Agriculture in Western Australia. 3. The economic potential of the Wongan-Ballidu Shire. Part 1

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The economic potential of the

By G. D. OLIVER, B.A., Officer-in-Charge and A. W. HOGSTROM, B.Sc. (Agric.), Adviser, Rural Economics and Marketing

INTRODUCTION

IN West Australian agriculture there is a considerable "backlog" of information available to farmers which is not being used in practical farming. This, of course, is true of agricultural industries anywhere in the world.

This "backlog" results in a big difference in productivity between the best farms and the "average" farms in each district.

This article is a simple economic study of the potential of one shire of Western Australia. In it an attempt is made to measure the difference between what is technically possible and what is actually achieved on the general run of farms in the Wongan-Ballidu Shire.

By comparing the results on the Department of Agriculture's Wongan Hills Research Station with those of the shire and the "average farm" the authors then estimate the returns which should accrue to farmers in the shire over the next 15 and 35 years—assuming continued research and extension of the results of this research, and the gradual application of the results by farmers. In the study current costs and prices are assumed throughout.

The investigation emphasises the value of the development of one shire and the research on which this development is based; it should also give some indication of the returns which farmers in this and many other areas of the State can achieve through modern scientific farming.

Most of the calculations are based on the results achieved at the Department's Wongan Hills Research Station. This Station, established in 1924, was the first of the Department of Agriculture's light land research stations. It has played a leading part in light land development work both for the Wongan-Ballidu Shire and the State as a whole. Much of its work has been associated with pasture development and clover ley cropping programmes, but increasing emphasis is being placed on animal production on the improved pastures.

It should be mentioned here that the station has at all times had the full support of the people of the district and of the Shire Council.

* * *

This is the third of a series of articles on the agricultural development of Western Australia. Two previous articles in the series discussed the growth of agriculture and the potential areas for development in the south-western part of the State.
SINCE 1945 most of the agricultural development in Western Australia has been on light lands and the Shire of Wongan-Ballidu is a good example of a region which has benefited from light lands research.

The progress of clearing, cropping and pasture improvement in this area has also been stimulated by the presence in the Shire of a Department of Agriculture Research Station, an active Light Lands Zone Committee, enthusiastic and capable Departmental officers and certain natural advantages in the Shire itself. These include a reliable 13 in. to 15 in. annual rainfall and land which could be cleared relatively cheaply.

Wongan-Ballidu has developed rapidly since the war, until 87 per cent. of the total area is now cleared. This makes it a suitable shire for a study of agricultural potential, based on present known techniques, because there is less room for development than in many other shires. Even in this shire there is still a great deal of scope for increased production through the utilisation by farmers of techniques either known to them but not yet adopted or recently discovered by scientists and now being fully tested.

Three separate sets of estimates are made:
1. An estimate of production in the shire in 1980; by this date it is expected that most of the cleared land in the shire will be under improved pasture.

2. An estimate of production in the shire in the year 2000; this is only 36 years away and equivalent to 1928 in retrospect. With agricultural technology and management changing so rapidly, causing most forward estimates to be understated, it would not be wise to look further ahead.

3. An estimate, for both the average farm and the shire, of the cumulative effect of development to the year 2000, in terms of gross and net farm income.

Rising Productivity

The increased productivity in the Wongan-Ballidu shire will come from:

• MORE GRAIN. Wheat, oats and barley are produced in the shire and the total production of each for grain will vary with relative prices. The proportion of the total area used for grain to total area used for sheep has been fairly stable for over 10 years and is expected to remain so in view of the markets for these commodities. Any increase in grain then will come from higher yields per acre as a result of successive cropping following a clover pasture, disease control or disease resistant grain varieties, better yielding varieties and improved cultivation techniques.

• MORE WOOL. The total sheep population should continue to increase as the area of improved pasture is expanded, as the quality of pasture is improved and as husbandry techniques allow for greater utilisation of available pastures. Other problems associated with an increase in total wool and meat production on which scientists must concentrate are the maintenance or improvement of wool quality, the availability of adequate water supplies and an increase in lambing percentages. It is to be expected that as stocking rates increase woolgrowers will place a higher value on available pasture and there will be a greater emphasis on culling for yield of wool per sheep and for quality. The Department of Agriculture will be called on for advice on fleece measurement as it is increasingly used for culling purposes.

• MORE SHEEP for sale as replacements in other areas or for meat. Ram and ewe infertility is not as serious a problem in this area as in areas further south.

• MORE MEAT. The climate and pastures in the shire are suitable for Merino sheep and it is not likely that there will be any movement towards meat breeds\(^1\). The increase in total sheep numbers will mean, however, a higher turnoff of aged and culled sheep for meat.

WHEAT PRODUCTION PROJECTIONS TO 1980 AND 2000

Total wheat production in the Wongan-Ballidu Shire exceeded three million bushels in 1963. In the five year period 1935 to 1939 average production was about 1,200,000 bushels. Comparison of the two five year periods 1935-39 and 1959-63, shows that total production has more than doubled in the 18 year period since World War II.

