



GeneMax™ Field Study Summary

Introduction

GeneMax™ (GMX) is a DNA test marketed by Certified Angus Beef LLC. It quantifies marbling and post-weaning growth potential in high-percentage ($\geq 75\%$) commercial Angus cattle.

GeneMax Score

GMX™ Scores are calculated by applying economic weighting factors to genomic results. A GMX Score from 1 to 100 is provided for each animal tested, where higher values represent greater genetic potential for economic return from combined gain and grade. Separate, percentile ranking-based values from 1 to 5 are calculated for the component traits of marbling and gain, with higher values for higher genetic merit.

Materials and Methods

A field study was conducted to determine GMX effectiveness in a practical feedlot situation. It made use of 173 high-percentage Angus steers from one ranch in southwest Kansas, delivered to Pratt Feeders near Pratt, Kan. All steers were weighed, tag numbers recorded and blood samples drawn for the test to determine GMX Score. Steers were divided into two pens and fed twice daily.

When steers were visually determined to have 0.50" of 12th/13th rib fat, they were harvested on two sorting dates at a commercial beef packing plant in Dodge City, Kan., where carcass information was measured and recorded.

After all steers were harvested, they were divided into four treatment groups based on the GMX Score: High, 80-99 (H; n=83); Mid-High, 60-79 (MH; n=32); Mid-Low, 40-59 (ML; n=30) and Low (L; n=28). Since average beginning weights were significantly different between treatment groups, the statistical model was adjusted for in-weight when appropriate on outcomes measured.

Results and Discussion

Marbling score: The marbling score at harvest was greater for H steers than for ML and L steers, but was similar to MH steers. (See Table 1).

Average daily gain: While numerically higher, ADG were not statistically different among the four groups. H and MH both had greater ADG than ML and L. This was likely due to the lower difference in the 1-5 Scores on the Gain component. From the H group with an average Gain Score of 4.64 to the L group with a score of 2.86, the net difference was only 1.78. Conversely, in the Marbling Score component, the range from H to L was 4.52 to 1.61, or a difference of nearly 3 points. (See Table 1).

Hot carcass weights, 12th/13th rib fat thickness, days on feed, calculated yield grade and carcass value, were also not significantly different. However, purely from a numerical view, hot carcass weights were 6 pounds heavier for H and MH than for L, and resulting per-carcass values were approximately \$30 higher than the L group of steers. Ribeye area was significantly larger in ML steers compared with H, but it was not different from the other two groups. (See Table 2).

In addition, in an odds-ratio statistical analysis, H and MH steers were nearly 5 times more likely to qualify for the *Certified Angus Beef*® brand than the L group. (See Table 3).

Summary

GMX Score is a reliable indicator of marbling score and post-weaning gain in high-percentage, commercial Angus cattle. Using this test together with EPDs can accelerate breeding programs to produce calves that will more easily reach *Certified Angus Beef*[®] brand acceptance, building in more net dollars to any commercial Angus program.

Table 1 - Marbling Score and Average Daily Gain by GMX Score Groups

GMX Score Group	No. head	Feedlot In-Weight, lbs.	Days on Feed	Avg. GMX TM Score	Avg. GMX TM Marbling Score	Marbling Score*	Avg. GMX TM Gain Score	Average Daily Gain**
High	83	811.5 ^a	142.0	90	4.52 ^a	538 ^a	4.64 ^a	4.33
Mid-High	32	827.5 ^{ab}	142.0	70	3.19 ^b	518 ^{ab}	4.06 ^b	4.36
Mid-Low	30	854.1 ^b	143.9	52	2.63 ^b	479 ^b	3.53 ^b	4.27
Low	28	838.9 ^{ab}	143.2	25	1.61 ^c	466 ^b	2.86 ^c	4.22

^{ab}Means within a column with unlike superscripts differ (P<0.05). Since feedlot in-weights were significantly different between treatment groups, models were adjusted for in-weight on outcomes measured.

*Marbling Score: 400 = Small⁰ (USDA Low Choice); 500 = Modest⁰ (USDA Middle Choice; minimum standard for *Certified Angus Beef* specifications).

**Average Daily Gain was calculated from hot carcass weight and dividing by a standard 63.5% dressing percentage.

Table 2 - Carcass measurements and dollar values by GMX Score Groups

GMX Score Group	Hot Carcass Weight, lbs.	Fat Thickness, inches	Ribeye area, sq. inches	Calculated Yield Grade	Total Carcass Value (\$/head)
High	915.1	0.52	14.44 ^a	3.41	\$ 1923.94
Mid-High	915.4	0.52	14.63 ^{ab}	3.55	\$ 1926.42
Mid-Low	910.8	0.48	15.21 ^b	3.22	\$ 1893.21
Low	908.8	0.47	14.90 ^{ab}	3.23	\$ 1894.07

^{ab}Means within a column with unlike superscripts differ (P<0.05).

Table 3 – The effect of GMX Score Groups on the CAB acceptance rate of Angus steer calves

GMX Score Group	No. of CAB calves	Total calves in the group	CAB Acceptance Rate (%)	Odds Ratio ^a	P-Value
High	58	83	69.88	4.96	0.0013
Mid-High	21	32	65.63	4.62	0.0077
Mid-Low	13	30	43.33	2.35	0.1394
Low	8	28	28.57	1.00	-----

^aThe odds of Angus calves qualifying for CAB in each treatment group compared with Angus calves with GeneMax scores of 4 to 39.

^bThe 95% confidence intervals for the odds ratios.

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