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B.J. Quinlivan

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PASTURE SEED PRODUCTION IN WESTERN AUSTRALIA

By B. J. QUINLIVAN, Adviser, Seed Certification and Weed Control Branch

Pasture seed production in Western Australia is an industry with a somewhat turbulent past. Booms and slumps have been the rule rather than the exception. However, during the past few years there has been some degree of "stability"—if not in price, at least in terms of total production.

PASTURE seed production in Western Australia began in a small way with subterranean clover in the early 1930's. The seeds were not threshed from the pods; the burrs were merely raked, put into sacks and sold.

The group settlement scheme in the lower south west caused an expansion of production in the 1920's and the first graded seed appeared in quantity in the 1930's. Expansion then continued steadily up to the late 1950's when some 2,500 tons of subterranean clover seed and smaller quantities of lupins and ryegrass were harvested each year.

The 1960's have seen the most dramatic changes in the pasture seed industry. Overall, production has trebled and there has been a wide diversity of species and varieties.

Current position
The production of subterranean clover seed still dominates the West Australian pasture seed industry and accounts for some three quarters of the total production. Other species of importance are barrel medic, rose and cupped clovers, serradella and lupins. Table 1 indicates production details for each species in the 1967-68 season, although, in this season, overall production was 10 to 20 per cent. less than in each of the previous two years.

The southern agricultural and south coastal regions are responsible for some two thirds of the subterranean clover seed harvest but most of the medic, lupin and rose clover seed comes from the drier, more inland cereal and sheep districts.

Production techniques
In a short article it is impossible to give much detail on production techniques for species as diverse as subterranean clover, cocksfoot, lupins and serradella. However, techniques for subterranean clover seed production are applicable in part to other annual legumes such as barrel medic and rose clover.

The statistical divisions of the agricultural regions of Western Australia (see Table 1)
Table 1.—Pasture seed production Western Australia 1967/68 (tons)

Production is shown for all species on a regional basis. The approximate regional boundaries are shown on the map.

<table>
<thead>
<tr>
<th></th>
<th>South-West</th>
<th>South Coastal</th>
<th>Southern Agricultural</th>
<th>Central Agricultural</th>
<th>Northern Agricultural</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clovers—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subterranean</td>
<td>463</td>
<td>2,750</td>
<td>1,842</td>
<td>1,290</td>
<td>771</td>
<td>7,116</td>
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<tr>
<td>rose</td>
<td>1</td>
<td>2</td>
<td>239</td>
<td>54</td>
<td>107</td>
<td>403</td>
</tr>
<tr>
<td>cupped</td>
<td>...</td>
<td>4</td>
<td>67</td>
<td>3</td>
<td>49</td>
<td>123</td>
</tr>
<tr>
<td>strawberry</td>
<td>19</td>
<td></td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>19</td>
</tr>
<tr>
<td>Medics—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>barrel</td>
<td>1</td>
<td>75</td>
<td>5</td>
<td>370</td>
<td>81</td>
<td>532</td>
</tr>
<tr>
<td>strand (harbinger)</td>
<td>...</td>
<td>...</td>
<td>9</td>
<td>5</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>Other legumes—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lupins</td>
<td>186</td>
<td>1</td>
<td>65</td>
<td>12</td>
<td>102</td>
<td>366</td>
</tr>
<tr>
<td>serradella</td>
<td>1</td>
<td>69</td>
<td></td>
<td>...</td>
<td>79</td>
<td>149</td>
</tr>
<tr>
<td>Grosses—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cocksfoot</td>
<td>...</td>
<td>4</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>4</td>
</tr>
<tr>
<td>ryegrass</td>
<td>1</td>
<td>...</td>
<td>63</td>
<td>64</td>
<td>1</td>
<td>129</td>
</tr>
<tr>
<td>puccinellia</td>
<td>...</td>
<td>...</td>
<td>12</td>
<td>...</td>
<td>...</td>
<td>12</td>
</tr>
<tr>
<td>paspalum</td>
<td>3</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>3</td>
</tr>
<tr>
<td>veldt</td>
<td>...</td>
<td>...</td>
<td>5</td>
<td>...</td>
<td>...</td>
<td>5</td>
</tr>
</tbody>
</table>

Growing season

Some six to eight weeks elapse from the time subterranean clover commences to flower in the spring to the completion of burr development. During this period, adequate soil moisture is essential if maximum seed setting is to take place. Hence, for consistently satisfactory seed production, it is normally necessary to grow a strain in an environment with a growing season a few weeks longer than that required for normal pasture growth.

