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MEAT PRODUCTION FROM FRIESIAN AND ANGUS BULLS

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SUMMARY

Fifty-one Friesian and twenty-two Angus bull calves were multiple suckled on dairy cows (3 calves per cow), weaned at 12 weeks of age and then grazed together. At approximately 18 months of age the twelve highest growth rate Friesian bulls were selected for breeding. Twenty of the remaining Friesians and twenty Angus bulls were chosen at random and slaughtered. Carcasses were fabricated into primal beef cuts.

Friesian bulls recorded superior liveweight growth; their carcasses were 36 kg heavier than Angus and they produced 22 kg more saleable meat. Angus carcasses had a higher percentage of meat and a lower percentage of bone than Friesians. Neither the trimmed fat content nor the proportion of high-priced meat cuts differed significantly between the two breeds.

STUDIES on several breeds of cattle and their crosses have indicated the potential of the Friesian for beef production in New Zealand (see Everitt *et al.*, 1970). Most of these studies have been restricted to steers and heifers. Largely because of higher meat prices for bull beef, an increasing number of entire males are now being kept commercially. Although bull beef production under European intensive feeding conditions is fairly well documented (Turton, 1969), very little experimental work has been undertaken and reported in New Zealand. In addition, the need to start selection programmes for both the meat and milk characters of the Friesian has been stressed recently (Shannon, 1971). Integration of selection procedures with commercial bull beef production may be possible.

This paper reports work where the growth and carcass composition of Friesian and Angus bulls involved in a selection programme were examined.

EXPERIMENTAL

Friesian bull calves were collected at 4 days of age from farmers in the Waikato region who were co-operating in

the New Zealand Dairy Board's sire proving scheme. In this operation, Friesian and Friesian-type cows were inseminated with semen from the sons of sires proven for dairy merit, and the resultant heifers milked on farms of origin to assess the bull for dairy merit. The bull calves from these matings are usually culled, but in 1969-51, representing the progeny of 12 sires, were collected.

In the same season, 22 straightbred Angus calves at the Whatawhata Hill Country Research Station, the progeny of 4 Angus bulls, were removed from their dams at 4 days of age. The Angus calves were born, on average, 39 days later than the Friesians.

All the calves were transferred to one location where they were reared by multiple suckling on dairy cows, at 3 calves per cow, and weaned at 12 weeks of age. Each cow suckled either all Friesian or all Angus calves to reduce competition due to size among the calves.

After weaning all the calves were transferred to a common grazing farm where they were treated similarly for the following 15 months. Animals were weighed three times during this period. At approximately 18 months of age, 15 of the top growth rate Friesian bulls were selected for breeding purposes and removed from the group (3 were later culled for defects). From the remaining 36 Friesian bulls, 20 were chosen at random for slaughter along with 20 of the 22 Angus bulls. The group size of 20 was dictated by slaughter and processing facilities.

After slaughter the frozen export carcass weight (minus the internal fat) was determined for each animal. After grading, the carcasses were fabricated into primal meat cuts, bone and excess trimmed fat. The inside, outside, knuckle, sirloin, striploin, flank steak, cube roll and tenderloin cuts were collated into a high-priced group (Everitt, 1961).

RESULTS

GROWTH TO SLAUGHTER

The growth of the Friesian and Angus bulls between collection and slaughter is shown in Fig. 1. The total liveweight gain was clearly superior for the Friesian.

The mean liveweights of each breed, together with appropriate growth rates, are summarized in Table 1. Friesian bulls grew faster both before and after weaning and were heavier at all ages.

