Herefords’ Undisputed Role in the Industry

by Craig Huffhines, American Hereford Association executive vice president

For several years now, I have talked about the nonsensical demands placed on black hide color within the U.S. cattle industry. For years the U.S. beef sector has promoted and almost institutionalized the breeding of the national cow herd to an Angus or black-hided base. Hence, at least a dozen other breeds of cattle have followed suit in the chase of a more marketable animal since hide color has been more or less the deciding factor in sorting cattle into perceived quality groups.

A couple of years back, I had a discussion regarding breed improvement programs with a breed executive of one of the “turned black” breeds. We were talking about the top few reasons cows were being disposed of from our respective registered cow herds.

In the Hereford breed, cows were culled because they were old, they were open or they were tailing off on their production cycle, among others. For the other breed, the No. 1 factor for cows being culled was because of color. The breed was systematically eliminating genetics that many breeders had spent a lifetime developing because the cows were not black. Now that, to me, is throwing the baby out with the bath water, but it has become common practice within our industry.

Today the economic cycle of the U.S. beef industry is dramatically changing along with other industries struggling to make ends meet in a difficult recessionary economy. All of us are facing growing demands on input costs. The current government administration is, of all things, contemplating an added tax on beef producers because of the natural biological emissions cattle produce.

The term “cap and trade” is certainly an appropriate title to a tax that will absolutely cap profitability and kill trade. The green movement, as irrational as it might seem sometimes, is not going away. The feedlot industry is struggling not only to make money but simply to limit their losses during this down turn, and the American consumer is looking for a high-quality beef product purchased at a bargain.

I outline these trends simply because the American Hereford Association (AHA) Board, as well as Hereford breeders, understands that we must make our cattle better in order to compete; and we have! While working on things that improve the quality of our seedstock, we have also invested a great deal in research that has quantified what the Hereford breed can do for the cow-calf sector, the feedlot sector and the food industry to help during trying times.

The Harris Ranch project along with the Circle A project documented the real world heterosis advantages that the Hereford breed brings to the table when crossed with Angus and Angus-cross cows. This heterosis/hybrid vigor effect directly affects long-term profitability of a cow-calf operation more dramatically than what most producers realize.

Cash flow, herd size, retained fertility and longevity are major drivers of cow-calf profitability. They are difficult to continued on back page…
Project Proves Profitability of Hereford-Angus Cross

Economic analysis of Circle A Ranch Heterois Project results predicts an advantage of $514 net per cow over a period of 10 years.

Using Hereford bulls on Angus-based cows will give producers advantages in profitability, cash flow, herd size, and retained female fertility and longevity according to a recently completed study at Circle A Angus Ranch. In fact, when the data were further analyzed for economic emphasis, the results showed an advantage of $514 net per cow over a period of 10 years. That’s a $51 difference per cow per year.

Economic models also predicted that if replacement females are retained over a period of 10 years, Hereford-sired females will generate a 20% advantage in herd size for the same relative cost versus the straight Angus commercial cows because of increased fertility and longevity.

The study, conducted by Circle A Ranch headquartered in Iberia, Mo., in cooperation with the American Hereford Association (AHA), was started in 2007. Mark Akin, Circle A Ranch manager, says, “The female side was what really peaked my interest, because we’ve bred purebred Angus for all these years, and I was curious if the heterosis from the cross would make available a better conception rate for us, and it did.”

To start the project, Circle A Ranch AI-bred 600 commercial Angus cows to 10 Hereford bulls with the goal of comparing the best of its Angus herd to the best of the Hereford-Angus cross. The control group included progeny from three proven Angus sires. The average expected progeny differences (EPDs) of the Angus sires would place them in the top 30% of the Angus breed for birth weight and top 20% of the breed for weaning weight. All of the cows and resulting calves were commingled and managed the same.

Data were collected by Circle A staff and interpreted by Dan Moser, Kansas State University associate professor of...
The steers were placed on feed efficiency test at Circle A Feeders. Individual feed intake was recorded and evaluated.

**About the project**

In 2007 Circle A Ranch, Iberia, Mo., agreed to participate in a research project with the American Hereford Association designed to determine and measure the advantages of using Hereford genetics on commercial Angus cows.

Circle A used 10 Hereford bulls with the goal of comparing the best of its Angus herd to the best of the Hereford-Angus cross.

Throughout the project, weaning weight and economically relevant traits such as feedlot gain, feed efficiency and fertility of the black baldie females were all measured and compared to straight commercial Angus cattle. Dan Moser, associate professor of genetics at Kansas State University, analyzed and interpreted the collected data.

Results from the project documented the Hereford efficiency advantage. With a 7% increase in conception rate, along with improved feed efficiency and average daily gain, Herefords were proven the right choice for commercial producers today.

