

Magnified Economic Returns

New economic analysis highlights how much more Hereford and heterosis contribute to the bottom line of commercial cow-calf operations.

by *Wes Ishmael*

Using Hereford bulls rather than Angus bulls in commercial Angus herds significantly increases an operation's net worth per cow and the average income generated per cow over time, according to a recent analysis conducted by the University of Tennessee (UT).

"The key reason is the value of maternal heterosis, in general terms, and the specific performance advantages inherent to the Hereford breed," explains Charley Martinez, UT Extension livestock economist. "For instance, previous

commercial Angus calves. There are fewer open cows with the black baldy females each year, less cow depreciation and more calves to market. At the same time, direct heterosis adds weaning and yearling weight to each calf marketed."

Martinez conducted the analysis for the AHA, utilizing previous AHA research documenting the performance of Hereford bulls compared to Angus bulls when used on Angus-based cowherds. Specially, he examined the impact for a herd of 30 cows and a herd of 500 cows.

Martinez used 10-year price projections from the Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri. Estimated acreage and management decisions were based on USDA's *Structure, Management Practices, and Production Costs of U.S. Beef Cow-Calf Farms (2023)*. Annual budgets were created based on state cow-calf budgets.

"Using the USDA publication, we have the number of acres associated with the operations, the fixed costs associated with them, the feed costs and any cash reserves that a producer would have, on average, and then we project forward using FAPRI prices," Martinez explains.

In broad terms, for each herd size of the Hereford-sired and Angus-sired calves, the model uses random pools of performance data, cost data, expenses and income.

Each model represents 500 simulations for each year of the 10 years. Next, Martinez

evaluated the difference between the Hereford and Angus models for annual net farm income and net worth.

"Cash is king. Producers always ask us about net farm income. That's what determines their tax liability and



Using Hereford bulls rather than Angus sires on commercial Angus cows bolstered the herd's income by more than 20% over a decade, according to new research. This added income comes largely from the maternal heterosis of black baldy replacements.

research conducted for the American Hereford Association (AHA) documented a 7% pregnancy advantage and a weaning weight advantage of 12.1 pounds for Hereford-sired commercial black baldies compared to Angus-sired

Sources:

¹Net farm income accounts for all receipts from sales and fixed and variable costs.

²Annual net worth utilizes operations' income statement, cash flow statement and balance sheet.

Table 1: Average Annual Net Farm Income for Angus and Hereford Sired Herds (2023-2032) based on 500 Simulations per Year

Net Farm Income for 500 Head										
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Hereford Sired	\$239,889.53	\$266,798.77	\$258,298.95	\$230,271.15	\$234,386.94	\$220,598.18	\$200,305.05	\$219,860.92	\$210,558.42	\$230,976.77
Angus Sired	\$247,391.57	\$230,061.19	\$212,197.27	\$195,595.19	\$180,274.86	\$165,630.33	\$156,961.92	\$154,723.40	\$157,646.93	\$162,291.42
Difference	(\$7,502.04)	\$36,737.58	\$46,101.68	\$34,675.96	\$54,112.08	\$54,967.85	\$43,343.13	\$65,137.52	\$52,911.48	\$68,685.36
Difference per Head	(\$15.00)	\$ 73.48	\$92.20	\$69.35	\$108.22	\$109.94	\$86.69	\$130.28	\$105.82	\$137.37
10-Year Average: \$89.93										
Net Farm Income for 30 Head										
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Hereford Sired	\$9,214.61	\$15,922.79	\$15,468.09	\$14,563.64	\$13,740.84	\$12,957.54	\$11,478.92	\$12,826.39	\$11,904.57	\$13,633.44
Angus Sired	\$14,977.19	\$13,340.14	\$12,322.43	\$11,372.21	\$10,499.05	\$9,664.34	\$9,165.91	\$9,027.19	\$9,173.81	\$9,418.37
Difference	(\$5,762.58)	\$2,582.65	\$3,145.65	\$3,191.43	\$3,241.78	\$3,293.20	\$2,313.01	\$3,799.20	\$2,730.76	\$4,215.07
Difference per Head	(\$192.09)	\$86.09	\$104.86	\$106.38	\$108.06	\$109.77	\$77.10	\$126.64	\$91.03	\$140.50
10-Year Average: \$75.83										

Table 2: Average Annual Net Worth for Angus and Hereford Sired Herds (2023-2032) based on 500 Simulations per Year

Net Worth for 500 Head										
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Hereford Sired	\$1,428,042.40	\$1,614,432.85	\$1,801,391.55	\$1,980,093.87	\$2,179,776.07	\$2,366,509.32	\$2,559,830.01	\$2,798,870.48	\$3,033,485.87	\$3,307,254.04
Angus Sired	\$1,423,176.87	\$1,586,315.26	\$1,744,284.70	\$1,900,653.06	\$2,052,007.35	\$2,203,861.88	\$2,368,997.07	\$2,549,779.01	\$2,749,246.80	\$2,962,270.34
Difference	\$4,865.53	\$28,117.58	\$57,106.85	\$79,440.82	\$127,768.72	\$162,647.45	\$190,832.94	\$249,091.48	\$284,239.07	\$344,983.70
Difference per Head	\$9.73	\$56.24	\$114.21	\$158.88	\$255.54	\$325.29	\$381.67	\$498.18	\$568.48	\$689.97
10-Year Average: \$305.82										
Net Worth for 30 Head										
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Hereford Sired	\$151,600.06	\$166,913.44	\$183,085.22	\$199,188.20	\$215,102.47	\$231,315.54	\$247,898.16	\$268,507.96	\$288,236.46	\$312,071.26
Angus Sired	\$126,280.51	\$139,037.07	\$152,132.23	\$165,067.34	\$177,730.14	\$190,594.43	\$204,601.81	\$219,826.28	\$236,469.24	\$254,340.64
Difference	\$25,319.55	\$27,876.36	\$30,952.98	\$34,120.86	\$40,721.11	\$43,296.35	\$48,681.68	\$51,767.22	\$57,730.63	\$4,215.07
Difference per Head	\$843.98	\$929.21	\$1,031.77	\$1,137.36	\$1,245.74	\$1,357.37	\$1,443.21	\$1,622.72	\$1,725.57	\$1,924.35
10-Year Average: \$1,326.13										

