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Beef production in a 14 inch rainfall district

D J. Barker
H. G. Cariss

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Beef production in a 14 inch rainfall district

Cover Page Footnote
The assistance of the Manager and staff of Wongan Hills Research Station in carrying out the beef studies on the Station is gratefully acknowledged. Thanks are also due to Mr. W. J. Bynon, of Wongan Hills, who made available his killing facilities and provided expert comments on the carcass quality of experimental cattle.
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BEEF PRODUCTION IN A 14-INCH RAINFALL DISTRICT

Progress report on a farm scale beef-raising investigation at the Department of Agriculture’s Wongan Hills Research Station

By D. J. BARKER and H. G. CARISS*

A SMALL herd of beef cattle was established at Wongan Hills Research Station in 1964 and the first crop of calves was dropped in the autumn of 1965. The calves’ growth rates were recorded and they were marketed as 18-month-old steer beef in November, 1966.

This was the beginning of a series of exploratory trials being carried out at Wongan Hills to gain information on management methods and economic returns from cattle in the agricultural areas of Western Australia.

This article reports the Station’s experience with this group of cattle. Further information will be published as the programme develops and results become available.

Paddocks and pastures

The cattle are run on heath plain soils markedly raised in fertility by an extended period under legume pasture. They are representative of many light soils of the agricultural areas.

The two main cattle paddocks are a 100-acre paddock used for set-stocking the 30-cow breeding herd and a 130-acre paddock for followers and other stock. Both are old clover paddocks cleared in 1924 and first sown to subterranean clover in 1947. They have been maintained under pasture except for cropping in 1952, 1955 and 1964, with one reseeding to clover in 1956.

In 1965 the 130 acre paddock was reseeded to Geraldton subterranean clover; the 100 acre paddock is a very successfully regenerated Dwalganup pasture.

Fertiliser treatment has been a total application of 2,100 lb. of superphosphate an acre to 1965, the annual rate being 100 lb. an acre as pasture topdressing. Zinc was included in 1955 and copper in 1958.

Under the management system adopted productivity has increased greatly. Before 1947 the average wheat yield was 12.1 bushels per acre; since 1947 it has risen to 18.3 bushels per acre.

Cattle husbandry

A simple system of husbandry was adopted, with a view to later modification if necessary. The production achieved is therefore similar to that which might be expected of any developing and expanding commercial herd in similar conditions.

The herd was established in 1964, with the purchase of 30 poll Hereford x dairy breed yearling and two-year-old heifers, and a young poll Hereford bull.

* The Authors: D. J. Barker, B.V.Sc., M.R.C.V.S., Beef Research Officer, Animal Division. H. G. Cariss, B.Sc. (Agric.), Senior Adviser, Wheat and Sheep Division
The heifers were mated from June to September (inclusive) and set-stocked at one beast per 3.7 acres for the 10 months to February, 1965. The calves were dropped from March to June and a ration not exceeding 10 lb. per head per day was fed during this period, until green feed was available. Total hay fed was about 1,000 lb. per breeder.

Twenty-eight of the heifers were in calf, but only 80 per cent. reared calves to weaning, due mainly to losses at or soon after birth—fairly common with first-calf heifers.

In 1965, the mating period was restricted to mid June to mid August to concentrate the 1966 calf drop by eliminating the "tail." The aim of this was to reduce labour and improve weaning weights.

Pregnancy diagnosis was carried out in November and the one heifer which had not become in calf in 1964 was found to be incapable of breeding and was culled. Five other cows were also found to be empty, mainly because they calved too late to get in calf in the restricted second mating period. These were retained to help build up herd numbers. They were run with the breeding herd and included in the assessment of stocking rate and production per acre.

The steer calves were weighed and castrated soon after birth. All calves were weighed in May, August, November and January, 1966, when they were weaned.

From calving to weaning the breeders and calves were set-stocked in the 100 acre paddock. At weaning the 24 calves were retained in this paddock, the cows being moved into a 120 acre paddock for six weeks.

In late February the calves were moved to the 130 acre paddock where they remained until the steers were slaughtered in November, other stock being added for a considerable period to aid in pasture control.

Meanwhile, the 29 cows were returned to the 100 acres, where they remained over the 1966 calf drop, through the second weaning and through their third calf drop, continuously set-stocked.

Hay was fed from the start of calving until late June, 1966, at similar rates to 1965.
In 1966, mating was advanced to late May-late July, in an attempt to improve average weights at weaning for 1967.