**Project specifics:**

- 600 Circle A commercial Angus females were randomly AI-bred to 10 Hereford sires, of both proven and unproven genetics.
- The control group included progeny from three proven Angus sires, one being the top Angus sire for registrations in 2008. The average EPDs of the Angus sires would place them in the top 30% of the Angus breed for birth weight and top 20% of the breed for weaning weight.
- Average birth weight for the Hereford-sired calves was 72 lb, 3 lb. heavier than the Angus sires, but still desirable and nearly ideal for commercial operations.
- At weaning the Hereford-sired calves were 11.9 lb. heavier than the Angus-sired calves, despite the Angus sires ranking in the top 20% of their breed for weaning weight EPD.
- Resulting heifer calves were developed and bred at Circle A’s Lineville, Iowa, ranch. The Hereford-sired heifers showed their prowess as productive females by boasting a 7% advantage in conception rate over the Angus heifers.
- Seventy-five of the bred heifers were sold at Circle A’s annual production sale and averaged $110 more per head than their commercial Angus counterparts.
- Maternal traits and the effect on birth and weaning weights of the calves will continue to be measured as the retained heifers calve and rebreed.
- Although difficult to measure, Circle A staff members say they were impressed with the baldie’s quiet, easy-to-handle disposition as well.
- Pierce evaluated the performance differences between the Hereford and Angus groups including birth, weaning and feedlot growth and carcass data on the steer calves and pregnancy rates from the female progeny of the sire groups. He developed an economic model projecting the added value of Hereford heterosis over a 10-year period.
- Pierce says, “The bottom line is if a rancher with Angus-based cows uses Hereford bulls compared to using Angus bulls and gets the same response as we had in this study, he will have improved cash flow, increased herd size and more calves to sell over a 10-year period.”

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Believing in Heterosis

John and Mark Lacey are presented the AHA Hereford Industry Innovator Award for their years of service to the beef industry and their cooperation in the Harris Ranch heterosis project.

Third and fourth generation cattlemen, John and Mark Lacey, are true leaders in the beef industry. The father-son team, based in Independence, Calif., raise cattle and horses.

“John and Mark Lacey have been faithful servants to the U.S. beef industry for decades,” says Craig Huffhines, American Hereford Association (AHA) executive vice president. “John has held the top level leadership role of our industry as president of the former National Cattlemen’s Association back in the 1990s.”

Since 2005 Lacey Livestock has been cooperating with AHA, Harris Feeding Co. and Harris Ranch Beef Co. in a research project studying the value of heterosis. The objective of the project is to conduct a controlled crossbreeding system comparing progeny sired by Hereford and Angus bulls under commercial conditions, emphasizing economic differences at the ranch, feedlot and packing plant.

John Lacey says he is happy with the research project results. “We reaffirmed the value of heterosis and saw an improvement in weaning weight, health and feed conversion,” he says. “We believe the project was done in a real-world commercial setting and others should experience the same results.”

In early December the Lacey calves were shipped from the backgrounding lot in Smith Valley, Nev., to the feedlot in Coalinga, Calif. Mark Lacey says their 2008 calf crop had one of their highest weaning weight averages in recent years. He attributes the increased pounds to crossbreeding as well as improved feed sources.

“When we asked John and Mark if they would be willing to work with us on the Harris Ranch study, they both jumped at the opportunity,” Huffhines says. “They have always been loyal to the industry first. They have strived to protect our ranching rights, and they have never turned down an opportunity to evaluate those things that can make commercial cattlemen more profitable.”

The AHA recognized the Lacey family in Denver by presenting them with the AHA Hereford Industry Innovator Award for their years of service to the beef industry and their commitment and cooperation with the Harris Ranch heterosis project.

Ranching tradition

The Lacey family has been ranching in California since 1870. After settling in the Owens Valley, Mark B. Lacey and his son expanded the operation to include 15,000 acres of city of Los Angeles lease land that increased their carrying capacity to 1,000 head. The ranch began with Hereford and Shorthorn cattle. In 1960 Angus cattle were introduced to replace the Shorthorns.

Mark B. Lacey passed away in 1964, leaving John and his wife, Dee, along with their children, Mark and Nicki, to continue to manage Lacey Livestock. John and son Mark still ranch most of the original Lacey outfit. They have divested themselves of all federal lands and have added 40,000 acres more to the Owens Valley Ranches. Altogether, Lacey Livestock is 60,000 acres with approximately 2,000 cows.

Today the Lacey family ranch is a cow-calf and stocker operation. They also raise Quarter Horses, and in 2003 Lacey Livestock earned the title of American Quarter Horse Association Remuda of the Year.

