MANAGING EXCESS PROTEIN PASTURES

Information Sheet

ADVANTAGE FEEDERS

THE BENEFIT FROM FEEDING LIVESTOCK WHEN THEY ARE GRAZING LUSH PASTURE

Actively growing pastures that are high in soluble protein have the potential to reduce growth rate potential in livestock.

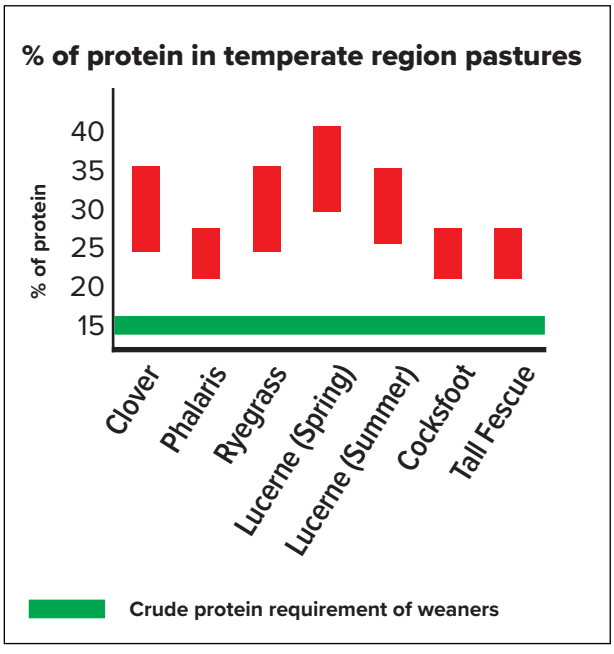
- Young growing livestock need 14-16% crude protein
- Actively growing pasture often tests above 25% crude protein

Soluble protein is the nitrogen in plants that has not yet been converted to protein. Rumen microbes change the soluble protein into a form of protein that can be used by the animal by converting it into ammonia and then use energy and ammonia to reproduce and create microbial protein.

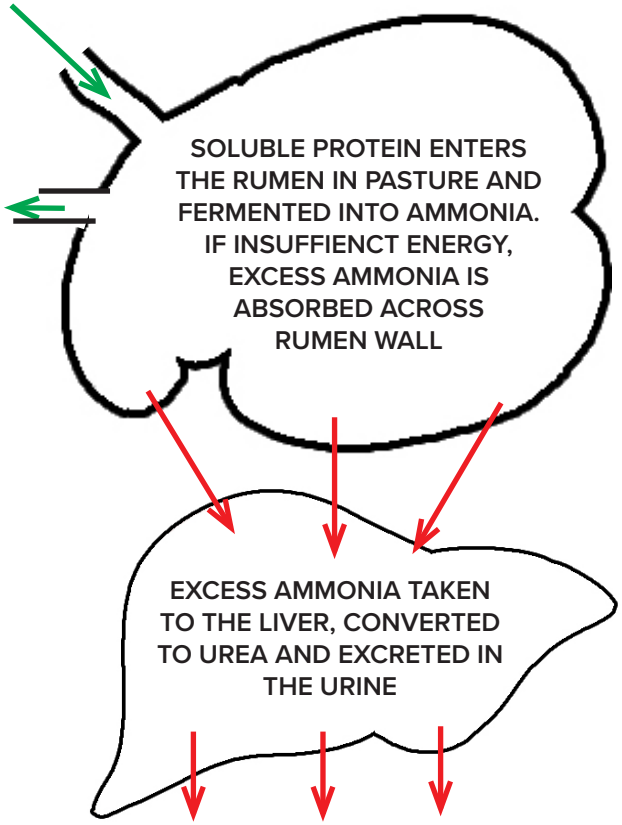
During periods of active growth, pastures can be high in soluble protein and flood the rumen. Very often there is insufficient energy (sugars and starch) to fuel the microbial reproduction. This produces a large surge of ammonia in the rumen and excess ammonia is absorbed across the rumen wall and taken to the liver where it is converted to urea. It is either recycled to saliva, diffused in the bloodstream or excreted in urine. This process requires the animal to expend energy to expel the excess and impacts production targets.