The 1966 calf drop was weaned in late November, due to an earlier close to the green feed season that year. This was made possible by the fact that all the calves had been born before the end of May. The early weaning reduced the early summer stress on the cows—a further advantage of an early, short calving period.

In 1966, 91.5 per cent. of the cows that were in calf reared calves to weaning, compared with 83 per cent. for 1965. This improvement was due to the lower rate of loss of calves at birth by the cows of 1966 compared to the heifers of 1965.

Cow and calf weights were again recorded at birth, May, August and weaning in November.

The fertility rate from the 1966 mating was 93 per cent., showing that the carrying-over of cows not mated in 1965 had not lowered the herd's fertility. These were in fact among the earliest calvers in 1967. The slightly earlier mating period also had not lowered the pregnancy rate.

A second draft of 20 yearling heifers was purchased, together with another bull, in June, 1966. They were mated from June until mid-August, to calve in May-June, 1967.

**Stocking rates**

**The 1965 calf drop**

Twenty-four calves were reared to weaning in January, 1966. Of these, 13 were steers, marketable as baby beef at weaning but retained for further study up to the 18-month old steer beef stage in November.

For the total time from the start of the calf drop to sale of steers (20 months) the effective stocking rate for the 1965 calf drop was calculated at about four acres per breeder and calf per annum up to the baby beef stage at weaning in January, and three acres per yearling from weaning to slaughter as prime 18-month-old steers in November.

**The 1966 calf drop**

Twenty-two calves were reared to weaning in November, of which 13 were steers marketable as baby beef at weaning. These were again retained for future studies, which have not yet been concluded.

The effective stocking rate for the 1966 calf drop was again about four acres per breeder and calf.

This stocking rate is not claimed to be ideal for beef production in this district, but is quoted to illustrate the background in which the growth and production rates were achieved.
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Average body weight and growth rates

<table>
<thead>
<tr>
<th>Average Date of Birth</th>
<th>1965 Steer Calf Drop</th>
<th>1966 Steer Calf Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving Spread</td>
<td>25/4/65</td>
<td>15/4/66</td>
</tr>
<tr>
<td></td>
<td>March 9 to June 22</td>
<td>April 1 to May 26</td>
</tr>
</tbody>
</table>

| Birth weight           | 65 lb.               | 72.5 lb.             |
| Average weight late November | 533.5 lb.           | 536.6 lb. (weaning) |
| Growth rate, birth to late November | 2.27 lb. per day | 2.15 lb. per day |
| Average weight, end of year    | 596 lb. (Jan. 7, weaning) | 568 lb. (Dec. 22) |
| Average growth rate, late November to end of year | 1.25 lb. per day (suckling) | 0.9 lb. per day (weaned) |
| Average break of season weight (20/5/66) | 672.5 lb. | |
| Growth rate, weaning to break of season | 0.58 lb. per day | |
| Average weight, June 20, 1966 | 617.3 lb. | |
| Mean growth rate over break of season | —1.7 lb. per day | |
| Slaughter date          | 10/11/66             | |
| Weight at slaughter     | 974.9 lb.            | |
| Growth rate, break of season to slaughter | 2.5 lb. per day | |

Growth rates

The growth of the steer calves divided readily into four fairly distinct phases—birth to weaning, weaning to break of season, break of season period, and break of season to slaughter.

The Table shows the average growth rates attained up to late December, 1966. The slightly lower growth rates from birth to November, 1966, compared to 1965 were probably due to the fact that a slightly larger proportion of the 1966 calves' lives were spent in dry summer conditions, as they were born 10 days earlier. The lower growth rates from late November to the end of the year were almost certainly due to the fact that they were weaned in late November, 1966. The frequently-observed improvement in calf growth rates from second calvers, as opposed to first calvers, did not occur in this case.

18-month-old steer, no hand-feeding—wt. 1054 lb.
Weight changes in cows

Body weights of the calved heifers increased from late May to late November, 1965, in spite of the stress of lactation, but from November to January the paddock feed quality had deteriorated sufficiently to cause weight loss. This was halted as soon as the calves were weaned in January.

With their second calves, the cows barely maintained weight from May to August, but gained weight from August to November, when the calves were weaned. Further slight gains were made from November to late December and the December weight was maintained until late February, just before the next calving.

The Table below compares body weight changes of the 20 heifers that had calved by May 20, 1965, with body weight changes in the 21 cows that had calved by May 20, 1966.