The Lacey family owned several ranches in San Luis Obispo County that they sold in 2000 to purchase the historic Dressler Ranch in Bridgeport, Calif. This ranch has 7,000 acres and annually is home to 8,000 steers. Lacey Livestock purchased this ranch with David Wood under the Centennial Livestock partnership. The partners completed an easement with the American Land Conservancy and the California Rangeland Trust. This ranch will be preserved for perpetuity. Centennial Livestock also leases 230,000
acres of the historic Tejon Ranch, south of Bakersfield, which is home to about 7,000 head.

Heterosis study

Huffhines says the Harris research project is becoming a landmark study defining what genetics can do for the industry when used properly in a real-world commercial setting.

Mark says, prior to participating in the project, his family had been part of the Harris Partnership for Quality (PQ) program since 1997. To participate in the PQ program, producers have to follow Harris’ guidelines, which include specific genetic criteria and prescribed best management and animal health practices.

Mark says producers don’t know the value of heterosis in a cow herd until they lose it. Then they are really caught because it takes too long to re-establish especially when you keep and develop your own replacement females.

“Heterosis is invaluable,” he says. “From my observations at the ranch, as we lost heterosis, we were seeing more health issues and the weaning weights just held their own.

“It was our opinion that we couldn’t continue to just breed to Angus indefinitely and continue to lose heterosis in our herd. Harris agreed to allow the trials of other breeds to see if they could meet the company’s carcass requirements. The Hereford Association stepped up and was willing to participate. My dad has always been a Hereford fan, so it was a perfect fit for us.”

To start the project, 400 mature Angus-based cows were sorted and identified with electronic ear tags in the Lacey Livestock program. Cows were randomly mated to 10 Hereford or 10 Angus bulls, selected based on rigorous genetic parameters (expected progeny differences [EPDs]) for overall merit. The project is being conducted for a three-year period, the typical lifespan of a bull under Western range conditions. To have more numbers for the project in year two and three, Lacey Livestock increased the number of cows to 600 and the number of Hereford bulls to 16.

Year one results showed a $78 advantage for Hereford-sired calves compared to Angus-sired calves. The second calf crop has been harvested and the third crop is at the feedlot in Coalinga, Calif.

“By and large the project has gone as expected,” Mark says. “We’re not breaking new ground. What we were hoping is that Harris would find the beef to be a product that would fit the PQ program. Harris has been impressed with the dollar advantage, but trying to figure out how to market the beef is the issue.”

The future

As the project comes to an end, Mark says the Laceys will continue to use the Hereford bulls that remain in their bull battery. This year he also artificially inseminated his black replacement heifers, nearly 250, to two calving-ease Hereford bulls.

“We want to continue to produce more baldie females,” Mark says. “As range cows go, I think the Hereford female is a superior range cow and makes a great mother.”

“The baldie females are the biggest pay off for us participating in the project. It is allowing us to get some heterosis back in our cow herd.” — Mark Lacey
As fall bull sale and breeding season approaches, it’s a good time to remember the benefits of crossbreeding and the value of heterosis. For commercial producers with black cow herds, Hereford bulls are a great option to add value to the resulting calf crop.

According to Matt Spangler, University of Nebraska-Lincoln Extension beef genetics specialist, “Crossbreeding takes advantage of heterosis (hybrid vigor) and breed complementarity. Commercial cattlemen must realize that no one breed excels in all areas that affect profitability. Breed combinations can be engineered to accommodate environmental constraints and meet marketing objectives.”

A crossbred animal is created by mating two straightbred animals of different breeds or a crossbred animal to an animal of a third breed or two crossbred animals of different mixes of breeds. Crossbreeding is the opposite of inbreeding.

Traditional crossbreeding systems have been shown to maximize heterosis but can be very cumbersome in practice. “Crossbreeding is yet another tool in the tool box of genetic improvement and like anything else can be very profitable if understood and used correctly,” Spangler explains.

Beginning in the 1960s, numerous studies documented crossbreeding effectiveness in improving lifetime productivity by more than 20%. Crossbreeding can be fairly easy to implement and has the potential for significant benefits.

“There is a clear economic advantage to crossbreeding,” Spangler says. “Crossbred cows can generate $100 per year or more than their purebred contemporaries. Traits that are lowly heritable, like reproductive traits, benefit greatly from heterosis.”

Spangler says the advantages of crossbreeding can be thought of as 1) taking advantage of breed complementarity, 2) taking advantage of non-additive effects (dominance and epistatic) and 3) capturing heterosis (hybrid vigor).

Breed complementarity is the combination of strengths of the breeds in the cross. Spangler adds that the strengths of the Hereford breed can be utilized to complement strengths and weaknesses of other breeds in a strategic crossbreeding system. “Heterosis can only be garnered by crossbreeding, and the use of Hereford genetics in a traditionally straightbred commercial herd can help capture profit for the commercial cattlemen that straightbred cattle leave on the table,” he explains.

