PRELIMINARY CARCASS AND MEAT RESEARCH RESULTS FROM CYCLE IV OF THE CATTLE GERM PLASM EVALUATION PROGRAM[1]

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Summary

Preliminary data representing two of five calf crops in Cycle IV of the Germ Plasm Evaluation Program are reported. Carcass and meat data from 454 steers produced by mating 11 sire breeds to Hereford and Angus dams were obtained. Hereford (H) and Angus (A) sires born in the late 1960's (original) and also 1982 to 1984 (new) were compared. Steers sired by the new sample of H and A sires were heavier at slaughter than those of original sires, whereas marbling and percentages of trimmed retail product (% TRP) have not changed. HA and AH had lower % TRP than most crosses. Longhorn crosses were lightest of all crosses and were average for % TRP and % Choice. Shorthorn crosses were similar to new HA and AH in % TRP and had a higher % Choice than all crosses. Piedmontese crosses were lighter and dressed higher than new HA and AH. A low percentage graded Choice, but they excelled in muscling, trimness, and % TRP. Steaks from Piedmontese crosses were more tender than those from most breeds. Salers crosses had similar weights, less fat, larger ribeyes, and higher % TRP than new HA and AH, but a lower % Choice. Nellore crosses excelled in dressing percentage but had the least tender steaks.

Breeds differed significantly in slaughter and carcass weights, dressing percentages, carcass composition, marbling, and meat tenderness. Breeds did not rank the same for marbling as they did for tenderness.

(Key Words: Breeds, Performance, Carcass Traits, Tenderness, Meat.)

Introduction

Market demands have changed significantly over the last two decades and likely will continue to change in the future. Thus, breeds representing different biological types need to be characterized for carcass and meat traits. In addition, genetic changes of currently popular breeds need to be evaluated. This report focuses on carcass and meat traits of different biological types of cattle.

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[1]This article was written from preliminary research results presented at the 1989 American Society of Animal Science Meetings. Data are from two of five calf crops in Cycle IV of the Germ Plasm Evaluation Program being conducted at the Roman L. Hruska U.S. Meat Animal Research Center, Clay Center, Nebraska. Michael E. Dikeman is a collaborator on the carcass retail product data collection.

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Experimental Procedures

Cycle IV of the Germ Plasm Evaluation Program began in 1985. These preliminary results are from two of five calf crops to be evaluated through 1990. Data are for 454 F_1 crosses obtained by mating Longhorn, Salers, Piedmontese, Galloway, Nellore, Charolais, Gelbvieh, Pinzgauer, Hereford, and Angus sires (about 30 sires per breed) to Hereford and Angus dams. Original Hereford (H) and Angus (A) sires used in Cycle I (1969 and 1970) have been used as reference sires throughout the program. H and A sires born from 1982 to 1984 (new) were also utilized to evaluate genetic trends in these breeds. Charolais, Gelbvieh, and Pinzgauer sires were included to increase ties to previous cycles of the program. Cows were bred AI for 45 d and then run with clean-up bulls for 21 d. Calves were born from mid-March to late May and were weaned at about 200 d of age. Steers (castrated at birth) were fed two backgrounding diets containing 2.7 Mcal ME/kg until about 700 lb, at which time they were placed on a 70% corn, 25% corn silage, 5% supplement diet (DM basis, 3.04 Mcal ME/kg). They were fed this diet until they were slaughtered serially in four groups about 3 wk apart, beginning at about 13½ mo of age.

Carcass USDA yield and quality grade data were obtained, and one side of each carcass was fabricated into boneless, retail cuts trimmed to 0.30 in. fat thickness. Retail cuts were then trimmed free of fat (0.00 in.) and reweighed. A rib steak from each carcass was cooked and sheared with a Warner-Bratzler shear device.

Results and Discussion

Data in Tables 15.1 and 15.2 show that new HA and AH crosses had heavier final and carcass weights than original HA and AH crosses, whereas dressing percent (Dr%) and percentage grading USDA Choice (% Choice) were similar. On the other hand, ribeye area did not increase, so ribeye area/cwt carcass tended to decrease. Both the original and new HA and AH and Shorthorn crosses had the lowest percentages of trimmed retail product (% TRP) at both 0.3 and 0.0 in. fat trim. Original HA and AH had lower ribeye shear values than current HA and AH.

Pinzgauer crosses were comparable to new HA and AH in weights but had lower Dr% and a lower % Choice. They had less fat thickness and somewhat higher % TRP than HA and AH. Gelbvieh crosses were slightly heavier than new HA and AH, had similar Dr%, and had a much lower % Choice. They had considerably less fat, larger ribeyes, and higher % TRP. Shear values were average. Charolais crosses had the heaviest weights of all crosses, average Dr%, and a lower % Choice than HA and AH. They had less fat, larger ribeyes, and higher % TRP than HA and AH. Shear values were about average.

