Department breeds new oat variety

Department of Agriculture, Western Australia

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XBVT 189, the new oat variety which will be released to selected growers for the 1975 planting, is the product of cross-breeding, selection and testing work conducted by the plant breeding and crop testing groups of the Department of Agriculture’s Wheat and Sheep Division. The oat is the final result of a cross made in 1965 between M127 (a selection from the cross Kent by Ballidu that also gave rise to Swan) and Radar 2, a rust-resistant variety bred in the United States.

XBVT 189 was initially selected within a standard breeding-for-yield programme but it and other selections soon demonstrated their rust resistance. As Swan is rust-susceptible there was a place for a high-yielding, rust-resistant oat in rust-prone areas and these early selections were gradually screened for field characteristics such as straw strength, shedding and the early maturity necessary under Western Australian conditions. Selections were made at the Wongan Hills Research Station during 1966, 1967 and 1968.

These selections including XBVT 189, were tested for yield in small plots at the Wongan Hills, Merre-
Fertiliser for maize on the coastal plain

P. G. Ozanne and P. L. Sewell
CSIRO, Division of Land Resources Management

The Swan Coastal Plain extends from Lancelin to Busselton and covers an area of 1.2 million ha. Under most of the plain the water table is within a few metres of the surface and this underground water has low levels of dissolved salts. Easy access to water, plus the high temperatures and radiation levels in summer, make the area suitable for the production of irrigated crops.

CSIRO has been investigating the production of a number of irrigated summer crops at its two research stations (East and West Pinjar) on the coastal plain. The most promising of the crops tested is maize.

Areas of deep grey (Bassendean) or yellow (Karrakatta) sand were cleared of their native shrub, cultivated, and planted in October or December with three varieties of maize. Irrigation started immediately after planting and continued through to harvest. Three applications, each of 25 mm, were applied each week through overhead sprinklers. The crops grew to maturity in about 120 days.

Varying rates of nitrogen (N), phosphorus (P) and potassium (K) fertiliser for maize on the coastal plain

CSIRO experiments have indicated the potential for producing high yields of maize on the Swan Coastal Plain.
fertilisers were applied either as a single dressing at planting or as split applications; the first (10 per cent of total) at planting and the other four at fortnightly intervals (10, 20, 50 and 10 per cent of total). A basal dressing of lime and trace elements was applied to all areas.

A summary of the rates of fertiliser applied and grain yields is shown in the table.

Split applications of fertiliser were much more effective, the lowest rate of split applications producing as much as the highest rate of single application. The low yields with the two lowest levels of fertiliser on the single application treatments were presumably associated with leaching and low availability of the nutrients towards tasseling when plant demand is high. On large areas, split applications of fertilisers would need to be applied by either aerial top-dressing or in the irrigation water.

We do not think that the fertiliser rates used in these experiments are necessarily ideal. However, we have shown the potential for producing high yields of maize on the Swan Coastal plain. The costs of production are high but returns may justify the costs. Economic evaluation of production would need to be done on an individual basis.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Seed density (seed/ha)</th>
<th>Nutrient applied (kg/ha)</th>
<th>Yield (tonne/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 28</td>
<td>74 000</td>
<td>213</td>
<td>9.4</td>
</tr>
<tr>
<td>DS 65A</td>
<td>121 000</td>
<td>370</td>
<td>11.9</td>
</tr>
<tr>
<td>XL 45</td>
<td>111 200</td>
<td>269</td>
<td>5.6</td>
</tr>
<tr>
<td>XL 45</td>
<td>111 200</td>
<td>404</td>
<td>7.5</td>
</tr>
<tr>
<td>XL 45</td>
<td>111 200</td>
<td>538</td>
<td>12.3</td>
</tr>
</tbody>
</table>

* Single application, at seeding, of soluble high analysis fertiliser.
** Split applications of the same total amount of soluble fertiliser.

**Fertiliser applications and grain yields of maize**

**Agriculture Protection Board studies the dingo**

The Agriculture Protection Board of W.A. has begun a new biological research programme on the dingo. The project is aimed at increasing the effectiveness of the various management techniques used by the Board and is therefore looking at those aspects of the dingo's biology most directly concerned with the techniques. Dingo behaviour is being studied in both economic and biological terms.

The programme includes a movement study, a food study, and a population study.

**Movement study**

The movement study is designed to give information about distances travelled by the animals and also on their methods of using areas of land. So far the study has been mainly restricted to the tagging and releasing of pups up to about three months of age. Pups are caught by hand at the nest site and a serially numbered ear tag is placed on one ear. If the other ear is large enough, it is tattooed with the same number.

We endeavour to capture all pups in the litter so that we also get data on sex ratio and litter size. However this is not always possible.

Recently some adult dogs have been caught using padded leg traps, tagged and then released. No recaptures have yet been made.

