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A COMPARISON OF BRITISH BREED CROSSES WITH F1 AND F2 ZEBU X BRITISH CATTLE ON THE BASIS OF A PRODUCTIVITY INDEX

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Summary

F1 and F2 Africander x Shorthorn and Hereford (AX), Brahman x Shorthorn and Hereford (BX), and Shorthorn x Hereford (HS) were evaluated on an index of kg beef produced per cow mated, at weaning (250 days) and at 820 days of age.

In the F1 generation mean fertility of the AX was slightly higher than that of the BX, but their growth rate was lower. Both the AX and BX were superior to the SH for fertility and growth rates. Thus in the F1 generations there was very little difference between the AX and BX in terms of a production index, but both were superior to the HS.

In the F2 generation there was a significant decline in the fertility of the BX, relative to the F1 BX and F1 and F2 AX, but no significant change in weight gains. In the F2 generations the AX were therefore superior to the BX for the production index.

I. INTRODUCTION

Beef production is primarily a function of reproductive efficiency and growth rate. In order to evaluate a particular breed or herd for beef production these two traits need to be considered together. F1 and F2 crossbreds, Zebu (Africander and Brahman) x British (Hereford and Shorthorn), and reciprocal British crosses were therefore evaluated on the basis of kg beef produced per cow mated.

II. MATERIALS AND METHODS

The data were collected from 1959 to 1962 at the National Cattle Breeding Station, "Belmont", Rockhampton. The breeding programme and the environment were described by Kennedy and Turner (1959). Purebred Africander, Brahman, Hereford and Shorthorn bulls were mated at random to Hereford and Shorthorn cows to produce F1 Africander x Hereford and Shorthorn (AX)? Brahman x Hereford and Shorthorn (BX), and Hereford x Shorthorn and Shorthorn x Hereford (HS) . F1 bulls were selected at random and randomly mated to F1 females to produce the F2 populations. Single sire matings were used, and the mating period was restricted to 7 weeks.

The proportion of calves weaned per cow mated was used as the measure of reproductive performance. True post-weaning losses were small and were

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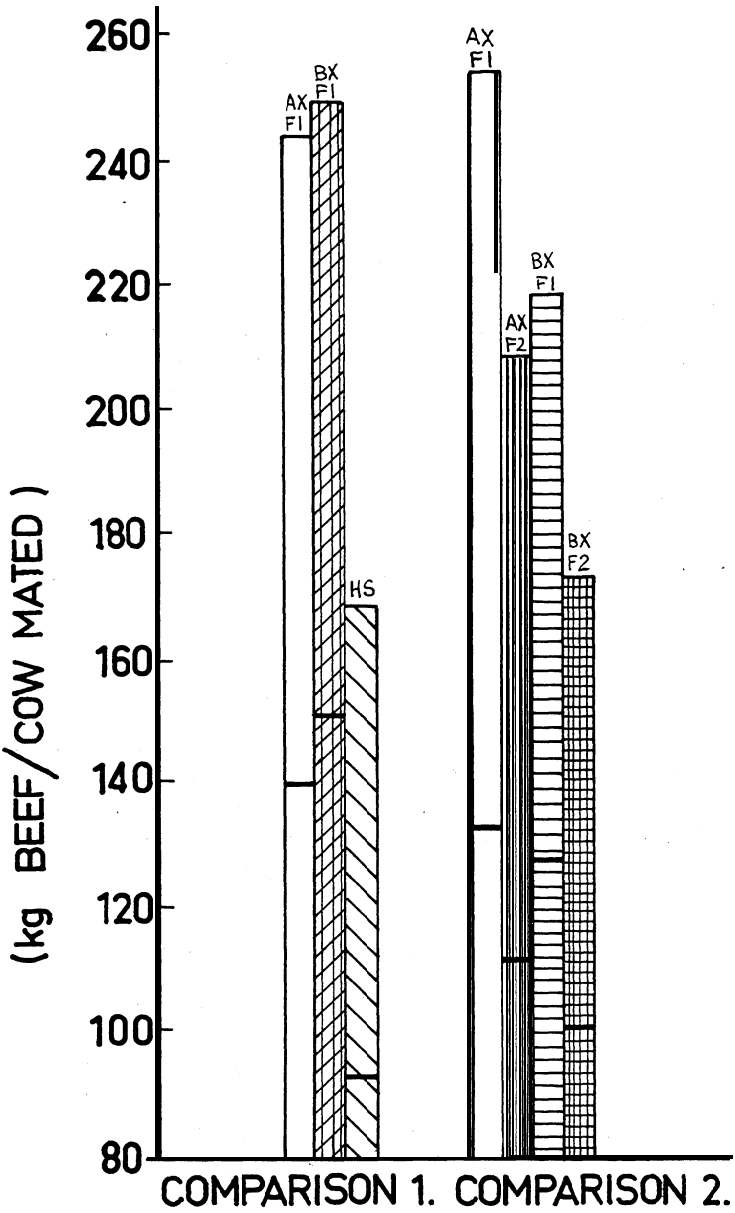
260
240
220
200
180
160
140
120
100
80
(kg BEEF/COW MATED)
AX F1
BX F1
HS
AX F1
AX F2
BX F1
BX F2
COMPARISON 1.
COMPARISON 2.