With a supplementation of fermentable carbohydrates, the microbes can capture more rumen ammonia, converting it into microbial protein.

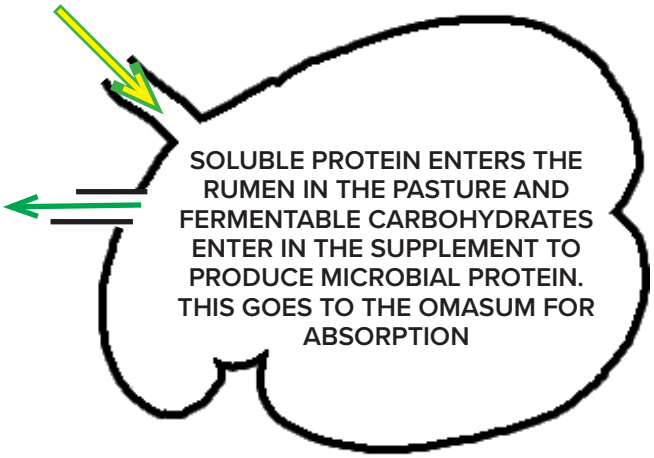
Source: www.extension.psu.edu/protein-in-pastures-can-it-be-too-high



RUMEN WITHOUT SUPPLEMENTATION LEADS TO ENERGY WASTAGE



RUMEN WITH SUPPLEMENTATION MANAGES EXCESS PROTEIN



Weaners need a diet with 14-16% crude protein

ESTIMATING THE WASTED GROWTH POTENTIAL FROM EXCESS PROTEIN IN A DIET

There are many factors that contribute to the actual daily weight gain of livestock and the exact amount of energy wasted to expel excess protein is still to be quantified however the following formula can provide an indication of the magnitude of the lost potential.

To calculate the reduced daily weight gain, a feed test of the pasture is needed to evaluate the:

1. Protein in the pasture, and the
2. NDF of the pasture

Formula:

$$\text{Reduced daily weight gain (g/day)} = \frac{\text{Weight of animal (kg)} \times 1200 \left(\text{Pasture protein (\%)} - \text{Animal protein requirement (\%)}\right) \times \text{Energy waste to expel 1\% excess protein for 1kgDM}}{\text{Neutral Detergent Fibre (\%)} \times \text{Energy required to put on 1kg of live weight (MJ)}}$$

Example with sheep:

Weight of animal	41kg
Neutral Detergent Fibre of pasture	31%
Protein of pasture	28.5%
Animal protein requirement	15.5%
Energy waste to expel 1% excess protein for 1kgDM	0.15MJ/kg*
Energy required to put on 1kg of liveweight	42MJ**

Reduced daily weight gain (g/day)

= 41 x 1.2 / 0.31 x (0.285 – 0.155) x 0.15 / 42
= 74g per day

Example with cattle:

Weight of animal	350kg
Neutral Detergent Fibre of pasture	29%
Protein of pasture	29.5%
Animal protein requirement	14.5%
Energy waste to expel 1% excess protein for 1kgDM of feed	0.15MJ/kg*
Energy required to put on 1kg of liveweight	42MJ**

Reduced daily weight gain (g/day)

= 350 x 1.2 / 0.29 x (0.295 – 0.145) x 0.15 / 42
= 776g per day

Formula assumptions:

