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Choosing a calcium supplement for sheep fed cereal grains

By Ron Peet, Senior Veterinary Pathologist, and Michael Hare, Technical Officer, Animal Health Laboratories, South Perth

Sheep fed cereal grains as an energy source over summer usually need added calcium because cereal grains are generally low in calcium (for example, 0.03 per cent calcium compared to 0.26 per cent phosphorus), and there may not be a natural source such as clover, weeds, leafy stubble or edible bush in the paddock.

The safest and most effective calcium supplement is finely ground limestone added to the feed, but some farmers have used other sources of calcium such as gypsum and superphosphate in this manner.

Results from Department of Agriculture trials with penned sheep fed oats supplemented with limestone, gypsum or superphosphate for four months have shown that sheep fed oats supplemented with finely ground limestone gained twice the average weight in the same period as sheep fed oats plus only and oats plus superphosphate. Sheep fed oats finely ground limestone grew about a quarter more wool than the other sheep. Sheep fed oats plus gypsum gained about three-quarters of the weight gained by those fed the oats plus limestone supplement.

Symptoms of calcium deficiency

Sheep fed unsupplemented cereal grains for long periods over summer (for example, during drought or in a feedlot) or those grazing eaten-out stubble paddocks can show unusual lameness and fail to grow. Weaner sheep can also develop muscle damage. The rib bones of unsupplemented sheep become soft, and are easily bent and broken by hand. Blood calcium levels may or may not be below normal levels. The sheep may have poor appetites for cereal grain.

Further work at the Department of Agriculture’s Animal Health Laboratories has shown that blood magnesium levels of these sheep are significantly higher than normal, probably because the magnesium is drawn out of the bones along with calcium in these deficient sheep. This high level of magnesium in the blood, together with an analysis of rib bone ash, is a significant and reliable indicator of calcium deficiency in weaner sheep.

The unusual lameness noted by Departmental field officers was also seen in some weaner sheep fed oats only in the laboratory. Post-mortem examinations of these sheep revealed haemorrhages under the bone covering (periosteum) of both fore and hind limbs.

Comparisons of calcium supplements

Gypsum (calcium sulphate) and superphosphate fertilizer, which is derived by treating phosphate rock with sulphuric acid, have been used by some farmers as calcium supplements for sheep fed cereal grain.

To our knowledge, these substances had not been tested previously as supplements under laboratory conditions, so an experiment was designed to compare them against finely ground limestone. CSBP and Farmers Ltd supplied the superphosphate and gypsum. Their gypsum is a by-product of fertilizer production and has a slightly different chemical composition from naturally occurring gypsum, which can vary in its chemical composition. Cable Minerals supplied the finely ground limestone.

Sheep can suffer superphosphate poisoning if they inadvertently eat mouthfuls of fertilizer spread on to paddocks. If enough superphosphate is eaten, the kidneys can be severely damaged, probably because of the high phos-
phosphate and fluoride levels. Hungry sheep forced to graze short pastures top-dressed with superphosphate before it rained can suffer such poisoning. The effect of superphosphate when used at the 2 per cent level as a cereal grain supplement is not known.

Superphosphate is also suspected of being a source of cadmium which is a potentially toxic heavy metal. Cadmium may also be present in manufactured gypsum.

Testing the supplements

Four groups of six similar Merino weaner wether sheep from the same research station were placed in individual pens. Over a three-week period their diet was changed from a balanced chaff diet to one of 0.8 kg oats per head per day. Group 1 was fed oats only, group 2 oats plus finely ground limestone, group 3 oats plus gypsum and group 4 oats plus superphosphate. All supplements were fed at the 2 per cent level. The animals had been previously drenched for worms, given cobalt and selenium bullets and supplemented with vitamins A, D and E.

After four months sheep fed oats supplemented with finely ground limestone gained, on average, twice as much weight as sheep fed oats only and sheep fed oats plus superphosphate. The limestone-supplemented sheep also gained one-third more weight than the sheep fed the oats plus gypsum-supplement (Table 1).

Wool growth rates were measured over the same period. Sheep fed the oats plus limestone supplement grew significantly more wool than sheep fed oats plus gypsum, which in turn grew more wool than those fed oats only and oats plus superphosphate (Table 1).

Recommendations

Finely ground limestone is the best of the calcium supplements tested to feed to sheep. It is safe, and even when fed at the 30 per cent level used as an appetite limiter in self-feeders by some farmers, it has produced no ill-effects providing the cereal grain contains at least 0.26 per cent phosphorus.

Ill health caused by feeding high levels of calcium has only been reported when the feed contained less than 0.08 per cent phosphorus. Most cereals grains in Western Australia would contain more than this amount of phosphorus.

Calcium supplements may also help prevent oxalate poisoning from summer weeds such as ice plant (*Mesembryanthemum nodiflorum*) by precipitating insoluble calcium oxalate in the rumen of sheep.

Calcium and salt have been shown to have a protective effect against phosphate and silica calculi seen in sheep grazing dry pasture and in feed lots.

These may be mixed together in a 'lick' form, for example 90 per cent limestone and 10 per cent salt, but this is not as effective as adding calcium directly to the grain. The calcium supplement in the high phosphate cereal grain prevents formation of phosphate calculi in the kidneys, and the salt increases the animal's water intake to help flush silica calculi through the urinary system.

**Table 1. Average increases in sheep bodyweights and wool growth of sheep fed oats with various calcium supplements**

<table>
<thead>
<tr>
<th>Group weight</th>
<th>Treatment</th>
<th>Average bodyweight gain (kg)</th>
<th>Average wool growth (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>oats only</td>
<td>6.6</td>
<td>1.97</td>
</tr>
<tr>
<td>2</td>
<td>oats plus finely ground limestone</td>
<td>13.6</td>
<td>2.22</td>
</tr>
<tr>
<td>3</td>
<td>oats plus gypsum</td>
<td>9.7</td>
<td>2.02</td>
</tr>
<tr>
<td>4</td>
<td>oats plus superphosphate</td>
<td>6.2</td>
<td>1.89</td>
</tr>
</tbody>
</table>

Finely ground limestone coats oat grains like talcum powder.