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The incidence of Lupinosis in sheep grazing Phomopsis-resistant lupin stubbles

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Lupinosis is one of the major diseases of grazing livestock in Western Australia. It occurs when animals graze lupin stubble containing toxins produced by the fungus Phomopsis leptostromiformis.

The Department of Agriculture has recently released new cultivars of Lupinus angustifolius which are more resistant to colonization by Phomopsis, and therefore develop less toxicity, than those previously available (Cowling et al. 1988).

The new cultivars - Gungurru and Yorrel - are called Phomopsis-resistant, however their resistance is only moderate. The old cultivars are referred to as Phomopsis-susceptible.

Trials and farm surveys

In trials conducted by the Department over the past four years, sheep grazing Gungurru stubble took longer to develop lupinosis than sheep grazing Phomopsis-susceptible Yandee lupins (Allen et al. 1989). Fewer sheep were affected and the lupinosis was less severe. These results showed that stubbles of the Phomopsis-resistant lupins provided a significantly reduced risk of lupinosis when compared with those of the Phomopsis-susceptible lupins, however the risk was not eliminated.

Gungurru and Yorrel were first released in 1988 to seed growers for bulking-up and then released to commercial growers in 1989. The summer and autumn of 1988-89 was the first opportunity for widespread grazing of sheep on stubbles of Phomopsis-resistant lupins.

To compare the ‘on-farm’ situation with the results of the grazing trials, we surveyed 100 seed growers to determine the incidence of lupinosis in their sheep when they were grazed on Phomopsis-resistant lupin stubbles. Where the same farmers also grazed sheep on Phomopsis-susceptible lupin stubbles, we collected information on lupinosis in these sheep.

Incidence of lupinosis

On the 100 farms in the survey, Phomopsis-resistant lupins were grown in 143 paddocks, of which 124 were sown to Gungurru and 19 to Yorrel. Eight farmers reported that sheep had died from lupinosis while grazing the lupin stubbles in these paddocks. However two of these reports were of flocks grazing in paddocks where both resistant and susceptible lupins had been sown.

All of the cases of suspected lupinosis were on Gungurru stubbles, however the small number of Yorrel growers precluded us from testing for real differences in the attack rates between the two cultivars. Eight-five of the farms surveyed also grazed sheep on Phomopsis-susceptible lupin stubbles.

Sheep deaths from lupinosis were reported in 8 per cent of flocks which were grazed on Phomopsis-resistant lupins. On the same properties, sheep died from lupinosis in 57 per cent of the flocks grazed on Phomopsis-susceptible lupin stubbles (Table 1).

On the farms surveyed, sheep grazing on Gungurru and Yorrel had 26 times less risk of dying from lupinosis than those grazed on the susceptible varieties. Furthermore, in affected mobs an average of 60 sheep per flock died.
Table 1. The number of sheep flocks affected by and deaths attributed to lupinosis when grazing Phomopsis-resistant or Phomopsis-susceptible lupin stubbles during the summer and autumn of 1988-89

<table>
<thead>
<tr>
<th>Type of lupin stubble</th>
<th>Flocks affected by lupinosis</th>
<th>Total flocks grazing stubbles</th>
<th>Sheep deaths attributed to lupinosis</th>
<th>Total sheep grazing stubbles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phomopsis-resistant</td>
<td>6</td>
<td>73</td>
<td>114</td>
<td>72,364</td>
</tr>
<tr>
<td>Both Phomopsis-resistant and susceptible</td>
<td>2</td>
<td>27</td>
<td>3</td>
<td>1,450</td>
</tr>
<tr>
<td>Phomopsis-susceptible</td>
<td>48</td>
<td>85</td>
<td>2,857</td>
<td>68,704</td>
</tr>
</tbody>
</table>

References

from lupinosis when grazing the Phomopsis-susceptible stubbles, and 19 sheep per flock died when on the resistant stubbles.

Specific details of some of the reports of lupinosis on Gungurru
On two farms, both Gungurru and a Phomopsis-susceptible lupin were sown in the same paddock. Sheep might have developed lupinosis from grazing the Phomopsis-susceptible lupin stubbles, particularly as on one of the farms another mob of sheep which only had access to Gungurru stubbles did not develop lupinosis.

On a third farm the sheep grazed Danja, a Phomopsis-susceptible lupin, for four weeks before being moved onto the Gungurru stubble. These sheep might have suffered as a result of this earlier exposure to the toxins.

In two flocks in which only a few sheep died, the sheep continued to graze the same Gungurru stubbles for at least another six weeks after the last death without further loss.

In one flock of 1,000 sheep, 330 sheep showed symptoms and 70 had died from suspected lupinosis. These sheep had only been on this Gungurru stubble for five days before the farmer recognized there was a problem. The situation on this farm was in marked contrast with the outcome of grazing on three other farms in the same district where sheep safely grazed Gungurru stubbles for periods of up to 16 weeks without showing signs of lupinosis.

Of the eight outbreaks of lupinosis in sheep grazing on Gungurru stubble, lupinosis was first recognized in December and January in two flocks, February and March in four flocks and April and May in two flocks. This suggests that if the stubbles are grazed before February fewer flocks will be affected by lupinosis.

Although we have no direct evidence to suggest that toxic stubble trash from lupin crops grown in previous years was responsible for the lupinosis reported in any of these flocks, this possibility does exist. We have seen lupinosis in sheep grazing Gungurru stubbles which were sown over two-year-old stubbles of Phomopsis-susceptible lupins. The Gungurru stems contained little toxin, while the stem fragments of the old stubbles were highly toxic.

Length of grazing
Sheep grazed the Phomopsis-resistant lupins for an average of 11.5 weeks at an average stocking density of 6.2 sheep/ha. This is about 500 sheep grazing days per hectare. Although some farmers were concerned that they were overgrazing the stubbles and causing a wind erosion hazard, in many cases seed was still present on the ground in late autumn and the sheep could have been grazed at higher stocking rates earlier in summer.

Summary
The results of this survey are similar to those obtained in our grazing trials over the past four years. Farmers can be confident that by sowing Gungurru or Yorrel rather than the old Phomopsis-susceptible lupin cultivars, they will significantly reduce the risk of lupinosis in their sheep when they graze the stubbles.

However, the Phomopsis-resistant cultivars will not prevent the occurrence of lupinosis. Farmers must continue to carefully monitor sheep grazing lupin stubbles and remove them at the first sign of illness. They should also be aware that the old stubbles of Phomopsis-susceptible lupins can be toxic in subsequent pastures or crop stubbles.

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