Statistically, this increase is accounted for in two ways: first, an increase in the area planted, and second, an increase in yield per acre.

The proportions are about two thirds to area and one third to yield. Fig. 1 compares total production and area planted with wheat and it can be seen that the upsurge in area planted is almost as dramatic as that in total production. Comparison of the two five-year periods 1935-39 and 1959-63 shows that the area

\(^1\) This will depend on the relative prices for wool and meat but even if these prices were to change the returns from sheep would not be altered greatly.
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**Yield Increases**

This leaves the second factor—yield increases. Fig 2 shows average yields for the shire from 1946 to 1963. The average of the five years 1935-39 was 12.9 bushels per acre. The average of the five years 1959-63 was 16.7 bushels per acre—an increase of 29 per cent. The research station yield is also plotted in Fig. 2 and, as would be expected, is usually higher than the average yield for the shire. Marked differences between shire and station yields first occurred in 1951-52, which year saw the introduction at the Station of wheat following a clover pasture. In the years from 1950-51 to 1962-63 there are marked fluctuations in Station yields and movements from year to year were inconsistent with shire yields in six out of 12 years, although station yields never fell below shire yields. This is a normal feature of a comparison between an individual farm and the average of a group of farms. Individual farms often have their particular problems and during this period the insect pest webworm was troublesome at the research station.

**Rise of Ley Farming**

As the proportion of pasture to cleared land in the shire rises so too do farmers' opportunities to increase wheat yields by taking advantage of ley farming.

At present only about one-quarter of the cleared area in the shire is under pasture compared with three quarters at the research station. However, the rate of pasture improvement in the shire has accelerated in recent years, rising from 87,129 acres in 1953 to 163,200 acres in 1963. If the area of pasture doubles again in another 10 years, 45 per cent. will be under pasture by 1973 and with a continuation of this trend two thirds of the shire before 1980. At the present ratio of crop to total cleared area this is all the land that would be available for improved pasture.

This rapid expansion of pasture in recent years has been made possible by improved establishment techniques and the introduction of Geraldton subterranean clover and other species which are well suited to the region.
On this basis, the average wheat yield for the shire should approximate the present research station yields by 1980, especially as farmers' cultivation methods and seed varieties will almost certainly have improved in the meantime. The present six-year average station yield of 22.9 bushels per acre is looked on as the standard the shire can reach by 1980, with present knowledge and techniques.

Meanwhile, the research station will not stand still.

Experiments are under way on nitrogen requirements of wheat crops, with particular stress on second and third wheat crops in succession after a clover pasture. It has been shown experimentally that the depletion of nitrogen with the first crop, resulting in a falling off in wheat yields to the second and third crops, can be offset by adding suitable quantities of nitrogenous fertiliser. This development, together with improved varieties, improved cultivation techniques and information emerging as to the rotation which will give the best
long-term average yields, is expected to raise the average station yields to 28 bushels an acre within 10 years and still further by 1980. This 28 bushels an acre is considered the potential of the shire on present knowledge.*

By the Year 2000 . . .

Table 1 sets out research station and shire yields and projections to the year 2000. It is assumed that the shire average yield will rise by 6.8 bushels to 22.9 bushels an acre by 1980, 17 years behind the research station, and by a further 5.1 bushels to 28 bushels per acre by the year 2000, 26 years behind the research station. By the year 2000, in the normal course of events, the research station will have progressed beyond 28 bushels per acre but no projection of this is required as our concern is primarily with the shire.

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Table 1.—Yield of wheat

<table>
<thead>
<tr>
<th>Period</th>
<th>Research Station</th>
<th>Shire of Wongan-Ballidu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Bushels per acre</td>
<td>22.9*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.1†</td>
</tr>
<tr>
<td>By 1974</td>
<td>28.0</td>
<td></td>
</tr>
<tr>
<td>By 1980</td>
<td></td>
<td>22.9</td>
</tr>
<tr>
<td>By 2000</td>
<td></td>
<td>28.0</td>
</tr>
</tbody>
</table>

* Average of 6 years 1957/8 to 1962/3.
† Average of 10 years 1952/3 to 1962/3.

Table 2 arrives at the annual projection for total wheat production in the shire by 1980 and the year 2000. The total production of 4,484,828 bushels and 5,483,600 bushels raise the present production of 3,153,088 bushels by 42 and 74 per cent, respectively.
The application of research results will raise the station's average wheat yield to 28 bushels an acre within 10 years; new varieties should bring a further increase.

