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Oat Trials and Usage

in the Wheatbelt, 1956

By
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Wheat Farming
and
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Plant Geneticist

The increasing acreages planted to oats in the Western Australian wheat growing districts have been associated with the improvement of farms for the carrying of stock and the need for a convenient change crop from wheat. Production of coarse grains, both oats and barley, has substantially increased the total area of cereals grown annually in Western Australia since 1930.

In the early years of development of a wheat farm or district, oats usually play but a minor part and even up to 1930, the area planted to this cereal, for all purposes throughout the State, was only 550,000 acres or 13 per cent. of that sown to wheat. By 1955-56 the total acreage of oats had increased to 1,782,000 of which 1,091,000 were harvested for grain, 133,000 for hay, and the remaining 558,000 utilised for green feed. In this year the total acreage of oats was 60 per cent. of that for wheat. Much of the increase has occurred over the 10 years since 1945-46, when the total area was 738,000 acres.

The extension of bulk handling facilities to provide for the receipt of oats and barley in bulk, has been an important factor in the expansion, over the past decade, of the oat acreages sown for grain. Allied with this has been the development of an overseas export trade in oaten grain, shipments being made almost wholly in bulk. Western Australian oats are of high quality and command a premium on the overseas market. The major constituent of the oats exported consists of the variety, Ballidu, which is particularly suitable for the requirements of European oat millers. The extension of oat-growing into the drier areas of the wheatbelt has necessitated the development of early-maturing varieties suitable to the less favourable climatic conditions. Oats have provided a convenient association with wheat production. The cropping and harvesting programmes can provide for both of these cereals. Oats for fodder can be planted in advance of the main seeding, with less danger of malting and the operation of harvesting can be completed before the main wheat crop is mature. Both can be planted and harvested with the same set of machinery. Oats are resistant to take-all and similar wheat diseases and therefore can be usefully included in a wheat-growing rotation as a measure of control, especially in conjunction with a fallow period. Some measure of control of webworm can also be achieved by growing oats on grassland which has been ploughed up for immediate cropping.

Oats have nutritional requirements similar to those of the two other common cereals—wheat and barley, but nevertheless, when utilised by stock on the farm,
contribute substantially to the maintenance and increase of soil fertility and improvement of its physical condition as the organic matter is returned to the soil.

**UTILISATION**

**Sown Specially for Grazing.**

The larger portion of the crop for this purpose is sown on wheat stubble land which is broken up with the first autumn rains. These crops provide a green “bite” in the earlier part of the season and in about five to six weeks from germination often carry five to ten sheep per acre for a period of 10 to 14 days. They may be grazed outright, or left to recover for grain. Besides providing a bulk of green feed earlier than natural pastures, their utilisation in the early part of the season allows the natural pastures to make a body of feed before they need to be fed off. This tends to prevent selective grazing of the young pasture plants with the possible elimination of desirable types which are more palatable in their early growth stages. Oats also provide an excellent cover grazing crop in the first year of establishment of subterranean clover and other pastures. Cereal crops grown for early green feed are invaluable to fat lamb producers, and the same crop can be used for topping off lambs in the spring when grass seeds are a nuisance.

**Sown for Hay.**

The almost complete change over to mechanised power farming has resulted in reduction of the area cut annually for hay. High labour requirements have possibly contributed also, but with the greater use of hay balers and other equipment, and the farmer’s appreciation of the necessity for adequate hay supplies for his stock, the area cut is likely to increase rather than decrease in the future. Over the past ten years, the acreage has been relatively stable, although during the last five years, there has been an upward trend.

The time of cutting cereal hay has a marked effect on both maximum yield and total digestible nutrients. The maximum yields of total digestible nutrients are obtained by cutting wheaten hay at the late “milk” stage and oaten hay at the early “dough” stage of grain formation. These times of cutting correspond with time of maximum total yield of hay.