* 42MJ of energy is needed to add 1kg of LW to an animal

** 0.15 MJ is used to excrete each additional percent of protein within 1kgDM of pasture.

THE PERIOD TO MANAGE THE EXCESS PROTEIN IN PASTURE

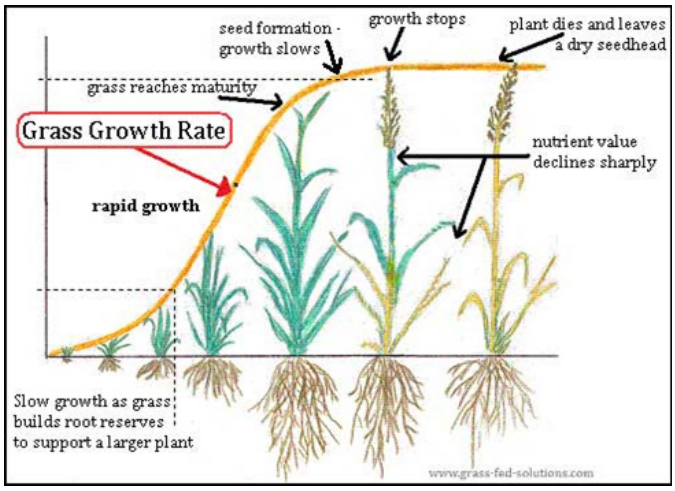
The period is as long as livestock are grazing lush, actively growing pasture that has high soluble protein.

Commencement

Supplementation commonly ceases when pasture growth overtakes pasture consumption. This usually corresponds with the 'spring flush' or the 'rapid growth' stage seen in the image below. Pasture commonly has high soluble protein content at this stage of growth and if supplementation ceases, it creates an energy and protein imbalance.

Completion

Protein content in pasture typically deteriorates rapidly when the plant "goes to head" or at the "seed formation" stage, seen in the image below.



Source: www.grass-fed-solutions.com/pasture-rotation

Depending on the length of spring pasture growth, the period of supplementation will often be between 60 and 90 days

THE RECOMMENDED SUPPLEMENTARY FEEDING AMOUNT

The most profitable feeding quantity is no more than the amount that will "manage" the excess soluble protein. Feeding any more than this when lush pasture is available will decrease profit because pasture is generally cheaper.

In practice, Advantage Feeders experiments have showed excellent feed conversions when 0.25% of body weight in fermentable carbohydrate has been supplemented.

- The Wright experiment fed 100g per day and the weaned lambs grew an additional 100g per day
- The Wyeth experiment fed 1.0kg per day and the rising 2yo. cattle grew an additional 0.5kg per day

The soluble protein levels in pasture will vary over the season. Feed between 0.25-0.33% of body weight as a starting point. This is general advice and you should consult your nutritionist for a recommended quantity to feed.

If 0.33% of body weight is fed, the following amounts apply to the following livestock types:

- 100g per day for a 30kg lambs
- 1kg per day for a 300kg weaned steer
- 150g per day for a 45kg lamb

As a starting point, feed between 0.25-0.33% of body weight per day

EDUCATING UNTRAINED LIVESTOCK TO THE FEEDER

As explained above, cereal grains are frequently used in this supplementary feeding application. If livestock don't have sufficient training to the feeder and gorge the supplement, this can lead to acidosis and potentially, be fatal.

Acidosis issues can be avoided if untrained livestock are provided a safe feed, like high fibre pellets, in an ad-lib setting to encourage and reward their eating behaviour at the feeder. Once feeding behaviour is consistent, the ration can transition to the cereal grain ration. While this process comes at a cost, time and time again, this has proved to have great results with little cost and minimal rumen upsets. For the full explanation, see page 11 of the Advantage Feeders User Manual. The User Manual is available to download from our website.

No training is needed for weaners that were creep fed before being supplemented to manage high protein pastures

THE BEST FEED TO USE TO MANAGE EXCESS PROTEIN

The supplement fed should be high in fermentable carbohydrates (Source: www.extension.psu.edu/protein-in-pastures-can-it-be-too-high) such as cereal grains because they are high in starch. The most profitable cereal grain option depends on what a farm has available and the relative starch prices.

Feeding high starch grains such as wheat should be introduced gradually. In this application of managing excess protein, only small amounts of feed are required which means the 3-way Restriction System on the feeders are close to, or fully restricted so there is lower risk of acidosis. Please note that livestock need to be trained to the 3-way Restriction System before the feeder can be used in the fully restricted setting.