Figure 1

therefore ignored. Cows that had failed to calve in two consecutive years were normally culled from the herd, but where such cows remained in the herd, data from them were not included in the computations. Body weight was measured as the age corrected weight at 250 days (weaning) and 820 days, and was computed within dam age, year of birth and sex, and the average of the means used.

TABLE 1

Dam ages, years of drop of progeny, proportion of calves weaned and mean weights of calves at 250 days and 820 days for comparisons I and II

Breed	Generation	Dam age	Year of drop	No. of matings	No. of calves weaned	% weaning	250 days weight kg	820 days weight kg
Comparison I								
AX	F1	3, 5-8	59-62	388	288	74.2	188.5	326.9
BX	F1	„	„	368	255	69.3	218.6	359.7
SH	F1	„	„	336	186	55.4	167.9	302.9
Comparison II								
AX	F1[1]	3-5	60-62	154	110	71.4	185.7	354.2
	F2[2]	„	„	95	58	61.1	182.8	341.1
BX	F1[1, 3]	„	„	174	103	59.2	216.5	367.5
	F2[2, 3]	„	„	81	36	44.4	208.0	387.2

[1]AX F1 significantly higher calving rate than BX F1 : $P < 0.05$.
[2]AX F2 significantly higher calving rate than BX F2 : $P < 0.05$.
[3]BX F1 significantly higher calving rate than BX F2 : $P < 0.05$.

Contemporary comparisons' between the British and the F1 and F2 Zebu crossbreds (AX and BB) were not possible in all years, and in these cases data from such years were not used. Comparison I (Figure 1 and Table 1) therefore compares the HS and the F1 Zebu crossbreds, while comparison II (Figure 1 and Table 1) compares the F1 and F2 Zebu crossbreds. The Fl data presented in comparison II is a subset of the F1 data presented in comparison I.

III. RESULTS AND DISCUSSION

Lampkin and Kennedy (1965) found no significant difference between the reproductive performance and growth rates of F1, AX and BX, but the Zebu crossbreds (AX and BX) were significantly better than HS. The data which are presented for comparison I in Table 1 represent a subset of that data. The production index for comparison I shown in Figure 1 correspondingly shows very little difference between the AX and BX, but a large difference between the Zebu crossbreds and HS. At 250 and 820 days the AX produced 11.6 kg and 6.7 kg less live weight per cow mated than the BX, while the average live weight produced per cow mated by the Zebu crossbreds was 52.7 kg and 78.2 kg more than that of the HS.

From Table 1 it appears that reproductive rates may have been lower and body weights higher during the years in which the F2 data was collected.

However the production indices for F2 Zebu crossbreds shown in comparison II, Figure 1 were lower than that of comparable Fl's. Mean weight differences between the Fl's and F2's were small. However the F1 AX and BX, and F2 AX weaned a significantly higher proportion of calves than the F2 BX (comparison II, Table 1), which accounted for the differences in the production index. The culling of cows which had failed to reproduce introduced a bias in favour of the lower fertile genotype in the index. However under different systems of management (e.g., extended mating period) the differences between the genotypes and generations may have been different.

The significant decline in the reproductive performance from F1 to F2, especially in the BX indicates that this trait is controlled by non-additive genetic factors, and the F1 fertility is therefore largely due to hybrid vigour. The body weights did not show a similar trend, and they were probably largely controlled by additive genetic factors.

Results from comparisons I and II are not strictly comparable, but it is interesting to note from Figure 1 that the F2 BX were no more productive than the HS. This loss of productivity points to the danger of indiscriminate establishment of new breeds from breed crosses which exhibit hybrid vigour in the F1 generations.

An index is a more sufficient measure of production than either body weight or fertility considered alone, in that it combines the information from these two traits. The index would be particularly useful in evaluating the beef production potential of genotypes when one has a significant advantage in growth, and the other a significant advantage in fertility.

IV. ACKNOWLEDGMENT

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