Soil type

Subterranean clover will grow well as a pasture on most of the acid sandy, gravelly or loamy soils of the agricultural districts. Satisfactory seed crops are obtained off a wide variety of soil types but the best seed setting occurs on sandy surfaced soils with a gravel or clay profile close to the surface. Deeper sands dry out quickly in the spring and are not always suitable for seed production.
Land preparation

Subterranean clover forms its seed at or close to the soil surface. The seed is then harvested mainly with air draught machines which need relatively even surfaces free of large sticks and roots to operate effectively. It is thus necessary to pay particular attention to clearing and levelling if a new paddock is to be used for seed production in the first year.

Seed and fertiliser rate

Most subterranean clover seed production is based initially on new land sowings. However, for a satisfactory seed crop on new land, fertiliser and seed rates need to be higher than those required for pasture establishment.

Superphosphate should be applied at rates in the vicinity of 350 lb. per acre. Trace element deficiencies as outlined in the November, 1968, Journal of Agriculture*, must also be corrected. Seeding rates of 12 to 15 lb. per acre should be used but, if seed is scarce or expensive or both, the seeding rate can be lowered and the fertiliser rate increased.

Time of sowing

The establishment and nodulation of newly sown subterranean clover pastures is more successful if sowing is done during autumn when soil and air temperatures are relatively high. The flowering date in spring is also controlled to some extent by the time of germination and an early germination frequently results in an early flowering. This then allows seed development to take place while soil moisture is adequate. Hence early sowing is desirable for seed production and, on new land should be carried out immediately after the break of the season.

Harvesting and grading

There is no standard preparatory technique for handling subterranean clover pastures before harvesting their seed. The methods used to remove straw and trash, and to bring burrs to the surface, are largely determined by the variety involved and the position of the burrs relative to the soil surface. Burning to remove surface straw is possible in some instances where the burrs are buried but, if they are on or above the soil surface, burning will normally kill a large proportion of the seeds. When burrs are on the surface the straw should be raked off or broken up by cultivation and harrowing. Harvesting can commence after cultivation and harrowing to bring the burrs to the surface.

Throughout harvesting and the subsequent grading process particular care should be taken to adjust the machines to ensure that the seed is not excessively cracked or chipped. However, scarification must be sufficient to overcome hardseededness and give a satisfactory germination.

* "Copper, Zinc and Molybdenum Fertilisers for New Land Crops and Pastures—1969". Also available as Bulletin 3614

![Harvesting subterranean clover seed at Boyup Brook. Prior to this operation the burrs are brought to the surface by cultivation and harrowing.](image-url)
Other species
For other species of annual legumes—barrel and harbinger medics, rose and cupped clovers, and serradella—production techniques similar to those outlined for subterranean clover are applicable. On new land the same fertiliser rate should be used. Where air draught machines are to be used for harvesting, land preparation should be given careful attention.

Seed rates should be adjusted for each species in accordance with the size of the seed and its expected germination. For medics and the rose and cupped clovers, seeding rates of 6 to 10 lb. per acre appear necessary for high seed yields in the first year. The seeding rate of serradella should be 7 to 10 lb. per acre for new land crops, or 4 to 5 lb. per acre following lupins. Further details on serradella establishment are contained in Department of Agriculture Bulletin No. 3507.

The marketing of pasture seeds
Western Australia imports small quantities of some pasture seeds but overall is a net exporter. Some 20 per cent. of the total seed crop harvested each year is sold in other States or overseas, the remainder is sold within this State. Table 2 summarises production statistics for the major Australian States.

Eighty per cent. of the seed produced in this State is subsequently planted by West Australian farmers. It is the factors affecting this local outlet which are of prime importance to the seed producer. New land, mainly in the medium rainfall districts, is being currently cleared at a rate of about a million acres per year. As nearly all this land is immediately sown to pasture it represents a sizeable outlet for seed. In addition some millions of acres of cleared land, mainly in the lighter rainfall districts, have never been sown to pasture. This unimproved pasture area represents an enormous market potential, provided suitable pasture species are available and farmers can be convinced of their value. Past experience has shown that a realisation of this potential is not likely to occur suddenly as it will be controlled, not only by farmer acceptance, but also by purchasing power. Seasonal conditions and ruling wheat and wool prices are important factors in determining finance available for purchasing pasture seed.

Up to the present the production of pasture seeds in Western Australia has not been subject to any regulation or control—the standard laws of supply and demand have been the main operative factors. At times this situation has led to wide price fluctuations within relatively short periods. Frequently, sound judgement in selling seed has been as important to the successful producer as his actual efficiency of production. However, moves are now afoot to regulate, in some form, the marketing of pasture seed.

