PUBLICATION 1633 1977

Postweaning growth and carcass traits of yearlings from Red Angus and Beefmaster sires with exotic first-cross dams

Agriculture Canada

Copies of this publication may be obtained from
INFORMATION DIVISION
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA
K1A 0C7

Code No.: 20M-38845-11:77
Cat. No.: A63-1633/1977
ISBN No.: 0-662-01203-8

Kromar Printing Ltd.
01A05-7-38845

POSTWEANING GROWTH AND CARCASS TRAITS OF YEARLINGS FROM RED ANGUS AND BEEFMASTER SIRES WITH EXOTIC FIRST-CROSS DAMS

G. W. Rahnefeld,[1] H. T. Fredeen,[2] J. E. Lawson,[3] and J. A. Newman[2]

In 1968, the Canada Department of Agriculture started a project to evaluate the reproductive performance of nine combinations of hybrid females by crossing Angus, Hereford, and Shorthorn cows with Charolais, Limousin, and Simmental bulls. The first-cross heifers produced by three consecutive years of matings were allocated at random within each breed cross to two contrasting environments, extensive range at Manyberries, Alta., and intensive farm-type management at Brandon, Man., for evaluation of their maternal performance. A tenth combination of hybrid females, a Hereford-Angus (H X A) cross, was included at each location to serve as a control group.

Each yearling heifer was mated to one of 15 Red Angus or 7 Beefmaster sires. Breed of sire and sire within breed were assigned equally at random within each of the 10 hybrid female subgroups. The resulting calves were reared on range until weaning at an average age of 7 months and then placed in feedlot for comparative evaluation of growth and carcass performance. Calves produced at Brandon remained at that location and those produced at Manyberries were transferred to Lacombe for postweaning evaluation. This phase of testing was completed in the fall of 1975.

Calves were born over a 9-week period from March 20 to May 22 each year. Each calf was weighed, ear-tagged, and tattooed within 18 hr of birth. Dehorning by caustic paste or electric dehorners was performed before the calves were 8 weeks old. Males were castrated by knife and vaccinated against blackleg during the first 2 weeks of June. In late September, calves were treated for warbles and vaccinated for IBR P13 and clostridium (7 way). Weaning was within the first 10 days of November.

At weaning, calves were moved into the feedlot and brought to full feed in 4 weeks. All the heifers were fed in one lot at Lacombe, but the steers at Lacombe and both sexes at Brandon were penned in groups of about 15. Roughage was fed at first and concentrate ration (Table 1) was gradually introduced. In early December, the on-test weight was recorded as the average of two weights taken 2 days apart. From this time until the end of test, the ration fed at Lacombe was 30% silage mixed with 70% of the concentrate ration, and the ration fed at Brandon was entirely grain concentrate with neither hay nor silage added. Feed was available ad lib. in feed bunks, which provided 60 cm (2 ft) of linear feeding space for each animal. No hormone treatments were administered.

The calves were weighed at 28-day intervals until mid-April (140 days in the feedlot). Slaughter was started soon after. Weight and degree of finish (potential carcass grade) were the chief criteria of readiness for market. Average daily gain was calculated for the first 140 days in the feedlot. Carcass

[1] Research Station, Brandon, Man.
[2] Research Station, Lacombe, Alta.
[3] Research Station, Lethbridge, Alta.

measurements included dressing percentage, rib-eye area, and average fat cover over the rib eye. A total of 788 calves completed the feedlot test, and slaughter data were obtained for 783 carcasses.

FEEDLOT GAINS

Average daily gain during 140 days in the feedlot was almost identical for calves from the two terminal sire breeds, averaging 1.15 kg (2.55 lb) per day for Beefmaster and 1.17 kg (2.58 lb) for Red Angus. Sex differences were important; steers gained about 14% faster than heifers (Table 2).

In general, the calves in the feedlot at Brandon gained about 2% faster than those at Lacombe. However, the two sexes responded differently at the two stations. The steers at Lacombe gained faster, and heifers slower, than those of the same age at Brandon (Table 3). These differences were anticipated because of differences in feedlot management of heifers (one large lot at Lacombe vs. several small lots at Brandon) and rations (silage at Lacombe vs. all concentrate at Brandon).