Preliminary results have shown that the animals have moved comparatively short distances and have also indicated that the different sexes travel different distances both in terms of total distance and average distance travelled per month. These results would be consistent with a hypothesis of dingo ways being essentially residential and males "defending" areas of land.

In order to gain more detailed information, a programme of radio tracking is planned for the near future. Juveniles and adults of both sexes will be "soft-trapped" and fitted with radio transmitters on collars. The animals will then be released and tracked from aircraft for about 12 months.

**Food study**

Information required from the food study is how much as well as what the dingo eats. The programme is also designed to show when dingoes are suffering from food shortage, that is, when it is most difficult for an individual to get enough to eat.

Stomachs are taken from dingoes trapped in the field, preserved in formalin and sent to Perth for laboratory analysis. Identification of the contents is made on the basis of hair characteristics, as most food appears to be mammalian. Weight and volume are also calculated.

Native fauna has accounted for more than 80 per cent of the weight of stomach contents so far examined. However about half of this was considered to be carrion when eaten. Macropods—kangaroos and wallabies—appear to be the major item from the preliminary analysis.

**Population survey**

The population survey is examining the fluctuations in numbers in an undisturbed dingo population. A method of determining an index of population density has been developed and is being applied regularly in field tests. From this a picture of normal population changes is emerging. This information will be vital when determining the effects of management techniques when they are imposed on a population.

Results from these programmes should prove invaluable in determining long range management plans. They should help the plans to achieve maximum efficiency as well as allowing them to be both environmentally discrete and biologically valid.
Survey of polyarthritis in pigs

M. Bond, Animal Division

Polyarthritis was proclaimed a compensatable disease under the Pig Industry Compensation Act in February, 1971. As a result of the proclamation owners with pigs condemned for polyarthritis at abattoirs were compensated for loss of the entire carcass. Owners of pigs partially condemned for arthritis received no compensation. During 1974 a survey of polyarthritis incidence was carried out at abattoirs and on farms because of an apparent increase in polyarthritis during the last three years (Table 1).

Arthritis has been associated with the organism Erysipelothrix insidiosa, which causes production of excess fluid and inflammation of membranes at joints, cartilage erosion and possible lameness. The term polyarthritis is used when several joints on one or more limbs are affected.

The aim of the survey was to find whether other organisms were associated with polyarthritis, the nature and distribution of joint lesions, and factors affecting the incidence of the disease. Inspection procedures and standards associated with condemnations were also examined.

The survey involved collection of material from animals condemned at three metropolitan abattoirs, recording some details about condemnations, and traceback via tattoos to properties of origin where a questionnaire was completed. Laboratory tests on condemned materials included bacteriological culture and gross and microscopic examination.

Collections were made from 235 animals condemned for polyarthritis between January 1 and March 31, 1974, and questionnaires were completed for 125 properties suffering condemnations between July 1, 1973, and March 31, 1974.

Table 2 includes condemnation statistics for collection days during the survey period and indicates that partial condemnations for arthritis were nearly four times as high as total condemnations for polyarthritis. No compensation is payable on partial condemnations although 90 per cent involved hindlimbs and 28 per cent involved both hindlimbs.

An immediate finding from the abattoir phase of the survey was that inspectors were operating without a clear, uniform definition of polyarthritis. The general consensus was that a carcass was condemned when major joints such as shoulder, elbow, hips or stifle (Figure) were grossly abnormal on at least three legs, but the lack of a uniform definition may account for some of the increase in polyarthritis condemnations, and for some of the differences found for condemnation rates between abattoirs. Table 3 indicates that the probability of isolating E. insidiosa from condemned carcasses was largely a function of the number of joints from which culture was attempted.

Histologically there appeared to be no essential difference between arthritis and polyarthritis, apart from the degree of severity. A high percentage of both conditions appeared to be caused by E. insidiosa.

The most common type of lesion in affected joints was a non-suppurative proliferative synovitis, usually accompanied by excessive production of synovial fluid. The highest incidence of the most severe lesions occurred in stifle and elbow joints, while hip and shoulder joints were affected less frequently and with...
milder lesions. Knee and "hock" joints showed a high incidence of mild to severe lesions but fetlocks were rarely affected. Despite these variations there appeared to be no significant difference in the relative severity of synovial lesions at different joints in cases condemned for either arthritis or polyarthritis.

No significant relationships could be found between polyarthritis and sex, weight (age), geographical distribution of originating farms or lairage time of pigs sent for slaughter. However, the poor standard of tattoo branding made it difficult to relate many carcasses to their properties of origin.

Analysis of answers to the questionnaires indicated that only 14 per cent of porkers and baconers condemned for polyarthritis had been vaccinated against E. insidiosa, and that only 3 per cent of the farms surveyed had a satisfactory vaccination programme. As all farms surveyed had supplied pigs later condemned for polyarthritis, the analysis suggested that erysipelas vaccine was not causing polyarthritis (a possibility which had been suggested by some people), and that a vaccination programme should be initiated and its results monitored.