**Sown for Grain.**

Results and comparisons of hay and grain yields give support to the conservation of cereal hay rather than grain. However, the total yields of dry matter are not the only consideration, and cereal hay is a roughage of comparatively low digestibility and a very low content of digestible protein. Grain, on the other hand, is a concentrate, particularly well adapted for supplementing the poor dry grazing of the summer months, and moreover, its digestible protein content is much higher than that of hay, and at this time of the year, a protein deficiency is probably the most important limiting factor in sheep husbandry.

Oat grain has the advantage over wheat in that, due to its physical condition, it is more suited to bulk storage over long periods than wheat. Whereas wheat has to be regularly turned over and aerated when in extended storage, oat grain can be left for years. It is also less liable to weevil attacks than is wheat. Disadvantages with oats are that they generally shed their grain more readily than wheat and also they are liable to lodging under unfavourable seasonable conditions.

**SOIL PREPARATION**

Although oats may do better than wheat with less careful soil preparation nevertheless, the better the soil preparation the better the crop. Oat crops which are intended to be cut for hay or harvested for grain should be planted under good conditions, either on fallow or land which has been improved by a period under clover pasture. On the latter, yields would be increased if planting is delayed for up to two weeks after the initial ploughing. When sown for early green feed, the more common practice is to sow them on the previous year’s wheat stubble following upon the first appreciable autumn rains. This practice allows of early sowing on a fairly good seed bed with a reasonable degree of weed control.

The purpose for which the crop is grown will, to a large extent, determine the seeding rate, but generally 40 lb. per acre is
recommended when the crop is to be grazed completely. When recovery is desired, this rate may be increased to 60 or 70 lb. per acre. The actual seeding rate will, however, vary with the purpose of the crop, time of sowing, district, and the stooling habit of the particular variety sown. When sown as a cover crop in the establishment of pastures, 20 lb of seed is recommended.

With regard to fertiliser requirements, if sown on fallow, the usual rates as for wheat should be adopted. When planted on stubble land as a catch-crop, the normal rate of application could be reduced. However, having regard to previous applications, it is not recommended that the rate be less than 56 lb. per acre, particularly for light soil types.

VARIETIES

The principal oat varieties grown in Western Australia are classified according to the following maturity groups.

Very Early: Wongan.
Early: Ballidu, Fulghum, Kent, Mulga, Orient.
Midseason: Avon, Dale, Guyra.
Late: Algerian.

Fulghum is slightly later than the other early maturing varieties and is sometimes classified as being of early midseason maturity.

The areas sown to the main oat varieties for all purposes during 1955-56 and the two preceding seasons are shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballidu</td>
<td>815,286</td>
<td>1</td>
<td>1,013,111</td>
</tr>
<tr>
<td>Wongan</td>
<td>152,691</td>
<td>2</td>
<td>197,215</td>
</tr>
<tr>
<td>Dale</td>
<td>111,509</td>
<td>3</td>
<td>126,047</td>
</tr>
<tr>
<td>Algerian</td>
<td>64,922</td>
<td>4</td>
<td>50,121</td>
</tr>
<tr>
<td>Fulghum</td>
<td>42,058</td>
<td>5</td>
<td>47,885</td>
</tr>
<tr>
<td>Guyra</td>
<td>35,357</td>
<td>6</td>
<td>31,919</td>
</tr>
<tr>
<td>Mulga</td>
<td>25,801</td>
<td>7</td>
<td>28,760</td>
</tr>
<tr>
<td>Orient</td>
<td>4,679</td>
<td>11</td>
<td>7,074</td>
</tr>
<tr>
<td>Other Varieties</td>
<td>32,069</td>
<td></td>
<td>37,890</td>
</tr>
<tr>
<td>Totals</td>
<td>1,284,172</td>
<td></td>
<td>1,549,022</td>
</tr>
</tbody>
</table>

Experimental work within recent years has shown that on light soils optimum cereal grain yields are not often obtained without the use of trace elements such as copper and zinc. With oats, zinc is of more importance than copper but when oats are sown on new light land, it is generally advantageous to apply the super-copper-zinc fertiliser with the first crop at a rate of not less than 150 lb., but preferably at a bag to the acre.