Feedlot gain was influenced by breed cross of dam. Calves produced by dams sired by Limousin bulls or from Angus cows gained 1.13 kg (2.50 lb) per day, a rate equivalent to that of the calves from the control H X A dams (Table 4). The calves with Charolais or Simmental as their maternal sire gained 1.19 kg (2.62 lb) per day. There were no interactions between breed of sire of calf and breed cross of the dam.

AGE AND CARCASS WEIGHT AT SLAUGHTER

Age at slaughter averaged 419 days at Brandon and 435 days at Lacombe, with carcass weights of 235 kg (518 lb) and 243.5 kg (537 lb). Within each station, there were no differences in slaughter age associated with sire of calf, or with breed of sire, or dam of dam (Table 5). However, carcass weight was influenced by all these factors. Red Angus calves averaged 4% lighter than Beefmaster calves, 235 vs. 243.5 kg (518 vs. 537 lb). Carcasses from calves out of Simmental, Charolais, and Limousin cross dams were 11%, 7%, and 4% heavier than the control group. Based on the breed of dam of dam, calves tracing to Shorthorn, Hereford, and Angus were 11%, 7%, and 5% heavier than the control average of 224.5 kg (499 lb). Differences in carcass weight per day of age were similar to those observed for carcass weights.

Steers averaged 11% heavier in carcass weight than heifers and had a similar advantage in carcass weight per day of age (Table 6). No interactions were found between sex, breed of terminal sire, or breed of sire or dam of the dam.

CARCASS CHARACTERISTICS

Calves from Beefmaster sires averaged higher in dressing percentage and rib-eye area and carried less fat over the loin eye than those sired by Red Angus (Table 7). Calves from the nine groups of crossbred dams averaged higher in dressing percentage and rib-eye area and lower in rib fat than the controls. However, as shown by grouping according to breed of sire of dam, differences associated with breed cross of dam were negligible.

Steers dressed higher with larger rib eyes and less rib fat than heifers (Table 8). There were no interactions between sex, breed of terminal sire, or breed cross of dam.

SUMMARY

The progeny of the two terminal breeds, Beefmaster and Red Angus, were found to be very similar in feedlot and carcass performance. The slightly faster growth rate of Red Angus did not fully compensate for their lower average weaning weight[4] and their carcass weight per day of age was slightly less than that for Beefmaster progeny. Breed cross of dam was an important source of differences in feedlot growth. The best performance was given by progeny with Shorthorn as the maternal granddam and either Charolais or Simmental as the maternal grandsire. Progeny with Limousin as the maternal grandsire or Angus as the maternal granddam grew at the same rate as progeny from the control (H X A) dams. Breed of maternal grandsire and breed of maternal granddam did not influence carcass characteristics. However, progeny from control females produced lighter, fatter carcasses with lower dressing percentage and smaller rib-eye area than progeny of the other maternal crosses.

[4] Fredeen, H. T., Lawson, J. E., Newman, J. A., and Rahnefeld, G. W. 1974. First-calf performance of foreign X domestic hybrid heifers. Can. Dep. Agric. Publ. 1537.

TABLE 1. FEEDLOT CONCENTRATE RATIONS

Lacombe		Brandon	
Ingredients	Percentage of ration	Ingredients	Percentage of ration
Barley	73.2	Barley	50.0
Oats	15.0	Oats	30.0
Protein supplement (35%)	5.0	Dried molasses beet pulp	15.0
Dried molasses beet pulp	5.0	Molasses	2.8
Limestone	1.0	Calcium phosphate	0.5
Salt	0.47	Limestone	0.75
Calcium diphosphate	0.25	Urea (45% N feed grade)	0.5
Vitamin A	0.08	Salt	0.4
		Vitamin A	0.05

TABLE 2. AVERAGE DAILY FEEDLOT GAIN BY BREED OF TERMINAL SIRE AND SEX OF CALF

	Breed of terminal sire							
	Beefmaster			Red Angus			Average weight	
	kg/day	(lb/day)	No. of calves	kg/day	(lb/day)	No. of calves	kg	(lb)
Steers	1.24	(2.73)	180	1.24	(2.73)	238	1.24	(2.73)
Heifers	1.06	(2.34)	180	1.09	(2.41)	190	1.09	(2.40)
Terminal sire average	1.16	(2.55)	360	1.17	(2.58)	428		

TABLE 3. AVERAGE DAILY FEEDLOT GAIN BY STATION AND SEX OF CALF

	Brandon			Lacombe		
	kg/day	(lb/day)	No. of calves	kg/day	(lb/day)	No. of calves
Steers	1.21	(2.67)	219	1.26	(2.79)	199
Heifers	1.11	(2.45)	178	1.05	(2.31)	192
Station average	1.18	(2.60)		1.15	(2.54)	