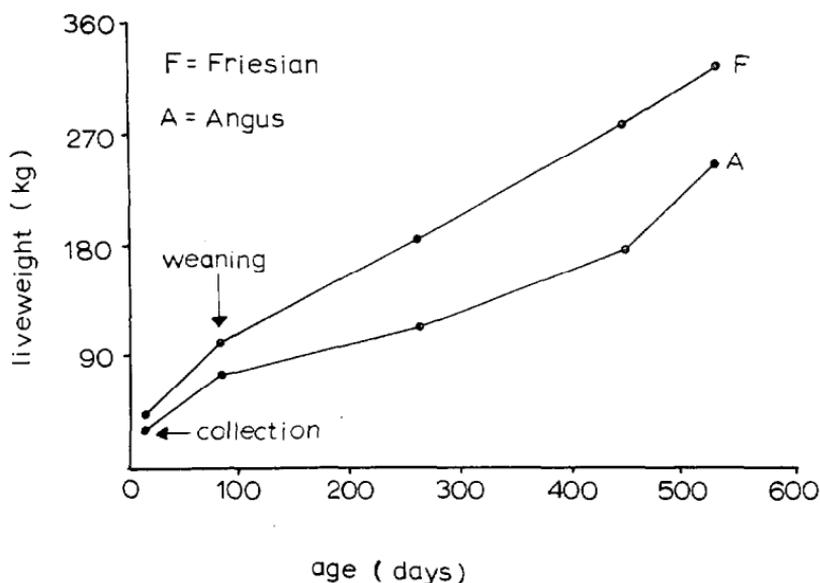


FIG. 1: Mean liveweights of Friesian and Angus bulls.

The distribution of animals of each breed for liveweight gain per day is shown in Fig. 2. The numbers of Friesians retained for breeding, and the animals from each breed slaughtered, are also shown. The Friesians retained for breeding had growth rates above 0.65 kg/day.

TABLE 1: MEAN LIVeweIGHTS (kg) AND GROWTH RATES (kg/day) (51 Friesians; 22 Angus)

Character	Friesian	Angus	Diff. \pm S.E. (F - A)
Collection wt (4 days)	42	32	10*** \pm 0.2
Weaning wt ¹ (84 days)	101	84	17*** \pm 3.3
Final LW ¹ (513 days)	335	260	75*** \pm 13.4
LW gain/day			
collection to weaning	0.71	0.60	0.11* \pm 0.05
weaning to final	0.57	0.38	0.19* \pm 0.09

Note: In this and subsequent tables the following abbreviations are used:
 * = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$; S.E. = Standard error of difference.

¹ Adjusted for age.

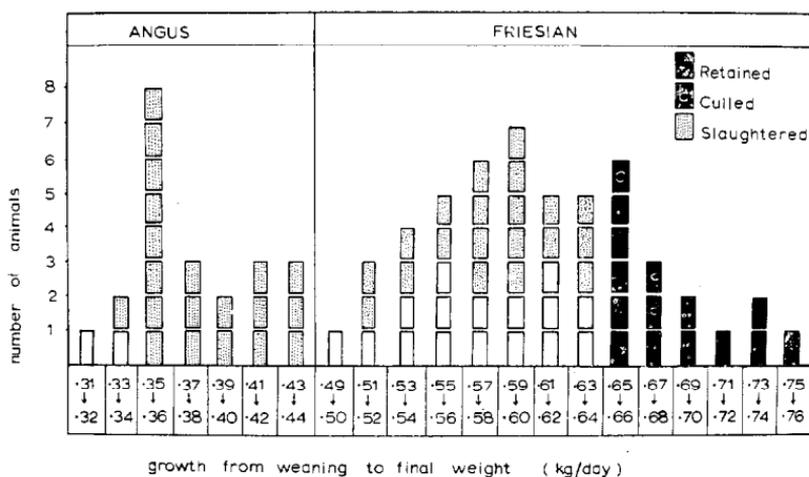


FIG. 2: Distribution showing growth of animals and number retained for breeding and slaughter.

CARCASS WEIGHT AND COMPOSITION

Dressing-out percentage was calculated using the live-weight after 24 hours' starvation prior to slaughter. This is presented in Table 2 together with weight of the carcass and major components for each breed.

The breeds did not differ significantly in dressing-out percentage. The Friesians, 36 kg heavier in carcass weight, provided more saleable meat (22 kg), bone (12 kg), and fat (3 kg) than the Angus at the same age. The saleable meat per day of age from each breed was 0.25 kg/day for the Friesian and 0.20 kg/day for the Angus.

The distribution of carcass weights for each breed is shown in Fig. 3.