The two seasons' records showed that, at the stocking rates used, good quality dry summer pasture can readily support dry cows at constant body weights without hand feeding. However, if suckling is prolonged into the summer, body reserves will be depleted.

The cows' ability to over-summer on dry pasture is further emphasised by the fact that the paddock on which these breeders were carried was stocked at about four acres per dry breeder in the summer of 1965-66, but at 2.3 acres per dry breeder in the summer of 1966-67.

Beef production

Although the steers from the 1965 calf drop were marketed as 18-month-old steer beef, the recording of liveweights at the baby beef stage enabled an estimate of baby beef production to be made, for both 1965 and 1966.

The difference in production level achieved between the two years was of course mainly due to the fact that the 1965

<table>
<thead>
<tr>
<th>Date of weighing 1965</th>
<th>Average body weight, 1965</th>
<th>Date of weighing 1966</th>
<th>Average body weight, 1966</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 20</td>
<td>735</td>
<td>May 20</td>
<td>890</td>
</tr>
<tr>
<td>August 20</td>
<td>836</td>
<td>August 18</td>
<td>881</td>
</tr>
<tr>
<td>November 11</td>
<td>1,018</td>
<td>November 17</td>
<td>1,039 (weaning)</td>
</tr>
<tr>
<td>January 1, 1966</td>
<td>968 (weaning)</td>
<td>December 22</td>
<td>1,074</td>
</tr>
<tr>
<td>February 2</td>
<td>984</td>
<td>February 23, 1967</td>
<td>1,070</td>
</tr>
</tbody>
</table>
Summary of baby beef production

<table>
<thead>
<tr>
<th></th>
<th>1965</th>
<th>1966</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total liveweight of steer calves at weaning</td>
<td>7,748 lb.</td>
<td>6,976 lb.</td>
</tr>
<tr>
<td>Total deadweight of steer calves at weaning*</td>
<td>4,261.4 lb.</td>
<td>3,836.8 lb.</td>
</tr>
<tr>
<td>Total acreage devoted to steer baby beef production</td>
<td>55.8 acres</td>
<td>59.1 acres</td>
</tr>
<tr>
<td>Steer baby beef production per acre</td>
<td>76 lb. per acre</td>
<td>65 lb. per acre</td>
</tr>
</tbody>
</table>

* Assumed dressing percentage = 55% of paddock weight.

calves were weaned six weeks later than the 1966 calves.

Since heifers' growth rates are slightly lower than steers', overall production would be slightly lower than that from steers only, quoted above.

When the 13, 1965-drop steers were finally marketed as steer beef in November, 1966, their average liveweight was 975 lb. per head in the paddock.

The average cold carcass weight of the 13 steers was 495 lb., giving an average dressing percentage of 50.77 per cent., based on paddock weights. On a starved weight basis (15 hours starvation immediately before slaughter) the dressing percentage was 52.85 per cent. Average weight loss during the 15-hour starvation was 46.5 lb.

Carcass quality was assessed by the butcher who purchased the steers. Two were graded prime, eight prime to slightly fat and three slightly over-fat. In this group of 13 carcasses it was observed that of the three graded slightly over-fat, two had the highest dressing percentages and the third had the fourth highest dressing percentage. This may indicate that in this age and type of animal a higher degree of fatness may have to be accepted with a higher dressing percentage.

Degree of fatness and dressing percentage were not otherwise related to age, growth rate or liveweight of the animals in this group.

Summary of steer beef production

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total steer beef produced</td>
<td>6,431 lb.</td>
<td></td>
</tr>
<tr>
<td>Average age of steers</td>
<td>18(\frac{1}{2}) months</td>
<td></td>
</tr>
<tr>
<td>Therefore average steer beef production per annum = 6,431 x 24/37</td>
<td>3,858.6 lb. per annum</td>
<td>56.1 acres per annum</td>
</tr>
<tr>
<td>Acreage devoted to steer beef production</td>
<td>56.1 acres per annum</td>
<td>68.6 lb. per acre per annum</td>
</tr>
</tbody>
</table>

Carcass assessment at Wongan Hills. 18-month-old steer carcass.
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Returns from baby beef production