The ideal sample for seeding is a well threshed and well cleaned plump grain, and the seed should be dusted with one of the proprietary mercurial dusts for the prevention of both loose and covered smut.

The increased area sown to Ballidu, the leading oat variety has almost equalled the whole of the increase in oat plantings in this State over the past eight years.

VARIETY TRIALS

The variety trials conducted at the research stations each season provide information which assists in determining the most suitable oat varieties for growing under different soil and climatic conditions.

GRAIN PRODUCTION

The grain yields from the 1956-57 season’s trials are presented in Table 2. Due to the small number of varieties
### TABLE 2.
Oat Variety Trials at Research Stations 1956-57 Season.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Avondale</th>
<th>Chapman</th>
<th>Merredin</th>
<th>Salmon Gums</th>
<th>Wongan Hills</th>
<th>Esperance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yield, Bus./Acre</td>
<td>Percent. of Control</td>
<td>Yield, Bus./Acre</td>
<td>Percent. of Control</td>
<td>Yield, Bus./Acre</td>
<td>Percent. of Control</td>
</tr>
<tr>
<td>Early Planted Trials—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avon</td>
<td>44.4 (4) 131</td>
<td>25.5 (3) 116</td>
<td>3.8 (2) 116</td>
<td>34.2 (4) 116</td>
<td>26.5 (5) 115</td>
<td>119</td>
</tr>
<tr>
<td>Dale</td>
<td>34.7 (4) 100</td>
<td>22.8 (3) 100</td>
<td>1.7 (4) 100</td>
<td>30.1 (4) 100</td>
<td>22.2 (4) 100</td>
<td>100</td>
</tr>
<tr>
<td>Fulmark</td>
<td>37.5 (4) 108</td>
<td>21.6 95</td>
<td>2.3 (4) 96</td>
<td>27.6 (4) 88</td>
<td>17.5 (5) 79</td>
<td>73</td>
</tr>
<tr>
<td>Algerian</td>
<td>20.2 (4) 84</td>
<td>8.3</td>
<td>13.8 (4) 64</td>
<td>27.6 (3) 88</td>
<td>17.5 (5) 79</td>
<td>73</td>
</tr>
<tr>
<td>Ballidu</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Kent</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Diff. for Sig.</td>
<td>P = .05</td>
<td>3.0 9</td>
<td>N.R.</td>
<td>N.R.</td>
<td>0.6 34</td>
<td>2.2 7</td>
</tr>
</tbody>
</table>

| Late Planted Trials— | | | | | | | | | | |
| Alpha | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Ballidu | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| Kent | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |

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under test, some of the trials were not randomised and in these trials differences for significance cannot be given. Varieties included in these trials are briefly described:

**Late Maturing.**

*Algerian.*—Although the yield from this variety has been less than that from the new variety Avon, it is recommended, especially as a general purpose grazing and hay variety for the higher rainfall districts.

**Midseason Maturing.**

*Avon.*—This new variety has consistently given higher grain yields than any other midseason or late variety. It is similar to Dale in grazing capacity, but recovers better after grazing to give higher grain yields (see Tables 4 and 5.)

*Dale.*—The most widely grown midseason variety, it is a good general purpose oat, being suitable for both grain production and grazing in the medium to high rainfall areas of the wheatbelt.

*Ballidu.*—The most popular oat variety in this State. Ballidu has proved to be a good variety for sowing over a wide range of conditions. It can be sown for grain production or for green grazing and subsequent recovery for grain. The grain is most suitable for the export market.

*Kent.*—This new variety, bred at the Wongan Hills Research Station, has a vigorous early-growth habit and is therefore particularly valuable for grazing early in the season when pastures are just commencing growth (see Table 4). Grain yields are similar to those obtained from Ballidu.

**HAY PRODUCTION**

At Avondale, Merredin and Wongan Hills, trials were conducted to compare the hay yields of the new varieties Avon and Kent, with the older varieties. Cutting was carried out at the early "dough" stage which corresponds with the time of maximum total yield of hay and maximum yield of total digestible nutrients.