TABLE 4. AVERAGE DAILY FEEDLOT GAIN FOR BEEFMASTER AND RED ANGUS CALVES RELATED TO BREED OF SIRE AND BREED OF DAM OF DAM

	Breed of terminal sire							
	Beefmaster			Red Angus			Breed group average	
	kg/day	(lb/day)	No. of calves	kg/day	(lb/day)	No. of calves	kg	(lb)
Breed of dam's sire								
Charolais	1.18	(2.60)	85	1.19	(2.63)	111	1.19	(2.62)
Simmental	1.17	(2.59)	121	1.20	(2.64)	144	1.19	(2.62)
Limousin	1.11	(2.45)	105	1.16	(2.55)	110	1.13	(2.50)
Breed of dam's dam								
Hereford	1.16	(2.57)	94	1.19	(2.63)	117	1.18	(2.60)
Angus	1.12	(2.48)	107	1.14	(2.52)	112	1.13	(2.50)
Shorthorn	1.19	(2.62)	110	1.21	(2.66)	136	1.20	(2.64)
Control H X A	1.14	(2.51)	49	1.12	(2.46)	63	1.12	(2.48)

TABLE 5. AVERAGE AGE AND CARCASS WEIGHT AT SLAUGHTER, AND CARCASS WEIGHT PER DAY OF AGE RELATED TO BREED OF DAM'S SIRE AND BREED OF TERMINAL SIRE

Breed of terminal sire	Breed of dam's sire			H X A (control)	Av for breed of terminal sire
	Charolais	Simmental	Limousin		
	Age at slaughter, days				
Beefmaster	423	426	427	424	425
Red Angus	427	427	427	432	428
Av for breed of dam's sire	425	426	427	428	
	Carcass weight at slaughter, kg (lb)				
Beefmaster	247 (545)	255 (562)	238 (526)	233 (515)	243* (537)
Red Angus	238 (525)	249 (549)	233 (515)	219 (483)	235 (518)
Av for breed of dam's sire†	242 (535)	252 (556)	235 (520)	226 (499)	
	Carcass weight per day of age, kg (lb)				
Beefmaster	0.58 (1.29)	0.60 (1.32)	0.56 (1.23)	0.55 (1.22)	0.57* (1.26)
Red Angus	0.56 (1.23)	0.58 (1.28)	0.54 (1.21)	0.51 (1.12)	0.54 (1.21)
Av for breed of dam's sire†	0.57 (1.26)	0.59 (1.30)	0.55 (1.22)	0.53 (1.17)	

*Significant breed of terminal sire effects.
†Significant breed of dam's sire effects.

TABLE 6. AVERAGE AGE AND CARCASS WEIGHT AT SLAUGHTER, AND CARCASS WEIGHT PER DAY OF AGE RELATED TO SEX OF CALF AND BREED OF DAM'S SIRE

Sex of calf	Breed of dam's sire			H X A (control)	Average
	Charolais	Simmental	Limousin		
	Age at slaughter, days				
Males	423	426	428	426	426
Females	428	427	427	430	428
	Carcass weight at slaughter, kg (lb)				
Males	256 (565)	262 (579)	248 (547)	237 (524)	251* (554)
Females	229 (505)	241 (532)	224 (494)	214 (473)	227 (501)
	Carcass weight per day of age, kg (lb)				
Males	0.60 (1.34)	0.62 (1.36)	0.58 (1.28)	0.55 (1.23)	0.59* (1.30)
Females	0.53 (1.18)	0.56 (1.24)	0.52 (1.16)	0.50 (1.10)	0.53 (1.17)

*Significant sex effects.

