Pasture legume varieties and ewe fertility

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PASTURE LEGUME VARIETIES AND EWE FERTILITY

ALTHOUGH it was first thought that all varieties of subterranean clover would cause ewe infertility, research in the last 10 to 15 years has shown that varieties differ in potency. The relative level of potency has also been shown to remain consistent for any one variety under normal conditions.

Clover disease of sheep has been known in Western Australia for over thirty years. Early workers suggested that, of the three common oestrogenic compounds isolated from sub clover, genistein and biochanin A were the major oestrogens causing clover disease. More recent research, however, has shown that the third oestrogenic compound, formononetin, is the major active oestrogen in sub clover and that genistein and biochanin A are rapidly neutralised in the rumen to non-potent compounds.

Experiments comparing the effects of 15 legume varieties on ewe fertility have consistently shown that certain varieties reduce ewe fertility. The varieties implicated in this reduction include Dwalganup, Geraldton, Yarloop and Dinninup, all of which contain relatively high concentrations of the oestrogenic substance formononetin.

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The varieties studied

The varieties studied in these experiments are listed in their approximate order of maturity in Table 1.

Environments

The experiments were conducted at Badgingarra, Bakers Hill and Esperance—three widely different areas with different environments. Two experiments, one at Badgingarra and one at Esperance, were sown on land that had been cleared for some years and which had grown either mixed pastures and/or cereal crops. The resultant experimental pastures on these sites contained grasses and other weeds. The remaining three experiments, at Badgingarra, Bakers Hill and Esperance, were sown on new land and the pastures were highly clover dominant.

Fertiliser rates at all sites were those normally recommended for pasture growth.

General management

The ewes continuously ran on the trial plots at Bakers Hill and Esperance, but at Badgingarra they spent their summer on stubbles. However, as clovers are only oestrogenic while green, this slight difference in management is unlikely to have had any bearing on the results.

In all experiments the ewes were stocked at moderate to high rates for the particular environment.
Ewe and lamb deaths due to difficult births (dystokia), prolapse of the uterus and other causes are common in clover disease affected flocks.

The ewes were mated for a late winter-spring lambing with 2½ to 4 per cent. rams. As differences in bodyweight at mating are known to influence fertility,* bodyweights at mating within each experiment were equalised as far as possible, either by feeding supplements or stubble. Lambing records were obtained from each experiment.

Results and discussion

Reduced ewe fertility occurred on four of the varieties tested (Table 1).

Table 1.—Summary of effect of legume variety on ewe fertility.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Average formononetin (% dry matter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subterranean clovers</td>
<td></td>
</tr>
<tr>
<td>Northam A</td>
<td>1.22</td>
</tr>
<tr>
<td>Blackwood</td>
<td>1.15</td>
</tr>
<tr>
<td>Uniwager</td>
<td>1.04</td>
</tr>
<tr>
<td>Daliak</td>
<td>0.96</td>
</tr>
<tr>
<td>Seaton Park</td>
<td>0.19</td>
</tr>
<tr>
<td>northam A</td>
<td>0.15</td>
</tr>
<tr>
<td>Blackwood</td>
<td>0.13</td>
</tr>
<tr>
<td>Seaton Park</td>
<td>0.08</td>
</tr>
<tr>
<td>Northam A</td>
<td>0.07</td>
</tr>
<tr>
<td>Uniwager</td>
<td>0.07</td>
</tr>
<tr>
<td>Mt. Barker</td>
<td>0.06</td>
</tr>
<tr>
<td>Bacchus Marsh</td>
<td>0.04</td>
</tr>
<tr>
<td>Kondinin Rose</td>
<td>0.01</td>
</tr>
<tr>
<td>Serradella</td>
<td>0.00</td>
</tr>
<tr>
<td>Lucerne</td>
<td>0.00</td>
</tr>
</tbody>
</table>

These four varieties all contain high levels of formononetin while those varieties that showed no effect on ewe fertility are low in formononetin. Average formononetin levels from all experiments are shown in Table 2. This supports the results of earlier laboratory and field work which pointed to formononetin as the major active oestrogen in subterranean clover.

Table 2.—Average formononetin contents of varieties in all experiments.

Figure 1.—Three years’ lambing results from one experiment at Esperance

3rd Year of grazing (1st Lambing) 4th Year of grazing (2nd Lambing) 5th Year of grazing (3rd Lambing)

% Ewes lambing

Yarloop 100% 100% 12%
Geraldton 92% 90% 21%
Dallak 83% 87% 7%
Seaton Park 87% 82% 5%
Uniwager 100% 100% 100%
Kondinin Rose 97% 97% 97%

trials. The major reasons for these variations appear to be—
(a) differences in pasture composition;
(b) differences in the time the ewes grazed the pastures.

As a general rule the older a pasture was then the more non-oestrogenic species (grasses, weeds, etc.) there were in it. The results suggested that the effect on fertility depended on the percentage of potent clover in the pasture.

On the other hand, fertility was further reduced by each additional year spent grazing a potent strain. This point is illustrated in Figure 1 which details three years’ results from one experiment at Esperance.

Several mummified lambs and prolapses of the uterus were recorded in a number of ewes grazing the high formononetin strains but not on the low formononetin strains.

Ewe and lamb death rates did not vary appreciably between varieties.

Recommendations

The results obtained show that varieties high in formononetin should be avoided where suitable alternative low or non-oestrogenic varieties are available.

If high formononetin varieties have already been sown then the potency of these could be reduced when the opportunity occurs by introducing low or non-oestrogenic species into the pasture or by allowing pastures to become dominated by other herbs and grasses.

As the effect of oestrogens increases with time, young ewes should not be grazed on high formononetin varieties.