Land fact

Supplementing livestock on mature African Lovegrass – Eragrostis curvula. (LF-AP-N-2.2)

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Feed value and analysis

Naturalised populations of African Lovegrass (Eragrostis curvula) experience a steep decline in quality, digestibility and palatability once plants mature. This generally occurs from late summer onwards before active regrowth in spring/early summer.

Feed test results outlined in Land Fact LF-AP-N-2.1 "Key to increased livestock production from African Lovegrass; Grazing strategies and management" show that feed samples taken during winter months had insufficient energy (4.8MJ/kg DM) and protein (<2%) to meet livestock requirements. Additionally, palatability and intake would be expected to be low due to high neutral detergent fibre (NDF) levels (90%) and low digestibility (<39%) estimates. NDF represents all plant cell wall materials such as cellulose, hemicellulose and lignin. These fractions are only partly digestible. High NDF values have a negative effect on digestibility and dry matter intake.

Digestibility and palatability issues

A plant's palatability is determined by its flavour, its nutrient and toxin content, chemical or physical characteristics, the animal's nutritional needs and previous experience with the food.

Digestibility is directly related to the energy content of the feed and has a positive relationship with protein. A pasture with a digestibility of >70% will have energy and protein levels capable of supporting high performance. The relative performance of animals grazing temperate and tropical perennial grasses varies as pasture quality changes. Animal performance on tropical pastures can be higher when digestibility declines below 66%. However animal performance will dramatically decline once below 52% digestibility. Pastures with lower digestibility have generally poor energy and protein levels, unable to meet an animal's basal needs.

Dry matter, organic matter, crude protein and NDF digestibility's (and therefore palatability and intake) is greatest during a plant's vegetative (growing) phase and prior to seed set. Feed value of African Lovegrass is high during its green, actively growing stages during early spring and summer. Unfortunately, more palatable and nutritious species are also available during this period.

Older growth has lower palatability and is usually avoided by animals. When grazing African Lovegrass dominant pastures during summer through to winter, they should be considered as little more than a fibre source.

To maximise livestock use and productivity on pastures with a high proportion of African Lovegrass, an integrated management plan using two or more strategies is recommended as outlined in *Land Fact LF-AP-N-2.1 "Key to increased livestock production from African Lovegrass; Grazing strategies and management"*

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Feeding the rumen

A healthy, well-balanced diet is essential for productivity. An animal's energy, protein, fibre, vitamin and mineral needs must be met to ensure an efficient rumen environment. Energy and protein requirements can vary depending on the animal's physiological state, age, size, environment and production efficiencies. Minimum energy and protein intakes for sheep and cattle are shown in Table 1 below.

Table 1: Minimum energy and protein requirements (50kg/DSE)

Production State	Metabolisable Energy (MJ/kg DM)	Crude Protein (%)
Survival	8	7
Late pregnant/ lactating	12+	12+
Growth	10+	12+
Finishing	11-12	12-15

Rumen microbes digest cellulose, sugar and starch (carbohydrates), produce *"by products"* of fermentation (Volatile Fatty Acids, Ammonia, CO2 and Methane), synthesize amino acids from non-protein nitrogen, synthesize Vitamin B's and K and are a major protein source when washed into the small intestine. When grazing low quality, African Lovegrass pastures supplements are needed to ensure a healthy, well balanced and functional rumen.

Energy

Energy is the most important indicator of feed quality. It is needed for muscle development, fat storage, maintenance and growth. An animal's energy needs are met through the digestion of feed and/or supplements.

African Lovegrass dominant pastures from late summer through to winter are unlikely to provide adequate energy for normal rumen function and production. A variety of supplements can provide additional energy for livestock grazing these pastures. These generally include cereal grains, pulses, processed meals and/or molasses.

All feeds contain varying levels of carbohydrates (starch, sugar, cellulose etc), protein and oil. The proportion of each can determine the feed's relative energy value and risk in terms of digestive upsets such as acidosis. For a comprehensive summary of use, limitations and recommendations when supplementary feeding all grains refer to *Land Fact LP-AP-05 "Feeding Cereal Grain to Livestock."*

Molasses is a by-product of sugar refining. Primarily a source of energy, due to its high sugar content (60-70% DM), it typically provides ~13 MJ/kg of dry matter. Molasses has a low nitrogen content with a crude protein equivalent value of between 5 to 6%. Fortified molasses (containing urea) is commonly used on dry standing feed to stimulate fermentation, improve energy intakes and digestion.