Cured weights from the 1956/57 trials are shown in Table 3.

**TABLE 3.**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Avondale</th>
<th>Merredin</th>
<th>Wongan Hills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Planted Trials—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algerian</td>
<td>65.0</td>
<td>94</td>
<td>21.4</td>
</tr>
<tr>
<td>Avon</td>
<td>61.5</td>
<td>89</td>
<td>21.0</td>
</tr>
<tr>
<td>Dale</td>
<td>69.2</td>
<td>100</td>
<td>20.2</td>
</tr>
<tr>
<td>Late Planted Trials—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballidu</td>
<td>45.7</td>
<td>100</td>
<td>14.2</td>
</tr>
<tr>
<td>Kent</td>
<td>61.0</td>
<td>134</td>
<td>14.1</td>
</tr>
</tbody>
</table>

*Fulmark.*—A variety recently released by the New South Wales Department of Agriculture. It gave promising yields, particularly at Avondale. Its grazing capacity has not yet been tested under local conditions.

**Early Maturing.**

*Alpha.*—This new Victorian variety shed its grain excessively and therefore, low yields were obtained at Chapman and Merredin. It is particularly vigorous in early growth.

Hay yields for Avon were approximately equal to those from Dale, except at Avondale where the yield was inferior. With the two early-maturing varieties, yields were similar at Merredin and Wongan Hills, but those for Kent were much higher than for Ballidu at Avondale. It should also be noted that the midseason varieties gave greater production than the early varieties; this may have been due to seasonal conditions or to the longer growing period required by the later maturing oats.
GRAZING AND RECOVERY FOR GRAIN

The subject of grazing has been dealt with in previous issues of this Journal (2) and may be summarised:—

(1) Oats should not be grazed beyond the date when the critical change in growth occurs, i.e., when the plants change from the vegetative or grassy to the reproductive or stemmy stage. Grain yields will be seriously reduced if grazing is carried out when the plants are in the stemmy stage.

(2) When feeding off the crop, it is essential that each grazing should occupy only a short period with a large flock of sheep, as this prevents selective grazing.

(3) Sheep should not be turned into the paddock when it is in a very wet condition, as pugging of the soil may result in poor recovery after grazing.

(4) Crops intended for grain should not be grazed if maximum yields are required. However, grazing rapidly over a very short period, and while the plants are in the grassy stage, allows the crop to recover satisfactorily for grain production.

Grazing Trials.

These are sown each season at Avondale, Merredin and Wongan Hills, and provide for no grazing; one grazing and two-grazing treatments. Grazing is carried out when the more vigorous varieties are from six to eight inches high. For the first grazing, this stage is usually reached in July, while the late grazing takes place towards the end of August. Sampling is carried out prior to grazing and, from the samples, the dry matter content is calculated for each variety.

Average dry matter yields in cwts. per acre and as a percentage of Ballidu, are included in Table 4. The number of years for which the results are averaged is four for Wongan Hills and three for the other two sites. Figures for the variety, Dale, at Wongan Hills have not been included as it was not in the trials for the full four-year period.

| TABLE 4. Dry matter Contents from Winter Grazings. |
|-----------------|-------|-------|-------|-------|
|                 | Cwts. | %     | Cwts. | %     | Cwts. | %     |
| Avondale—       |       |       |       |       |
| 1st Grazing (July) | 4.4  | 100   | 4.7  | 107  | 3.7  | 84    |
| 2nd Grazing (Aug.) | 5.7  | 100   | 5.0  | 88   | 5.6  | 98    |
| Total ....       | 10.1 | 100   | 9.7  | 96   | 9.3  | 92    |
| Merredin—       |       |       |       |       |
| 1st Grazing (July) | 3.2  | 100   | 3.5  | 109  | 2.9  | 91    |
| 2nd Grazing (Aug.) | 4.5  | 100   | 4.2  | 93   | 4.3  | 96    |
| Total ....       | 7.7  | 100   | 7.7  | 100  | 7.2  | 94    |
| Wongan Hills—   |       |       |       |       |
| 1st Grazing (July) | 3.4  | 100   | 3.7  | 109  | 3.2  | 94    |
| 2nd Grazing (Aug.) | 3.4  | 100   | 3.4  | 100  | 3.2  | 94    |
| Total ....       | 6.8  | 100   | 7.1  | 104  | 6.4  | 94    |

