep intake on pasture is not affected at levels above 1800kg FOO, therefore, accuracy at higher levels of FOO (i.e >2000kg DM) is low and less important compared to measurements between 500kg and 1500kg FOO. At these lower levels, being plus or minus 200kg in your guesses compared to the actual can result in a significant difference in animal intake, performance and supplementary feed requirements.

You can dry the sample at home using either an oven or a microwave (if the husband/wife) is happy to do this.

Using a microwave instead of oven drying to determine FOO

The microwave oven method can be used for two things:

1. Determining FOO (provided sample is cut from a calibration ring)
2. Determining dry matter content of a sample (pasture, silage or hay)

To use the microwave method, you will need a microwave (turntable model and at least 500W) and a set of electronic scales with a capacity of 100g (or more) and an accuracy of 1g (0.1g more accurate but not essential) with a tare button. A good set of scales with adequate accuracy can be purchased from most reputable home ware shops and cost between $40-100. Such a set of scales can also be used to calibrate seeders and fertiliser spreaders and are therefore a worthwhile investment.

Determining FOO

You need to use the entire sample you have harvested from the calibration ring. If you have harvested a large quantity of green material, you may need scales that go to 500g as the starting material may be heavy and bulky. Chop the sample down into 3-4cm pieces using scissors or secateurs.

Place an empty plastic Chinese takeaway container on the scales, allow to settle until the weight appears on the display. Hit the 'tare' or 'zero' button and record the weight (A). Next, put your chopped up sample into the container and then record the weight on the scales (B). Place the sample into the microwave together with a small cup of water (helps absorb the microwaves as the sample dries out and avoids fires!). Depending on sample volume, water content and microwave wattage, initial drying times can take up to 5 minutes. If using a 1000W microwave, it is better to start with shorter drying times (i.e 2 minutes initially). Once finished, pull the sample out of the microwave and weigh and record weight. Stir the sample around and place sample back into the microwave for another 1-3 minutes and re-weigh and record weight. Repeat this process until the weight matches the previous sample or is within 1g of previous sample and record this weight (C). This indicates that the sample has no more moisture to loose and is at a constant weight. If done correctly, there should be no smoke or fires!

To calculate FOO:
= C-A
Example: Empty container (A) = 25g
Container + wet sample (B) = 75g
Container + dry sample (C) = 40g

40 - 25 = 15g

That is, the weight of the dry material ONLY weighs 15g. In $0.1m^2$ (area of the calibration ring) there is 15g of dry mater, therefore in 1 ha, there is 1500kg DM. (10,000 m^2 in 1 ha).

(i.e $0.15kg \times 10{,}000m^2$) = 1500kg

FOO of dry summer pasture

It is possible to determine FOO in the paddock with a set of scales and a calculator provided that the pasture is 'dry' and contains no green material. This can be useful over the summer months and will give you a high level of accuracy without the need to use the microwave or oven drying technique.
Harvest the dry pasture from the calibration ring down to ground level. Place the pasture in a container of known weight (empty container (A = 15g)), and record the weight (pasture + container (B = 32.6g)).

FOO = ((B-A) x 90%) x 10,000

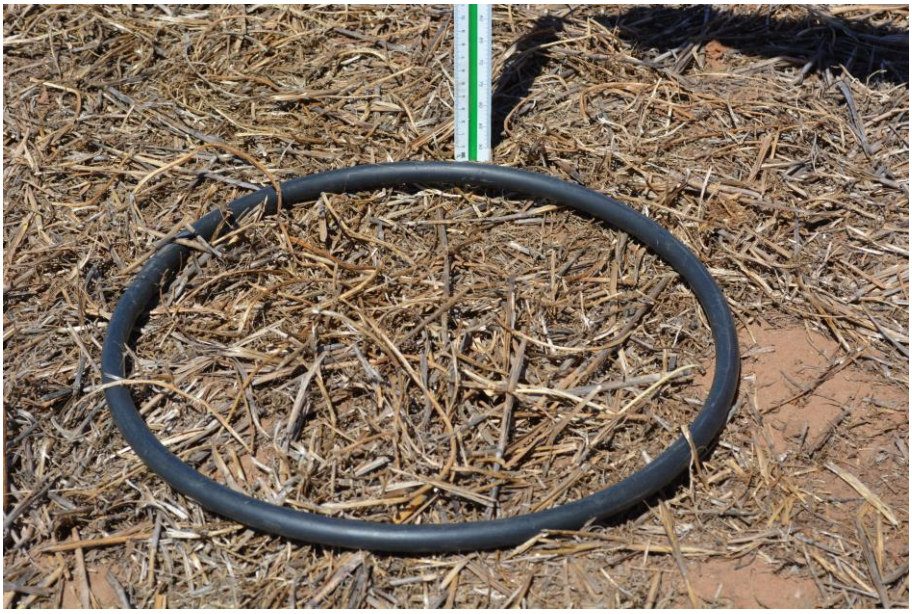
Eg. FOO = 32.6g – 15g = 17.6g
Assuming that the pasture contains 90% DM (remember we have not determined DM using an oven or microwave), then we need to multiply 17.6g x 90% = 15.84g

The dry pasture cut from the calibration ring contains 15.84g of dry material.

Therefore, in 1 ha, there is:

$0.1584kg \times 10{,}000m^2$
= 1584kg DM/ha

Note: It is not possible for plant samples to be 100% Dry matter. They ALWAYS contain some level of moisture trapped in the cell walls that cannot be extracted by oven drying or microwaving.



To estimate FOO in the paddock with a set of scales, the summer pasture must be visually 'dry' and contain no green material as shown above.