cash reserves,” Martinez says. “Any decision that impacts cashflow has long-term effects. The decision to alter what you buy or not sell, for instance, has a short-run effect on a producer’s net farm income in a given year.”

Longer term, all of those decisions contribute to net worth over time.

“People who choose to run cattle on their land are choosing to utilize those resources to generate wealth into the future rather than using the same resources to invest in the stock market, as an example,” Martinez explains. “Take your three classic financial documents, the income statement, your cashflow statement and your balance sheet. They show your operation’s net worth, and a key part of that is current assets including cash on hand. That’s why cash is king from an accounting standpoint.”

Analysis results

Net Farm Income¹ (see Table 1)

- At the end of 10 years, breeding commercial Angus cows to a Hereford bull returns an average of \$90 more per cow per year in a 500-cow herd, compared to breeding commercial Angus cows to an Angus bull.
- At the end of 10 years, breeding commercial Angus cows to a Hereford bull returns an average of \$76 more per cow per year in a 30-cow herd, compared to breeding commercial Angus cows to an Angus bull.
- Net farm income is larger in the Angus-sired herds for the first two years as Hereford-sired herds retain more replacements, foregoing increased cash sales.

continued on page 14...

Net Worth² (see Table 2)

- Across 10 years, breeding commercial Angus cows to a Hereford bull returns an average of \$305 more per cow per year in a 500-cow herd, compared to breeding commercial Angus cows to an Angus bull.
- Across 10 years, breeding commercial Angus cows to a Hereford bull returns an average of \$1,326 more per cow per year in a 30-cow herd, compared to breeding commercial Angus cows to an Angus bull. The significant difference in value, compared to the 500-head herd is because each single head contributes more relative value to the smaller herd.

Martinez emphasizes the magnitude of difference rather than the specific dollar amounts is the key take-away from the analysis since every operation is unique. For instance, the average income generated per cow was 21% more for the 30-head herds using Hereford bulls rather than Angus. It was 24% more in the 500-head herds.

“As a producer retains more black baldy females over time, the net impact of maternal heterosis is magnified. That’s what is driving the significant economic advantage over time,” Martinez says. “The bottom line is that with the rational assumptions made in these models, Hereford bulls returned significantly more average annual net income per cow per year and significantly more average annual net worth per cow per year than using Angus bulls in a commercial Angus herd over time.”

While economic advantages are similar for both herd sizes, Martinez notes, “There is added benefit for smaller herds in that they are able to achieve the economic gain although they lack the economies of scale typically associated with the larger herds.”

Martinez also calculated net present value associated with the decision to use Hereford rather than Angus bulls. “Whether it was the 30-head herd or the 500-head herd, using Herefords offered a three to one advantage,” he says.

Control what you can

The UT analysis also underscores the impact of management decisions over time and the value of managing for the longer term rather than year to year, according to Martinez.

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— Charley Martinez, University of Tennessee

“The bull someone buys is one of the most consequential decisions of a cattle operation,” Martinez says. “For the most part, we don’t have much control over what we get in terms of price, but what we can control is management and our inputs. We do have control over how we use everything in between to help with the variable costs, help with the fixed costs and help our bottom line.” **BA**

Model Assumptions and Details

Ten-year models were developed for 30-cow and 500-cow commercial Angus herds utilizing a Hereford bull or an Angus bull. These models incorporated cattle-cycle effects on returns to enterprise cattle sales (premiums for black-hided animals) and fluctuating input prices (estimates taken from Food and Agricultural Policy Research Institute — FAPRI). Model results were compared to analyze impacts on an operation’s net worth and net farm income.

For each model, estimated acreage and management decisions were based on *Structure, management Practices, and Production Costs of U.S. Beef Cow-Calf Farms*, USDA (2023). Replacement percentages started at 15% and gradually increased to 35%.

- Each model divides female and male animals into classes (mature cows, heifers and bulls) with costs for the feed for each class allocated according to diets developed by Land Grant university budgets.
- Input prices (cost per acre, total labor, fixed costs, and fuel and utilities) and feed costs are based on FAPRI production estimates and prices paid and received by farmers (2023 U.S. Agricultural Market Outlook).
- Annual budgets were created and connected over a 10-year period to achieve results.
- Prices were estimated and adjusted using FAPRI long-term forecasts over the same 10-year period.
- Sales of all animals were assumed to occur in the same pattern between the Hereford and Angus sire groups; however, one group may have more or less animals to sell based on the long-run production of calves and herd growth.
- The end results represent a 10-year annual cash flow and net worth difference between the two herd sizes.
- The models assume constant breeding and calving intervals. The results can alter if the herd has inconsistent or long breeding seasons (Boyer et al., 2020) . **BA**