Longhorn crosses had the lightest weights of all crosses, below average Dr%, and a lower % Choice than HA and AH. They had less fat and higher % TRP than HA and AH. Ribeye areas/cwt carcass were larger than those of new HA and AH. Shear values were about average. Galloway crosses were heavier than Longhorn crosses, but lighter than all other crosses. Dr% and % Choice were about average. Ribeyes were similar to those of HA and AH but they had less fat and higher % TRP. Shear values were average. Shorthorn crosses tended to be heavier than new HA and AH, and had similar Dr%. They had higher marbling scores and a higher % Choice than all other crosses. They were similar to new HA and AH in fat thickness, ribeyes, and % TRP.

Table 15.1. Mean Final Weight, Carcass Weight, Dressing Percentage, Marbling Score, and Percentage Grading USDA Choice of Breed-crosses

Breed group	No. steers	Final wt, lb	Carcass wt, lb	Dressing %	Marbling score[a]	% USDA Choice
Original HA and AH	32	1,064	665	62.5	Sm^{25}	71
New HA and AH	41	1,122	699	62.3	Sm^{16}	67
Pinzgauer crosses	50	1,129	690	61.0	Sm^{00}	47
Gelbvieh crosses	65	1,139	709	62.1	Sl^{87}	32
Charolais crosses	36	1,186	737	62.1	Sl^{79}	40
Longhorn crosses	38	961	596	61.9	Sl^{98}	52
Galloway crosses	32	1,012	636	62.8	Sl^{97}	49
Shorthorn crosses	43	1,149	715	62.2	Sm^{57}	83
Piedmontese crosses	37	1,060	683	64.4	Sl^{60}	28
Salers crosses	36	1,122	707	62.9	Sl^{78}	35
Nellore crosses	44	1,100	720	65.3	Sl^{68}	29
Mean LSD .05		40	26	.7	25	19

[a]Slight = Sl^{00} to Sl^{99}, Small = Sm^{00} to Sm^{99}.

Piedmontese crosses were lighter than new HA and AH, but had significantly higher Dr%. They had much lower % Choice than HA and AH. They had less fat thickness and larger ribeyes than all crosses and yielded the highest % TRP of all crosses. Their high Dr% was apparently due to their superior muscling. Interestingly, they had lower ribeye shear values than most crosses, even though they had the least fat thickness and had low marbling scores.

Salers crosses were similar in weights to new HA and AH, and their Dr% was slightly above average. They had much lower % Choice than HA and AH. Salers crosses had less fat thickness, larger ribeyes, and higher % TRP than HA and AH. Their tenderness was about average.

Nellore crosses were intermediate in final live weight to original and new HA and AH, but their carcass weights tended to be heavier because of their exceptionally high Dr%. Their % Choice was very low and comparable to that of Piedmontese crosses. They had larger ribeyes and higher % TRP than HA and AH. Shear values for Nellores were distinctly higher than for all other crosses, which would probably result in consumer complaints about toughness. Breeds did not rank the same for marbling as they did for tenderness.

Table 15.2. Mean Fat Thickness, Ribeye Area, Kidney Knob, Retail Product, and Shear Force of Breed-crosses

Breed group	Fat thickness, in.	REA[a]	Kidney knob, %	Retail product, % .30 in. fat	Retail product, % .00 in. fat	W.B. shear force, lb[b]
Original HA and AH	.60	11.1	2.8	70.5	64.6	12.0
New HA and AH	.56	11.0	2.5	71.0	65.2	13.7
Pinzgauer crosses	.41	11.4	2.9	72.3	67.0	12.3
Gelbvieh crosses	.36	12.2	2.6	73.8	68.5	13.5
Charolais crosses	.41	12.5	2.9	73.3	68.1	13.8
Longhorn crosses	.38	10.8	2.8	73.2	67.7	13.4
Galloway crosses	.47	11.1	2.6	73.4	67.8	13.3
Shorthorn crosses	.51	11.1	2.8	70.6	65.0	13.3
Piedmontese crosses	.27	13.4	2.3	77.8	73.3	11.6
Salers crosses	.43	11.9	2.8	73.6	68.2	14.0
Nellore crosses	.53	11.7	2.8	73.1	67.6	16.3
Mean LSD .05	.06	.5	.3	1.0	1.1	1.5

[a]Ribeye area, sq. in.
[b]Higher Warner-Bratzler (W.B.) shear values mean less tender meat.

The cattle Germ Plasm Evaluation (GPE) research program began with the 1969 breeding season. The primary objective is to characterize different biological types of cattle for economically important traits from conception to consumption. This research program is the largest, most comprehensive one of its kind, and results from it are utilized around the world. Each cycle involves different breeds and/or biological types; cycle IV is the most recent.

The basic procedure involves mating Hereford and Angus cows to representative sires of different breeds. Steer progeny are finished and slaughtered serially from about 13 1/2 mo to 16 mo of age. Carcasses are fabricated into closely trimmed retail cuts and meat is evaluated for palatability. Heifer mates are retained and evaluated for maternal traits.

Michael E. Dikeman has cooperated on the carcass and meat aspects of the GPE program since the first progeny were slaughtered in 1971. Carcass steer progeny will have been obtained when cycle IV is completed. Results from this project are useful to researchers, cattlemen and meat processors alike.