Protein

Sheep and cattle require a minimum of 7% crude protein for normal rumen function and production. Inadequate protein will lead to a reduction in gut bacteria with a concurrent slowing of digestion and reductions in intake and ultimately productivity. Protein supplementation when grazing dry feed has shown to increase appetite/intake by as much as 30%, leading to improved feed efficiencies and growth/productivity.

Protein/nitrogen rich supplements such as pulse grains (lupins, beans, peas etc) are more commonly used for supplementing sheep while protein meals (cottonseed, canola, soybean meals etc) or non-protein nitrogen additives such as urea, are commonly used for cattle supplementation.

When using pulses lupins contain the most protein (commonly 38%) and are a reasonably safe grain due to their low starch content. Peas (chickpeas, cowpeas) and beans (faba, mung, navy etc) have lower protein values and higher starch levels and may pose a slightly higher acidosis risk, particularly if cracked or rolled.

Processed meals commonly used include cottonseed, canola, soybean, sunflower, copra and palm kernel meals. Protein contents generally range between 20 to 50% with varying levels of fat/oils depending on meal used and processing method (chemical or pressure extrusion). Oil content, while improving energy intake, can be an issue in terms of impacts on digestion and rancidity. It is important to limit total diet oil intakes to below 7-8% to minimise rumen upsets.

Non protein nitrogen (NPN) sources such as urea can be used to provide the rumen microbes with a readily available nitrogen source. These microbes produce protein and, with a healthy, balanced rumen state, provide 'bypass protein' when digested within the small intestine.

'True' protein must contribute 75% or more of the animal's total protein intake.

NPN supplements alone may not be suitable if looking to achieve reasonable growth rates, particularly within younger stock. Additionally, a reasonable energy intake is needed to make use of available nitrogen and it needs to be introduced slowly to reduce the risk of ammonia toxicity.

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Urea should not exceed levels of 3g/kg/day bodyweight. Dry licks containing urea must be protected from rain to avoid 'pools' of liquid forming on the block/licks surface. Such 'pools' frequently pose a major threat if consumed.

With the rapid decline in digestibility from April onwards, supplementing with NPN or protein meals alone may not meet the nutritional requirements of all classes of livestock. The profitability of supplementing with different commodities varies between seasons and from year to year, making it important to review the most cost-effective feed supplement on a cents per megajoule and per kilogram of protein on a regular basis. The drought and supplementary feed calculator is one tool that can be used. (*Available for download from the app store*).

Vitamins and minerals

Sheep and cattle require many mineral's but most are needed in only small amounts. Of the 'macro minerals' Ca, Na, P and Mg are most important. Refer to NSW DPI's *"Assessing stock feed additives and mineral supplements"* and *"Mineral content of common ruminant stock feeds, crops and pastures"* Primefact's for specific mineral information, requirements and recommendations.

Most pastures generally provide adequate calcium but may have high potassium (relative to magnesium), low sodium and marginal magnesium contents. Interactions between these minerals can predispose livestock to a number of health issues depending on the animal's requirements and total mineral intakes.

Many supplements, including cereal grains, pulses, processed meals and some hays/forages, can be low in calcium (relative to phosphorus), low in sodium, and high in potassium (relative to sodium) which can affect magnesium and calcium absorption.

Mineral supplementation is recommended when grazing African Lovegrass dominant pastures and/or supplementing with energy or protein rich feeds. Commercial blocks/licks can be provided or producers may make their own loose licks on-farm. The latter generally consist of feed elements providing calcium, sodium and magnesium. Sulphur, necessary for many amino acids and proteins, can be included particularly if running a wool-based flock.

