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PHALARIS STAGGERS—PREVENTION BY COBALT BULLETS

By B. J. GORDDARD, P. P. MANN and A. J. HADLOW

During 1965, heavy losses occurred in weaner sheep grazing a Phalaris tuberosa pasture at Woogenellup, 20 miles east of Mt. Barker. Similar sheep which had been treated with cobalt bullets were completely protected against the effects of Phalaris.

FARMERS in the south west of Western Australia are familiar with the use of cobalt for the prevention of ill-thrift and deaths due to cobalt deficiency in sheep and cattle. Less common is the use of cobalt for the prevention of chronic phalaris poisoning, known as phalaris staggers. This condition is well known in eastern Australia, but only isolated cases have been recorded in W.A. no doubt due to the relatively small area sown to phalaris in this state.

What is phalaris staggers?

Phalaris tuberosa is a perennial grass with many valuable properties as a pasture species. Under certain conditions however, sheep and cattle grazing on phalaris develop a disorder of the central nervous system known as “phalaris staggers.” The development of staggers is normally associated with a high intake of green phalaris, such as occurs following the first autumn rains when the pasture contains a high percentage of young, green phalaris.

Phalaris is toxic throughout the growing season, although when the other pasture species are actively growing the percentage of phalaris in the pasture is decreased and the toxicity of the pasture is reduced. Dry phalaris appears to be quite safe.

Both sheep and cattle are affected; young stock are the most susceptible, but the disease has been recorded in sheep of all ages.

Phalaris staggers is of particular concern because once symptoms has appeared, the damage to the brain and central nervous system is permanent and irreversible. Affected animals can survive for long periods if left undisturbed, but any stress such as yarding or handling will bring on recurrent attacks which are eventually fatal. However, animals can be grazed on phalaris for a short period without permanent effects, the duration of safe grazing varying from a few days to the more usual three or four weeks. If the animals are removed before symptoms appear there should be no permanent damage.

The experiment

During the spring of 1965, a trial was commenced at Woogenellup to investigate the nutrition of weaner sheep, and to compare animal performance on annual and perennial pastures.

The annual pasture was composed of subterranean clover and volunteer grasses, mainly barley grass. The perennial pasture was a mixed sward of Phalaris tuberosa, subterranean clover, some strawberry clover, and volunteer annual grasses.

Each pasture type was stocked with 128 Merino weaners at a grazing intensity of 4.6 weaners per acre.

At the beginning of the trial in December, 1965, 64 weaners on each...
pasture were given cobalt bullets and grinders.

**Annual Pasture**

With Cobalt = 64 sheep  
Without Cobalt = 64 sheep  
Total = 128 sheep

**Phalaris Pasture**

With Cobalt = 64 sheep  
Without Cobalt = 64 sheep  
Total = 128 sheep

**Seasonal conditions**

The 1966 season opened with good rains in early April, resulting in an even germination of clover, although at first the phalaris was slow to respond. Follow-up rains were poor and clover growth was limited, as usually happens under these conditions. The result was a dominant stand of young, green phalaris by the end of April.

The sheep were observed closely during this period, and apparently did not begin eating phalaris until early in May. From then on their body weights increased, and the first signs of phalaris staggers appeared three weeks later, on May 30.

Experience throughout Australia has shown that outbreaks of staggers usually occur in seasons when the opening rains are too light to promote vigorous early pasture growth. The pasture becomes phalaris dominant and animals grazing such a pasture are prone to phalaris poisoning.

**Symptoms of phalaris staggers**

While the sheep on the phalaris pasture were being yarded for weighing, a number collapsed and had difficulty regaining their feet. If left undisturbed for a few minutes these animals would get up and move off with an inco-ordinated, "proppy" gait, only to collapse again after covering a few yards. Affected animals were obviously excited and showed muscular tremors, head shaking and a lack of coordination in the movement of their legs. Most cases also developed an easily-detected pounding heart beat, particularly after collapsing.

The severity of symptoms varied between sheep, some collapsing after only a few paces, whereas others could run for a considerable distance before signs of uncoordinated gait or collapse appeared.

Other symptoms noted during the progress of the disease included damage to the mouth and lower jaw caused by the animal falling heavily while running, and a tendency for chronically-affected animals to lose partial use of their front legs and to graze in a kneeling position. Terminal cases were unable to rise, normally lying on their sides with progressively weaker thrashing of the legs, and a tendency to convulsive efforts when disturbed.

**Prevention by cobalt bullets**

The outbreak of phalaris staggers was confined to those sheep which were not previously treated with cobalt bullets; no treated animals were affected. Cobalt bullets had given complete protection to sheep grazing this potent phalaris-dominant pasture.

The fact that no cobalt-treated sheep were affected indicates that the acute forms of phalaris poisoning were not involved in this outbreak. Cobalt does not protect sheep against acute phalaris poisoning, which has not been recorded in Western Australia to date.