TABLE 2: CARCASS CHARACTERISTICS ADJUSTED FOR AGE (No./group = 20)

Character	Friesian	Angus	Diff. \pm S.E. (F — A)
Carcass wt ¹ (kg)	178	142	36*** \pm 8.9
Dressing-out %	50.8	50.5	0.3 \pm 0.2
Total ² (kg)			
Meat	126	104	22** \pm 7.3
Bone	47	35	12*** \pm 2.5
Excess fat	8	5	3* \pm 1.0

¹ Frozen (export) carcass weight with internal fats removed.

² The total of meat, bone and excess fat slightly exceeds frozen carcass weight because fabrication was carried out on chilled carcasses.

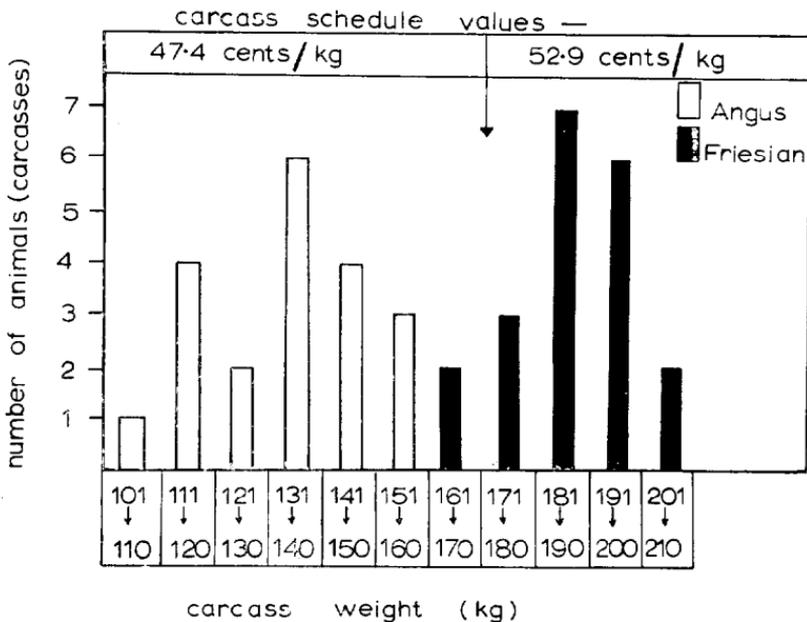


FIG. 3: Distribution of carcass weight of each breed.

Bull carcasses weighing 170 kg or more received a price premium over those below this weight. It can be seen from Fig. 3 that all but 2 of the Friesian carcasses could claim this premium, but all Angus carcasses weighed less than 170 kg.

Table 3 records the carcass components as percentages of carcass weight using the data from Table 2. The high-priced group of meat cuts is also recorded as a percentage of the total meat.

The lighter Angus carcasses had a slightly higher proportion of meat and a lower proportion of bone than the Friesians. The difference in the proportion of excess fat

TABLE 3: CARCASS COMPONENTS AS PERCENTAGES OF CARCASS WEIGHT
(No./group = 20)

Character %	Friesian	Angus	Diff. \pm S.E. (F — A)
Meat	70.1	71.6	-1.5** \pm 0.47
Bone	25.9	24.5	1.43*** \pm 0.39
Excess fat	4.0	3.9	0.1 \pm 0.25
High-priced cuts ¹	39.4	39.3	0.1 \pm 0.37

¹ High-priced cuts expressed as % of total meat.

between the breeds was not significant. Similarly there was no significant difference between the proportion of high-priced cuts from each breed. The conformation of all carcasses of both breeds was satisfactory and the animals were slaughtered before excess fat deposition occurred.

Table 4 shows the weight of carcass components after adjustment for differences in carcass weight. At the same carcass weight, the Angus bulls produced 5 kg more meat and 4 kg less bone than the Friesian. There were no significant differences between the breeds in excess fat or the weight of the high-priced cuts from the carcass.