Corn and sorghum are not as effective as cereal grains because a component of their starch bypasses the rumen and is digested in the small intestines.

How to work out the price of starch per tonne of different feed options

Formula:

$$\text{Price of starch (per tonne)} = \frac{\text{Price (per tonne as fed)}}{\text{Starch density (\% of feed of dry matter)} \times \text{Dry Matter (\%)}}$$

Examples:

1. A sample of wheat is $300 delivered, it has a 75% starch of DM and the feed is 90% DM. The price of starch is $300 / 75% / 90% = $444.44 per tonne.
2. A sample of barley is $225 delivered, it has a 65% starch of DM and the feed is 90% DM. The price of starch is $225 / 65% / 90% = $384.62 per tonne.
3. A sample of lamb finishing pellets is $400 delivered, it has a 45% starch of DM and the feed is 90% DM. The price of starch is $400 / 45% / 90% = $987.65 per tonne.

In these examples, the sample of barley has the most cost-effective starch.

Grain Type	Starch Content (%DM)
Maize/Corn	**70-75**
Wheat	**65-70**
Barley	**55-60**
Oats	**45-50**
Sorghum	**65-70**

Source: www.feedcentral.com.au

PROFITABILITY OF MANAGING EXCESS PROTEIN PASTURE WITH DIFFERENT LIVESTOCK CLASSES

The amount of profit gained from managing protein depends on the benefit you receive from having heavier livestock. From highest to lowest on most farms:

1. Livestock that are sold generally get a return based on their weight. Most of these animals are young livestock so it is very common to supplement weaned lambs and cattle. When mutton and mature cattle prices permit, it can also be profitable to supplement mature livestock that are sold
2. The is a strong correlation between the weight of young maternal animals and their likelihood to become pregnant. Reaching higher joining weights will mean that more maternal animals get pregnant. This application is more common when ewes are mated before 9 months of age and heifers are mated at 15 months of age. In addition, excess ammonia/urea in the blood has negative impacts on fertility.
3. Maternal livestock could put on more weight in the spring which would mean that they would have the ability to lose more weight in the summer and autumn and end up at the target body condition score. This is especially practical with cows that calve in the spring and are being rebred shortly after calving. Their milk production and ability to conceive will increase.
4. Rams and bulls benefit from being heavier and in better condition before mating.

The biggest return on investment commonly comes from supplementing weaners

CALCULATING THE ADDED PROFIT FROM MANAGING EXCESS PROTEIN PASTURES

WANTING TO TRY OUT THE CALCULATORS FOR YOURSELF?
www.advantagefeeders.com.au/roi/excess-protein/

LIVESTOCK PER FEEDER IN THIS APPLICATION

250 sheep per feeder or 50 cattle per feeder is recommended. This is more livestock per feeder recommended than any other applications. When the pasture is in the elongation and high quality phase, livestock have ad-lib access to pasture and they will choose to visit the feeder less because the difference between the feed quality of the complimentary/supplementary feed and the pasture is marginal.

Like all applications, the amount of livestock/feeder can be increased but it increases the risk of uneven consumption because there is more competition for trough space. The increase in risk requires more oversight/management to identity a potential unevenness in feed consumption.

Source: The Wright experiment showed that 1 feeder for 400 lambs can have great results.

Recommend 250 sheep per feeder
Recommend 50 cattle per feeder

CONTROLLING THE RATION TO ACHIEVE A SMALL DAILY INTAKE

Controlling the ration to 0.33% of body weight is common. There are several experiments where the ration of weaned lambs and weaned cattle have restricted the ration to less than 0.25% of body weight when grazing lush pasture.

Sources:

- The Wright experiment fed 100g per day to 40kg lambs (approx. 0.25% of body weight)
- The Wyeth experiment fed 1.0kg per day to 500kg rising 2yo. cattle (approx. 0.2% of body weight)

Wright Experiment

Visit www.advantagefeeders.com.au/trial-results for full results.

EXPERIMENT: WRIGHT