<table>
<thead>
<tr>
<th></th>
<th>1965 steer calves</th>
<th>1966 steer calves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average weight at weaning</td>
<td>596 lb. (January)</td>
<td>536.6 lb. (November)</td>
</tr>
<tr>
<td>Mean carcass weight at weaning*</td>
<td>328 lb.</td>
<td>295 lb.</td>
</tr>
<tr>
<td>Value at weaning</td>
<td>25c per lb.</td>
<td>29c per lb.</td>
</tr>
<tr>
<td>Estimated average value at weaning</td>
<td>$82.00 per head</td>
<td>$85.55 per head</td>
</tr>
<tr>
<td>Total value of steer portion of calf drop</td>
<td>$1,066</td>
<td>$1,112</td>
</tr>
<tr>
<td>Acreage devoted to baby beef production</td>
<td>55.8 acres per annum</td>
<td>59.1 acres per annum</td>
</tr>
<tr>
<td>Gross return as baby beef</td>
<td>$19.10 per acre per annum</td>
<td>$18.80 per acre per annum</td>
</tr>
</tbody>
</table>

* Assumed dressing percentage = 55% of paddock weight.

Economic returns

As baby beveses the 1965 calves at weaning were valued at 25 cents per lb. deadweight (January) whilst the 1966 steer calves were valued at 29 cents per lb. deadweight (November). The equivalent price per lb. for the 1966 drop if they had been weaned and sold in January would have been 26 cents per lb., thus showing that most of the increased price per lb. would have been due to selling earlier, rather than to yearly variation in price.

As 18-month-old steer beef, the price obtained on the property for the 10 steers graded prime and prime-slightly fat was 22 cents per lb., whilst the three graded slightly over-fat realised 21 cents per lb.

Again, overall return for both heifers and steers would be lower on average than for steers only. Not only do heifers grow slightly slower than steers, but they also fetch a lower price per lb., deadweight at this time of the year.

Cost factors

The actual costs involved in the operation of a beef herd will vary greatly from property to property, depending upon efficiency of management, accessibility to markets and so on. Profits on different properties will vary accordingly.

Conclusions

The production figures quoted have strictly limited application, because a number of factors have not yet been critically examined.

(a) A single stocking rate only is included. Whilst this appears to be satisfactory, it is not known whether it is the ideal.

(b) More accurate steer beef production figures are needed; these will be obtained when enough animals are available to conduct a specific trial.

(c) Production from male calves only is included, because of the need to build up herd numbers as rapidly as possible; results are therefore biassed on the high side. More complete figures will be obtained when surplus females are available.

(d) All the baby beef production figures are based on an assumed dressing percentage of 55 per cent. of paddock weight. Until more calves are available, we cannot obtain more accurate production figures by killing and critically recording.
However, a number of facts emerge quite clearly from the work done at Wongan Hills:—

- In this type of environment it is perfectly feasible to produce good quality baby beef at eight to nine months old, if calves are born in March-April.
- The hand-feeding of cows need not exceed 1,000 lb. cereal hay per head in a normal season, to maintain them in reasonable condition after calving.
- Baby beef production could result in higher gross returns per acre than 18-month-old steer beef. Greater investment in breeders is necessary to achieve this higher return and risks of losses at calving and due to lower fertility are also increased. Hay-making and feed-out costs would not be increased in full proportion to the numbers of breeders kept because extra breeders require very little more time to provide for, if some are being provided for already.
- Breeders can be set-stocked successfully under the system used here, and one breeder and calf per four acres appears to be a satisfactory stocking rate at Wongan Hills. Other rates may well be necessary on other properties.
- Good rates of fertility can be achieved in a two-month calving period.

- Eighteen-month-old steers of this type (second cross Hereford x Dairy breed) reared under this regime can be expected to dress out at about 51 per cent. of paddock weight when slaughtered in prime condition. Fatter carcasses may show higher dressing percentages but realise a lower price per pound deadweight.

So far, at Wongan Hills we have examined production off pasture only. This invariably results in selling fat-stock at the end of the green-feed season, when prices are lower than at some other times. Current experiments are aimed at determining whether or not it is worthwhile to produce saleable baby beef in the June-July period, using home-grown cereals as the basis of supplementary feed. The costs involved and the economic return obtained will be determined.

The effects of calving earlier still (February-March) upon growth rates, cows' weights and calf weaning weights are also being examined.

Other problems of husbandry will be tackled as the size of the herd is increased.

ACKNOWLEDGMENTS

The assistance of the Manager and staff of Wongan Hills Research Station in carrying out the beef studies on the Station is gratefully acknowledged. Thanks are also due to Mr. W. J. Bynon, of Wongan Hills, who made available his killing facilities and provided expert comments on the carcass quality of experimental cattle.