TABLE 4: WEIGHTS (kg) OF CARCASS COMPONENTS
ADJUSTED FOR CARCASS WEIGHT
(No./group = 20)

Character	Friesian	Angus	Diff. \pm S.E. (F - A)
Total			
Meat	113	118	-5** \pm 1.5
Bone	43	39	4** \pm 1.3
Excess fat (total)	7	6	1 \pm 1.0
External	(5)	(5)	0 \pm 0.6
Kidney and channel	(2)	(1)	1 \pm 0.5
High-priced cuts	45	46	-1 \pm 1.0

DISCUSSION

The growth rate of the Friesian bulls was clearly superior to that of the Angus bulls. As long as producers are paid on carcass weight, the large difference of 75 kg in final liveweight and 36 kg in carcass weight, in favour of the Friesian, is extremely important in profitability. The 22 kg of additional meat derived from the Friesian is important to the processor if grading or purchase on the basis of meat yield becomes the main criterion.

There appears no reason to suspect that suckling the Angus calves at three per dairy cow unfairly penalized their subsequent performance. It is suggested that the milk available to these calves was as much, if not more than they would have obtained from their own dams over this period. The pre-weaning growth rate of 0.17 kg/day (Table 1) of the Friesians compares favourably with the values recorded by Everitt and Phillips (1971) in trials with Friesian calves suckled on Jersey foster dams. Likewise, the pre-weaning growth rate of 0.60 kg/day for the Angus calves (Table 1) is similar to that recorded by Hight, *et al.*, (1971a, b) for Angus calves up to 12 weeks of age being suckled by their own dams. However, these

growth rates should not necessarily be considered optimal in considering the beef potential of these breeds in a selection programme.

The Friesian bulls grew at a steady rate between weaning and slaughter (Fig. 1). That the Angus showed little compensatory growth over this same period supports the assumption that pre-weaning nutrition had been adequate. However from a commercial beef production point of view the slaughter weights for age of these bulls were poor. A carcass weight of about 200 kg at 18 months of age should be attainable. Achievement of this target means that bulls would receive the premium payment for bull carcasses over 170 kg. As processors are becoming increasingly aware of the overhead costs of processing light animals, the fact that more Friesians than Angus weighed over 170 kg at the same age is important.

Although economic return is mainly dependent upon liveweight increase per unit of time, carcass composition is important as reflected in meat yield. Breeders should aim for lean tissue gain per unit of time. The range in meat yield within the Friesian (68 to 75%) and the Angus (68 to 72%) shows that there is scope for selection within each breed.

At the same carcass weight, the Angus produced more meat (5 kg) and less bone (4 kg) than the Friesian. The f.o.b. value of this meat in the manufacturing export trade would be approximately \$5.50 per carcass. As bone has very little value, the Angus, at the same carcass weight, would be preferred by the processor.

However, profitability to the producer depends on carcass weight per day of age. The 36 kg extra carcass weight from the Friesian would be worth approximately \$19 per animal. The 22 kg extra total meat from the Friesian would be worth approximately \$24. Meat yield of the Friesian is likely to increase at heavier carcass weights; thus, unless grading was based on proportionate meat yield, the Friesian would always be likely to give higher returns.

The distribution of meat in the carcass is important to the processor when selling table beef. The similarity between both breeds in the proportion of high-priced cuts is notable. The boneless meat produced from the carcasses of both breeds could have met the standards of the European table beef trade.

It should be emphasized that the Friesians slaughtered in this study were chosen after the top growth rate bulls had been removed and therefore were lower in mean liveweight than the initial group. The satisfactory perform-

ance of these Friesians stresses the beef potential of the breed currently available in New Zealand. Further, some of these Friesian bulls would have had their growth potential reduced by being bred out of Friesian-type cows which, in the Waikato at present, are likely to be graded-up Jerseys. Slower growth of Jersey steers (Barton *et al.*, 1968) and bulls (Carter, 1969) compared with other breeds and crosses has been reported.

The clear growth advantage of the bull compared with the steer (Turton, 1969) must be exploited for meat production, particularly in intensive production systems.

This fact provides an economic basis for a profitable integration of bull selection with commercial farming of beef, hence reducing the cost of breeding programmes. This trial has shown that the planning, collection and management of such programmes is not complex and that there is considerable scope for selection among breeds. With widespread use of artificial breeding through existing industry channels, performance testing for growth could be followed by progeny testing for carcass assessment with wider exploitation of the best animals.

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