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A variety of grains (cereal, pulse, oilseed etc) can be used when supplementary feeding or lot feeding sheep and cattle. This Land Fact (Cereal Grains) is one in a series of information sheets that will discuss the advantages, disadvantages, dos and don'ts when considering feeding grain to livestock.



### Cereals, pulses & oilseeds

Cereal grains commonly used when supplementing or lot feeding livestock include barley, corn, oats, triticale and wheat.

Sorghum, millet and rye are less commonly fed as a basal grain but may be used if available and price competitive.

Use and interest in Dry Distiller Grains (DDGs), a by-product of ethanol production, have grown in recent years as these products have become more readily available.

Cereal grains are a concentrated source of energy, with much of that energy stored as starch. They also provide varying levels of oil, protein, vitamins, minerals and fibre.

Pulses and some oilseeds (e.g. lupins and faba beans) are generally higher in protein than cereal grains and are commonly used to increase ration protein content and meet the requirements of different stock classes being fed.

Although similar to cereal grains in terms of energy values, pulses are a safer option in terms of acidosis (grain poisoning) risk but are usually more expensive per unit of available energy.

There may be considerable variation in quality within grain types and also between crops and seasons.

A feed analysis providing energy, protein, dry matter and digestibility values is always recommended prior to undertaking a grain-based feeding program.

### Grain preparation

- There is little advantage in cracking, rolling or flaking grain when feeding to sheep or lambs. Trial work has repeatedly shown that whole grain can:
  - increase grain intake and growth rates,
  - improve feed conversion efficiency, and
  - reduce acidosis risk compared to 'processed' cereal grains.

Flaking or light hammer milling of cereal grains may be necessary when feeding to cattle.

Light processing will improve feed digestibility and feed conversion rates provided they are fed as part of a total mix ration and care is taken to minimise acidosis risk.

There may be advantages with respect to pulse grain uptake and/or acceptance if it is cracked or rolled, through reducing 'sorting' and grain refusal by sheep and lambs.

There are potentially greater benefits when feeding cracked/rolled pulses to cattle than to sheep however the cost of additional processing and the cost/benefit of doing so should be taken into account before undertaking additional processing.

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## Grain poisoning (acidosis)

Grain poisoning or 'acidosis' is a common health risk when feeding cereal grains or high-grain based pellets or rations.

Acidosis is usually caused by the rapid rise of volatile fatty acids (e.g. lactic acid) within the rumen and hind gut following the breakdown of highly fermentable carbohydrates such as starch.

## Grain in the rumen.

The slow introduction of cereal grain(s) to allow the rumen environment to adapt to the increase in acid production; adequate 'effective' fibre (ensuring a stable, active rumen) and additives, should be considered.

Pre-training of young stock prior to weaning may help with future recognition, acceptance and uptake rates of grains, fewer shy feeders and problems associated with acidosis.

Average energy, protein, starch, fibre and oil contents of the common cereal grains are shown in the following table.

Grain	Energy (Mj/kgDM)	Protein (%)	Starch (%)	Fibre (%)	Oil* (%)
Wheat	13.5	13 %	(%)	Oil *	1-2%
Triticale	13.0	13%	(%)	2-3%	2-3%
Maize	13.0	8%	76%	2-3%	2-3%
Sorghum	13.0	12%	70%	3-5%	3-4%
Barley	13.0	12%	61%	5-7%	1-2%
Oats	12.0	10%	42%	12-25%	7-10%

*\*Oil has 2.25 times as much energy as starch, providing additional energy without an increased acidosis risk. Ruminants can handle up to 7-8% oil in a diet but levels beyond this may affect rumen function, the efficiency of digestion and palatability.*

## Wheat and Triticale

- Most dangerous of the cereals due to high starch and low fibre levels. Introduce slowly.
- High gluten levels in wheats may lead to 'pasty' digesta.
- Limit to 40% of ration if possible and ensure adequate fibre.

## Sorghum and Maize

- Lower levels of starch fermentation in rumen but higher fermentation in small intestine (more energy extracted than starch digested in rumen) compared to other cereals.
- Can cause 'hind-gut' acidosis. Introduce slowly.
- Tannins in sorghum seed coat may 'reduce' protein availability and fibre digestion.



## Barley

- Not as dangerous (higher fibre and lower starch) than wheat or triticale.
- Palatable and the highest in Vitamin A and E of the cereal grains.
- Storage (weevils) may be a problem.

## Oats

- Are generally safer due to higher fibre levels and lower starch levels.
- Have good energy levels due to additional energy stored as oil.
- productivity. The use of an effective broad spectrum drench as required, is also recommended.
- Digestibility may be low (particularly Coolabah, Echidna and Mortlock) due to high lignin content in hulls (lignin digestibility <40%)

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## Cereal grain limitations & treatments

- All cereal grains are low in calcium and sodium. These should be corrected by adding fine limestone and fine salt at 1 to 2% on a weight basis for sheep and 1 to 1.5% (limestone) and 0.5% (salt) for cattle.
- Dolomite (limestone containing higher levels of magnesium) or Acid Buf may be used instead of fine lime to provide additional magnesium.
- If the ration's calcium to phosphorus ratio is not 1.5 to 1 or 2 to 1 (recommended level) there is a risk of urinary calculi (bladder stones). Increasing calcium levels should address this deficiency.
- Adding salt (sodium) will help by increasing gut flow due to higher water intakes, reducing stone formation. Acid salts may also be used as a feed additive and/or drench treatment (in early signs of bladder stones).

## General Recommendations

Introduce cereal grains slowly over a 10-14 day period so the rumen becomes accustomed to increasing acid levels.

Provide at least 10% 'effective' fibre in a lamb's diet and 10 to 20% in cattle rations.

- Effective fibre is fibre that physically stimulates (scratches) the rumen, cleaning walls and stimulating digestive juice release.
- This fibre 'forms' a rumen mat onto which starch rich grains initially fall and digestion rates are slowed.
- Below the 'mat' previous feed ingested is slowly mixed and broken down/digested, slowing digestion of high starch grains and maintaining a good rumen bug balance.
- Inadequate fibre will lead to a reduction in rumen motility and possibly rumen stasis and ultimately acidosis.
- Ground or fine fibre found in pellets and most cereal grains is not effective fibre.
- Intact grains or pellets swallowed whole by a lamb may however 'act' as small fibre particles and stimulate rumen walls prior to breakdown during the cud chewing process.



## More Land Facts

For a complete list of Northern Tablelands Local Land Services Land Facts, please visit our website at [www.lls.nsw.gov.au/northerntablelands](http://www.lls.nsw.gov.au/northerntablelands)



## Contact and more information:

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