Examples of loose lick mixes include the following:

- 2/2/1 Lime/Salt/Causmag (Ca/Na/Mg)
- 2/2/1/1 Lime/Salt/Causmag/Gypsum (Ca/Na/Mg and S)
- 1/1 Dolomite/Salt (Ca/Mg/Na)
- 1/1 Acid Buf/Salt (Ca/Mg/Na plus buffers against acidosis)
- 2/1/1 Acid Buf/Salt/Gypsum (Ca/Mg/Na and S plus buffers against acidosis)

Vitamins A, D and E are fat soluble and stored in the liver. Green feed usually ensures adequate reserves. Vitamin B12 is produced in the rumen from cobalt. It is needed for cell growth, energy and wool production. Deficiencies are rare but may occur on sandy/granite soils, if grazing grass/cereal pastures in spring or if an animal's rumen is not fully developed. Vitamins A, D, E and B12 are available as vaccines and/or in complex commercial blocks/licks.

In terms of Vitamin requirements, deficiencies are rare except during drought and/or long-term grain feeding.

Supplementation considerations for cattle and sheep

Commercial proprietary blocks and dry licks may vary in levels of molasses, salt, minerals, urea and other additives. Licks and blocks may be a suitable option in the early stages of pasture quality decline. However, during autumn when quality and digestibility of Lovegrass further declines, additional supplementary feed options should be incorporated.

Protein meals, pulse seed grain and cottonseed

Protein meals and pulses allow sheep and cattle to utilise protein over a longer period of time in comparison to non-protein nitrogen. This allows for twice weekly feeding to be effectively used. This combination makes for a good supplement when pasture quality and digestibility declines.

Cottonseed is one option for supplementing stock on mature Lovegrass, high in energy and protein but care must be taken to restrict oil intakes as previously discussed. For cattle, intake should be limited to a maximum of 1% bodyweight per day (breeders: 4 kg, weaners: 2 kg). Sheep tend to 'self-limit' and seldom consume more than 500g/h/d on a dry matter basis. Cottonseed can be fed in 'dumps' or through modified, sliding panel feeders that allow stock to access the cottonseed while reducing wastage and spoilage from trampling etc.

Fortified molasses

M8U (molasses plus 8% urea) is a common form of supplementation during the winter period for pregnant heifers and cows. The urea effectively increases protein whilst also regulating intake due to urea's bitterness. Cows will eat between 2-3 kg/day and weaners less than 1 kg/day. Depending on the season, it may be an expensive option. It is important to note that molasses will corrode concrete and galvanised iron tanks and troughs.

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Cereal grains

Cereal grains, while reasonable in terms of protein content, are principally used for improving energy intakes. Unfortunately, due to the inherent risk of acidosis, these grains (if fed) should be fed frequently (daily or every second day) or through self-feeders. 'Lick' feeders are readily available for use within sheep operations to help regulate daily intake and reduce acidosis risk. Such systems are seldom used, or available, for cattle operations and care is essential to prevent engorgement if feeding cereal grain-based diets.

Cereal grains are not the preferred supplement option for cattle when dry paddock feed is available.

Cereal and legume hays

It is generally more profitable to have stock eat as much of the dry standing feed as possible. Hays act as a substitute for paddock feed rather than a supplement, where supplements encourage the use of dry standing feed. Hays can be strategically used in times where stock need a quick boost of energy, for example when a cold front comes through and maintenance energy levels increase.

Intakes on dry standing feed

Sheep and cattle generally consume between 1.5 to 2% of their liveweight daily in a grazing situation. 50kg mature ewes and a 500kg cow can be expected to eat between 0.75 to 1kg and 7.5 to 10kg of feed on a dry matter basis daily **provided** feed quality and digestibility's are "reasonable". As mentioned previously, mature, dominant stands of African Lovegrass provide little energy or protein and are poorly digested.

Sheep and cattle require a minimum of 10% and 20% respectively 'effective' fibre within their diet to ensure rumen efficiency. If we consider mature African Lovegrass as equivalent to low quality hays or straws, sheep and cattle need only consume 75-100g and 750g to 1kg respectively to meet their fibre needs. This is possible provided producers 'feed' the rumen with energy, protein and (some) mineral supplements as discussed earlier.

Summary

Feeding livestock on mature African Lovegrass is critical to maintain production. Care should be taken when assessing options as commodity values change year on year. Consideration should also be given to any additional labour, machinery or potential wastage of each feed option.

References

Supplementation feeding considerations:
https://www.daf.qld.gov.au/business-priorities/agriculture/disaster-recovery/drought/managing-recovery/managing/supplementation-feeding-considerations

We're here to help!

Contact and more information:

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