TABLE 7. CARCASS CHARACTERISTICS RELATED TO BREED OF DAM'S SIRE AND BREED OF TERMINAL SIRE

Breed of terminal sire	Breed of dam's sire			H X A (control)	Av for breed of terminal sire
	Charolais	Simmental	Limousin		
			Dressing percentage		
Beefmaster	60.2	59.8	60.4	59.2	59.9*
Red Angus	59.8	59.3	60.1	59.1	59.6
Av for breed of dam's sire†	60.0	59.5	60.2	59.2	
			Rib-eye area, cm^2 (sq in.)		
Beefmaster	71.6 (11.1)	71.6 (11.1)	70.9 (11.0)	65.8 (10.2)	69.7* (10.8)
Red Angus	69.0 (10.7)	69.7 (10.8)	69.7 (10.8)	61.9 (9.6)	67.1 (10.4)
Av for breed of dam's sire†	70.3 (10.9)	70.3 (10.9)	70.3 (10.9)	63.9 (9.9)*	
			Rib fat, mm (in.)		
Beefmaster	14.5 (0.57)	14.2 (0.56)	13.7 (0.54)	17.5 (0.69)	14.9 (0.59)
Red Angus	14.9 (0.59)	14.9 (0.59)	14.2 (0.56)	17.0 (0.67)	15.5 (0.61)
Av for breed of dam's sire†	14.7 (0.58)	14.7 (0.58)	14.2 (0.56)	17.3 (0.68)	

*Significant breed of terminal sire effects.
†Significant breed of dam's sire effects.

TABLE 8. DIFFERENCES IN DRESSING PERCENTAGE, RIB-EYE AREA, AND RIB FAT ASSOCIATED WITH SEX OF CALF AND BREED OF DAM'S SIRE

Sex of calf	Breed of dam's sire			H X A (control)	Average
	Charolais	Simmental	Limousin		
			Dressing percentage		
Males	60.3	59.6	60.4	59.3	59.9*
Females	59.7	59.4	60.1	59.1	59.6*
			Rib-eye area, cm^2 (sq in.)		
Males	72.3 (11.2)	71.6 (11.1)	72.3 (11.2)	65.8 (10.2)	70.3* (10.9)
Females	67.7 (10.5)	69.0 (10.7)	68.4 (10.6)	61.9 (9.6)	67.1 (10.4)
			Rib fat, mm (in.)		
Males	13.9 (0.55)	14.2 (0.56)	13.7 (0.54)	16.5 (0.65)	14.5 (0.57)
Females	15.8 (0.62)	15.2 (0.60)	14.5 (0.57)	18.0 (0.71)	16.0* (0.63)

*Significant sex effects.

CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor	Results in:	
LINEAR			
inch	x 25	**millimetre**	**(mm)**
foot	x 30	**centimetre**	**(cm)**
yard	x 0.9	**metre**	**(m)**
mile	x 1.6	**kilometre**	**(km)**
AREA			
square inch	x 6.5	**square centimetre**	**(cm^2)**
square foot	x 0.09	**square metre**	**(m^2)**
acre	x 0.40	**hectare**	**(ha)**
VOLUME			
cubic inch	x 16	**cubic centimetre**	**(cm^3)**
cubic foot	x 28	**cubic decimetre**	**(dm^3)**
cubic yard	x 0.8	**cubic metre**	**(m^3)**
fluid ounce	x 28	**millilitre**	**(mL)**
pint	x 0.57	**litre**	**(L)**
quart	x 1.1	**litre**	**(L)**
gallon	x 4.5	**litre**	**(L)**
WEIGHT			
ounce	x 28	**gram**	**(g)**
pound	x 0.45	**kilogram**	**(kg)**
short ton (2000 lb)	x 0.9	**tonne**	**(t)**
TEMPERATURE			
degrees Fahrenheit	($^\circ$F-32) x 0.56 or ($^\circ$F-32) x 5/9	**degrees Celsius**	**($^\circ$C)**
PRESSURE			
pounds per square inch	x 6.9	**kilopascal**	**(kPa)**
POWER			
horsepower	x 746	**watt**	**(W)**
	x 0.75	**kilowatt**	**(kW)**
SPEED			
feet per second	x 0.30	**metres per second**	**(m/s)**
miles per hour	x 1.6	**kilometres per hour**	**(km/h)**
AGRICULTURE			
gallons per acre	x 11.23	**litres per hectare**	**(L/ha)**
quarts per acre	x 2.8	**litres per hectare**	**(L/ha)**
pints per acre	x 1.4	**litres per hectare**	**(L/ha)**
fluid ounces per acre	x 70	**millilitres per hectare**	**(mL/ha)**
tons per acre	x 2.24	**tonnes per hectare**	**(t/ha)**
pounds per acre	x 1.12	**kilograms per hectare**	**(kg/ha)**
ounces per acre	x 70	**grams per hectare**	**(g/ha)**
plants per acre	x 2.47	**plants per hectare**	**(plants/ha)**