(1) The early-maturing varieties produced higher dry matter yields than the midseason varieties and therefore when grazing alone is required it is better to sow an early-maturing variety in the medium and low rainfall areas of the wheatbelt.

(2) Kent produced more feed when grazed early than did Ballidu, although total production from the two grazings was similar for each variety.

Average grain yields from the grazing treatments are expressed in bushels per acre and also as percentages of Ballidu are shown in Table 5.
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TABLE 5.
Grain Yields from Grazing Trials.

<table>
<thead>
<tr>
<th></th>
<th>Avondale—</th>
<th></th>
<th>Merredin—</th>
<th></th>
<th>Wongan Hills—</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No grazing</td>
<td>One grazing</td>
<td>Two grazings</td>
<td>No grazing</td>
<td>One grazing</td>
</tr>
<tr>
<td>Ballidu</td>
<td>Bus. %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22-0 100</td>
<td>20-4 100</td>
<td>6-9 100</td>
<td>26-1 100</td>
<td>17-7 100</td>
</tr>
<tr>
<td>Kent</td>
<td>Bus. %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26-6 121</td>
<td>20-1 98</td>
<td>7-8 113</td>
<td>27-5 105</td>
<td>19-0 112</td>
</tr>
<tr>
<td>Avon</td>
<td>Bus. %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37-7 171</td>
<td>28-4 139</td>
<td>11-5 167</td>
<td>27-5 105</td>
<td>28-2 159</td>
</tr>
<tr>
<td>Dale</td>
<td>Bus. %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25-6 116</td>
<td>20-2 99</td>
<td>6-9 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These figures show that oat varieties can be grazed once and still produce a worthwhile grain yield. A second grazing causes a further reduction in yield but could still be an economical overall proposition, including the feed value obtained.

Varieties planted in the grazing trials cannot be harvested so readily in their respective order of maturity. Under the climatic conditions at Avondale, more grain from the early-maturing variety Ballidu was lost from the non-grazed section and therefore the percentage yields are not comparable with those obtained from the variety trial at that Station.

RECOMMENDED VARIETIES
To assist in the selection of the most suitable varieties to grow, the wheat and sheep area of the State has been divided into three maturity zones based approximately on rainfall (see map). In the early-maturing zone, with less than 14 inch annual rainfall, cereal growing is the major occupation with sheep raising as a sideline. The midseason zone consists of those areas between the 14in and 18in isohyets where cereal and sheep are of equal importance. In the late zone, with over 18in. rainfall, improved pastures and stock raising are more important than the growing of cereals.

Under normal conditions grazing crops should be planted in late April or early May. If intended for hay or grain, the late and midseason maturing varieties should be planted early in May, while the early maturing varieties should be sown from mid-May to mid-June for best results. Too early sowing of early maturing varieties produces rank, tall crops which have a greater tendency to lodge and/or shed grain.

THE EXPORT MARKET
The suitability of oats for the export market has recently been discussed in this Journal (3). Ballidu appears to be the most suitable for milling purposes as it normally produces a very clean rolled oat.
The other three varieties on the recommended list are also acceptable although not as popular as Ballidu. The midseason varieties have a tendency to produce light-weight grain when grown in a dry season or in the lower rainfall areas. This is particularly noticeable with Avon, which under these conditions, produces a grain with a low groats husk ratio, and as the groats only is required for milling, this means a lower percentage extract. Under higher rainfall conditions, Avon has given ratios as good as and sometimes better than for Ballidu.

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