Herds with 20 or less breeding sows accounted for 83 per cent of the polyarthritis condemnations, which were also associated with a lower general standard of pig management. No significant relationships could be found between feed or breed and polyarthritis incidence.

On the basis of the survey a new definition of polyarthritis has been submitted to abattoir inspection authorities, and pig owners have been advised to follow recommended erysipelas vaccination programmes. Further work is also planned on the cause of the disease, the effectiveness of vaccination programmes, and a comparison of "leg weakness syndrome" incidence in intensively and extensively managed pig units.

### Table 1—Polyarthritis condemnations, 1971-1973

<table>
<thead>
<tr>
<th>Period</th>
<th>Total pigs killed</th>
<th>No. pigs condemned</th>
<th>Per cent of total condemnations for polyarthritis</th>
<th>Compensation payments for polyarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971—April to Dec.</td>
<td>259,086</td>
<td>828</td>
<td>67</td>
<td>na</td>
</tr>
<tr>
<td>1972</td>
<td>422,944</td>
<td>1,758</td>
<td>60</td>
<td>43,110</td>
</tr>
<tr>
<td>1973</td>
<td>545,887</td>
<td>2,966</td>
<td>78</td>
<td>70,389</td>
</tr>
<tr>
<td>1974—Jan. to Mar.</td>
<td>126,442</td>
<td>381</td>
<td>95</td>
<td>16,128</td>
</tr>
</tbody>
</table>

### Table 2—Arthritis condemnations between January 1 and March 31, 1974. (Total throughput for collection days = 15,919 pigs.)

<table>
<thead>
<tr>
<th>Arthritis Polyarthritis</th>
<th>Total cases</th>
<th>E. insidiosa isolations</th>
<th>Total cases</th>
<th>E. insidiosa isolations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condemnations Percentage of throughput</td>
<td>264</td>
<td>1·65</td>
<td>73</td>
<td>0·46</td>
</tr>
<tr>
<td>Collections</td>
<td>178</td>
<td>27</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>E. insidiosa isolations</td>
<td>62</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of E. insidiosa isolations</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3—Relationship between number of joints cultured per animal and E. insidiosa isolations

<table>
<thead>
<tr>
<th>No. of joints cultured per animal</th>
<th>Arthritis</th>
<th>Polyarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total cases cultured</td>
<td>E. insidiosa isolations per cent</td>
</tr>
<tr>
<td>1</td>
<td>64</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>57</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>8 or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Planting time for lupins

Results of trials examining effects of time of planting on lupins have clearly supported the recommendation for early planting. Using Uniharvest and Unicrop narrow-leaved lupins, the trials were conducted at two sites, Lancelin and North Bannister, and included eight times of planting from early-May to mid-August, 1973. They were supervised by Plant Research Division research officers M. W. Perry and M. L. Poole.

Soil types for the trials consisted of deep yellow sand (Lancelin) and ironstone gravel (North Bannister). Plantings for both varieties at each site, and for each of the eight planting times, involved three replica-
tions of 6 m x 2 m plots which had previously carried a mixed grass/legume pasture. The seeds were dusted with inoculum before hand sowing with superphosphate (rate 250 kg/ha), ammonium sulphate (125 kg/ha) and potassium chloride (60 kg/ha).

Growth observations were begun two weeks after seeding and continued at weekly intervals until after harvest. Sample plants were dissected for floral initiation. The plots were also weeded and sprayed for insect control as necessary.

Results

The effect of time of planting on yield was dramatic, especially for Uniharvest. Figure 1 summarises the results at Lancelin and emphasises the yield loss of crops planted after mid June.

Reasons for the yield losses appear to be associated with the shorter growing period available to later planted plots. Growth for all plantings ceased at much the same time, regardless of the time of planting, and regardless of the time of first flowering. The duration of flowering was thus severely reduced; from 70 to 21 days for earliest vs latest planted Unicrop, and 43 to 11 days for earliest vs latest planted Uniharvest. As a lupin plant continues to produce flowering spikes throughout its flowering period, the later seeded plants produce less spikes and, consequently, less flowers, pods and seeds. Figure 2 summarises these effects for Unicrop grown at Lancelin.

Results of the trial suggest that early planting which extends the flowering period is a critical management consideration for lupin cultivation in Western Australia. Early planting allows the growth of additional flowering spikes capable of producing seeds and pods, as well as giving more vegetative growth for fodder purposes. The results also point to the yield superiority of Unicrop over Uniharvest. The latter may require colder conditions than are normally present in Western Australia if it is to realise its full yield potential.

Fig. 1.—Effect of time of planting on yield of lupins at Lancelin.
Fig. 2.—Effect of time of planting on components of dry matter production for Unicrop Lupins.