<table>
<thead>
<tr>
<th>Type of Pasture</th>
<th>N.S.W.</th>
<th>Vic.</th>
<th>Qld.</th>
<th>S.A.</th>
<th>W.A.</th>
<th>Tas.</th>
</tr>
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<tbody>
<tr>
<td>Barrel medic</td>
<td>20</td>
<td></td>
<td></td>
<td>258</td>
<td>1,082</td>
<td></td>
</tr>
<tr>
<td>Clover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subterranean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strawberry</td>
<td>3,226</td>
<td>274</td>
<td></td>
<td>378</td>
<td>8,777</td>
<td></td>
</tr>
<tr>
<td>white</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td>107</td>
<td>22</td>
</tr>
<tr>
<td>Other legumes (rose, cupped clover, serradella, etc.)</td>
<td>2</td>
<td>128</td>
<td></td>
<td>20</td>
<td>551</td>
<td>16</td>
</tr>
<tr>
<td>Lucerne</td>
<td>509</td>
<td>N.A.</td>
<td>20</td>
<td>2,263</td>
<td>3</td>
<td></td>
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<tr>
<td>Lupins</td>
<td>422</td>
<td>685</td>
<td>122</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phalaris tuberosa</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhodes grass</td>
<td>281</td>
<td>1,614</td>
<td></td>
<td>21</td>
<td>137</td>
<td>524</td>
</tr>
<tr>
<td>Ryegrass</td>
<td>5</td>
<td></td>
<td>624</td>
<td>236</td>
<td>171</td>
<td>42</td>
</tr>
<tr>
<td>Sudan grass</td>
<td>255</td>
<td>87</td>
<td>827</td>
<td></td>
<td>11,001</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>4,720</td>
<td>2,808</td>
<td>1,503</td>
<td>3,385</td>
<td></td>
<td>594</td>
</tr>
</tbody>
</table>

Table 2.—Australian Pasture seed production 1966/67 (tons)
Profitable Calf Rearing with Denkavit

The introduction of Denkavit Calf Milk to Australia and New Zealand some 7 years ago has revolutionised calf rearing. The use of Denkavit has made it possible for almost anyone to rear numbers of calves artificially with a minimum of losses.

Denkavit have pioneered this revolution in calf rearing and over the past 10 years have reared a great number of calves—far more than any other commercial or Government enterprise.

It is because of this experience that we are able to advise with some authority that the simplest and most economical way to rear calves is with Denkavit, hay and pasture.

On the Denkavit Demonstration Farm, we rear calves commercially, using methods and facilities which we have found can be easily followed and adapted to suit varying conditions.

The disused cow barn makes a wonderful calf house at Menzies Creek, but a hay barn or wool shed is almost as good. Housing for the first three weeks is NOT essential, but it makes the job much simpler for the operator.

Feeding

Good pastures is the key to economical rearing. We feed as little Denkavit as possible and much grass as possible. We rear calves at three weeks (depending on the state of the pasture) and can rear a Jersey calf on a bag of Denkavit and a Friesian on a bag and a half. There is no feed as cheap as good pasture and pastures is the key to economical rearing.

For the first three weeks is not essential, but it makes it easier for the operator and it is much simpler for the operator.

Rearing large numbers of calves is easy with Denkavit and the Calfeteria Major. Illustrated above are three Calfeteria Majors each with teats for 30 calves. A disused concrete courtyard above are three Calfeteria Majors each with teats for 30 calves. A disused concrete courtyard

Feeding is merely a matter of opening the gate at the first batch, then fill up the Calfeterias with a hose from the mixer and let in the calves.

At the time of writing we would have about 500 bull and heifer calves under 5 months of age and these have been reared with a minimum of losses.

SYSTEM

Our method is very simple and one man can rear several hundred calves with a little planning beforehand.

Calves bred are kept a couple of days on cows and calves brought in get a dose of 'ANTI-STRESS' aureomycin mixture which fed mixed with Denkavit for the first 2-3 days.

Calves are kept in simple pens for 3 weeks. •

Bedding is barley straw and we keep building it up. Calves are offered hay to nibble from birth and by 3 weeks, we try to have the calves to a pen.

Rearing large numbers of calves is easy with Denkavit and the Calfeteria Major. Illustrated above are three Calfeteria Majors each with teats for 30 calves. A disused concrete courtyard above are three Calfeteria Majors each with teats for 30 calves. A disused concrete courtyard

Feeding is merely a matter of opening the gate at the first batch, then fill up the Calfeterias

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