**Losses due to phalaris staggers**

Once the outbreak of staggers appeared, all sheep on the phalaris pasture were immediately given cobalt bullets, and in addition sheep showing symptoms of staggers were drenched with cobalt sulphate solution.

In spite of this, during the next month, six affected sheep died from the effects of phalaris staggers, and losses in the original "no cobalt" sheep continued until all animals were replaced in October. A total of 20 sheep from the original "no cobalt" group of 64 died, or were killed "in extremis" as a result of phalaris staggers. This represents a loss of 31 per cent.

**Prevention of phalaris staggers by cobalt bullets**

<table>
<thead>
<tr>
<th></th>
<th>With Cobalt Bullets</th>
<th>Without Cobalt Bullets</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of sheep</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Deaths due to phalaris staggers</td>
<td>N11</td>
<td>20</td>
</tr>
<tr>
<td>No. of sheep surviving</td>
<td>64</td>
<td>44</td>
</tr>
<tr>
<td>% Loss due to staggers</td>
<td>—</td>
<td>31%</td>
</tr>
</tbody>
</table>

\[ P = 0.001 ** \]
Permanent effect of phalaris staggers

Once the symptoms of phalaris staggers have appeared the damage to the animals' nervous system is permanent and irreversible, and cobalt therapy at this stage is ineffective. In an attempt to minimise losses, 10 affected sheep were treated with cobalt and removed from the phalaris pasture for a period of four weeks. During this time three died from the effects of phalaris, but the remainder improved and their symptoms became progressively less obvious.

These sheep were then replaced on the phalaris, where they died intermittently from July till October. The two apparent recoveries could die in future from recurring attacks of staggers precipitated by stress, such as driving or shearing.

The sequence of events observed confirm that once a toxic phalaris pasture has been grazed, giving rise to symptoms of staggers, then cobalt treatment is not effective in preventing further losses nor in curing affected animals.

Methods of supplying cobalt

Since animals grazing phalaris pastures need an adequate supply of cobalt to prevent the possibility of poisoning, the preventative measures taken should aim at providing a steady supply of cobalt throughout the growing season. In addition, considerable areas of the South West are marginally deficient in cobalt, and need cobalt to prevent wasting disease of ill-thrift.

Cobalt bullets

The administration of cobalt bullets is the most satisfactory method of preventing phalaris staggers. If good phalaris pastures become phalaris-dominant in autumn, a cobalt bullet given to each sheep will prevent staggers.

On coastal sands or other calcareous soils a "grinder" is also needed to remove coatings which develop on the bullets. In Western Australia, coatings occur only where sheep are grazing on these soils, or in unweaned lambs.

Drenching with cobalt sulphate or chloride

Cobalt drenching is an effective and positive method of supplying cobalt at the correct dose rate. However, to be fully effective in the prevention of phalaris staggers, drenching must be done weekly because animals are unable to store cobalt for any length of time. Weekly drenching with 10 to 15 ccs of a solution of one ounce of cobalt sulphate dissolved in one gallon of water should provide complete protection against phalaris staggers.

This method has restricted application due to the large amount of time and labour involved.

Topdressing

Cobalt sulphate topdressed onto phalaris pasture can increase the cobalt content of the pasture and prevent phalaris staggers. Experience in South Australia has shown that 4 ounces per acre of cobalt sulphate topdressed in autumn will prevent staggers in that year only.

This treatment must be repeated each autumn since the residual value of cobalt in the soil decreases rapidly during the year.

Other methods

Techniques for supplying cobalt such as through licks, water supplies or in fodder supplements are not recommended for the prevention of phalaris staggers.

Phalaris staggers and cobalt—responsive ill-thrift

The mechanism by which cobalt prevents phalaris staggers is unknown, although cobalt is probably involved in the detoxification of the alkaloids present in phalaris through the action of micro-organisms in the rumen. The normal function of cobalt is concerned with vitamin B12 production and a deficiency of cobalt in the diet results in animal ill-thrift.

However, it has been shown that vitamin B12 is not involved in the detoxification of the toxic principle in phalaris, so that animals can be affected by phalaris while their vitamin B12 levels are quite normal.

In the trial at Woogenellup there was no indication of cobalt deficiency in the animals grazing either pasture type, either in terms of live weight response or serum vitamin B12 levels which were found to normal.
Conclusion
Phalaris is a valuable pasture grass in many higher rainfall areas of Australia, but as yet the acreage shown in W.A. is negligible.

The value of phalaris lies in its ability to persist under heavy grazing and, being perennial, to respond reliably to autumn rains when annual pastures are at their worst.

Phalaris staggers does not occur universally on phalaris pastures, and in fact the greater part of Australian phalaris pastures have never caused losses through staggers.

In areas where staggers does occur, the problem can be overcome with appropriate cobalt supplements, and the risk of phalaris staggers should not deter farmers from planting this potentially valuable grass.

ACKNOWLEDGMENTS
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