Table 2.—Production of wheat in Wongan-Ballidu Shire

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>By 1980</th>
<th>By 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area cleared</td>
<td>(a) 725,327</td>
<td>725,327</td>
<td>725,327</td>
</tr>
<tr>
<td>Area improved pasture</td>
<td>(b) 163,200</td>
<td>476,000</td>
<td>476,000</td>
</tr>
<tr>
<td>Area wheat</td>
<td>(a) 195,844</td>
<td>195,844</td>
<td>195,844</td>
</tr>
<tr>
<td>Yield per acre</td>
<td>(b) 16.1</td>
<td>22.9</td>
<td>28.0</td>
</tr>
<tr>
<td>Annual production</td>
<td>(b) 3,153,088</td>
<td>4,484,828</td>
<td>5,483,600</td>
</tr>
</tbody>
</table>

(a) 1962-63.
(b) 10 year average 1952/3 to 1962/3.

SHEEP AND WOOL PROJECTIONS TO 1980 AND 2000

In 1962-63 there were 298,000 sheep in the Wongan-Ballidu Shire (0.4 per acre cleared) from which 3,000,000 lb. of greasy wool was produced, valued at £630,200 (on the auction floor).

Estimates of the livestock turnoff of the district include 10,000 lambs and about 60,000 other sheep. The value of sheep and lambs was £189,500.

The average greasy wool per sheep shorn, for the 10 years ended 1962-63, was 8.5 lb. It appears that, in the short run at least, any increase in total wool production in the shire will come from increased numbers of sheep carried rather than from an increase in cut per head as the research station yields have tended to decline with increased stocking rates. The station's average for the six years ending 1962-63 was 8.22 lb. per sheep shorn.
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—0.28 lb. less than the shire average. This decline is probably a temporary phase, largely associated with flock structure, as the station flock has carried a low proportion of wethers. Many farms expect a higher cut per head.

However as the research station has been adopted as the standard for this study the figure of 8.22 lb. is used in the absence of experimental evidence which would allow a more optimistic forecast.

Higher Stocking Rates

The stocking rate at the research station has been steadily improved in recent years, rising from \( \frac{3}{4} \) sheep per cleared acre in 1953 to one sheep per cleared acre in 1963.

This has been made possible by the establishment of improved pasture on the Station until virtually the whole area has been covered (96 per cent. of cleared area less crop or 75 per cent. of total cleared area).

It has already been mentioned that, by 1980, 66 per cent. of the cleared land in the shire should be under improved pasture. In other words, 96 per cent. of the present cleared area, less crop, will be under pasture by 1980. Allowance was made for the higher proportion of crop to cleared area in the shire (31.6 per cent.) than at the research station (18.7 per cent.) when estimating possible sheep numbers by the years 1980 and 2000.

The improvement in the stocking rate for the shire, from 0.41 sheep per acre in 1962-63 to 0.84 sheep in 1980, will result from the expansion of improved pasture and the extension throughout the district of management techniques such as set stocking, which will encourage fuller utilisation of pasture. Research designed to determine the ideal stocking rate is in its infancy even at the research station but results indicate that radical improvements in stocking rates can be made. These will be economic for the great majority of farmers in the shire.

The research station should reach 1.25 to 1.5 sheep per cleared acre by 1980 and the same standard should be reached by the shire some 20 years later.

Better Lambing Percentages

Experience at the research station also points to an improvement in the shire's lambing percentage.

The shire average for the 10 years ending 1962-63 has been 69.5 per cent. of mated ewes. The research station average has been 83 per cent. The difference can
be attributed to better conditioning of breeding ewes before lambing, more attention to culling to eliminate infertile rams and ewes, and post-natal care of ewes and lambs.

It is expected that within a few years, possibly less than 10 years, the lambing percentage will be raised to 90 at the research station purely by further attention to the management practices mentioned above. The shire average should reach 90 per cent. by the year 2000.

The relevant figures for sheep and wool projections are summarised in Table 3.

### Table 3—Sheep and wool projections to 1980 and 2000—Wongan-Ballidu Shire

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Research Station</td>
<td>Shire</td>
<td>Research Station</td>
</tr>
<tr>
<td>Ratio pasture to cleared area ( % )</td>
<td>77.5</td>
<td>22.5</td>
<td>77.5</td>
</tr>
<tr>
<td>Ratio crop to cleared area ( % )</td>
<td>18.7</td>
<td>31.6</td>
<td>18.7</td>
</tr>
<tr>
<td>Sheep per cleared acre ( \text{No.} )</td>
<td>1.0</td>
<td>0.41</td>
<td>1.2</td>
</tr>
<tr>
<td>Sheep per cleared acre less crop ( \text{No.} )</td>
<td>1.23</td>
<td>0.60</td>
<td>1.5</td>
</tr>
<tr>
<td>Wool per sheep shorn ( \text{lb.} )</td>
<td>8.22</td>
<td>8.5</td>
<td>8.22</td>
</tr>
<tr>
<td>Ratio lambs marked to ewes mated ( % )</td>
<td>83</td>
<td>69.5</td>
<td>90</td>
</tr>
</tbody>
</table>

To be concluded next issue