As explained by Jim Gosey, retired University of Nebraska Extension beef specialist, heterosis is actually the recovery of accumulated inbreeding depression. In just one generation, the offspring exhibit the maximum of what was lost through generations of “pure” breeding within a closed gene pool.

By definition, the gene pool in any given breed is limited. A certain amount of production potential is always sacrificed in order to gain the uniformity desired in a breed, since the most dependable way to gain the uniformity was by using inbreeding and linebreeding in the early history of the breed. A breed is essentially a closed group of cattle, not allowing any infusion of other genetics. It thus accumulates some inbreeding over time, even if it’s not done deliberately.

**Heterosis**

Spangler says a phenomenon as old and as recognized as heterosis still seems to spark debate and, unfortunately, confusion. A quick search of the scientific literature will provide numerous studies quantifying heterosis for specific traits under specific crosses.
Crossbred cows provide the ultimate benefit

percent heterosis realized in the average
animals, efficiency and longevity.
maternal ability, growth rate of young
survival — due to hardier calves —
fertility and reproduction, calf
increased beef production, including
many traits that are important for
us to capture.

Within breed selection tools do not allow
to dominance and epistatic effects that
within breed selection tools do not allow
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Heterosis beneficially influences
many traits that are important for
increased beef production, including
fertility and reproduction, calf
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maternal ability, growth rate of young
animals, efficiency and longevity.

Percent heterosis can be calculated as:

\[
\text{% heterosis} = \frac{\text{crossbred average} - \text{straightbred average}}{\text{straightbred average}} \times 100
\]

A simple example would be the
percent heterosis realized in the average
weaning weight from breeding a herd
of Breed A cows to a group of Breed B
bulls. Let 525 lb. be the average weaning
weight of the F1 calves, 450 be the
average weaning weight of the Breed
A population and 550 be the average
weaning weight of the sire’s population.
The pounds of heterosis would be:

\[
\text{pounds of heterosis} = 525 - \frac{(450 + 550)}{2} = 25 \text{ lb.}
\]

The percent of heterosis would be:

\[
\text{% heterosis} = \frac{25}{(450 + 550)/2} = .05 \text{ or } 5\%
\]

The amount of heterosis that is
realized for a particular trait is inversely
related to the heritability of the trait.
This result is logical since traits that are
lowly heritable have a small additive
component (proportionally speaking) and
crossbreeding takes advantage of
dominance and epistatic effects.

With that in mind, traits of
low heritability (reproductive
traits) generally
benefit from heterosis the
most (Table 1).

They generally have
a heritability of less than 10% and can
be improved through the adequate use
of crossbreeding systems. End-product
traits that benefit from heritability in
the moderate to high range, on the other
hand, benefit less from heterosis.

Spangler says the three main types of
heterosis: 1) individual, 2) maternal
and 3) paternal. He says the offspring of
a F1 female will benefit from maternal
heterosis (Table 2). See “Crossbred
cows provide the ultimate benefit,”
for more about the F1 female.

| Table 1: Individual heterosis: Advantage of the crossbred calf |
|----------------------|------------------|------------------|
| **Trait Observed**   | **Improvement**  | **% Heterosis**  |
| Calving rate         | 3.2              | 4.4              |
| Survival to weaning  | 1.4              | 1.9              |
| Birth weight         | 1.7              | 2.4              |
| Weaning weight       | 16.3             | 3.9              |
| ADG                  | 0.08             | 2.6              |
| Yearling weight      | 29.1             | 3.8              |

*Adapted from Cundiff and Gregory, 1999

| Table 2: Maternal heterosis: Advantage of the crossbred cow |
|----------------------|------------------|------------------|
| **Trait Observed**   | **Improvement**  | **% Heterosis**  |
| Calving rate         | 3.5              | 3.7              |
| Survival to weaning  | 0.8              | 1.5              |
| Birth weight         | 1.6              | 1.8              |
| Weaning weight       | 18.0             | 3.9              |
| Longevity            | 1.36             | 16.2             |
| Cow lifetime production: |
| No. calves           | 0.97             | 17.0             |
| Cumulative wean wt., lb. | 600             | 25.3             |

*Adapted from Cundiff and Gregory, 1999

immune response. Thus, a crossbred cow tends to have more
optimum immune system function than a straightbred cow and,
hence, not only stays healthier herself but may also produce
more protective colostrum.

When all factors are weighed, the crossbred cow gives
her owner the most benefit. By contrast, the stockman who
is merely trying to take advantage of hybrid vigor in the calves
using straightbred cows and bulls of another breed, gains less
impact on profitability. Calf weaning weights for crossbred
calves are 5% more (and yearling weights 4% more) than
straightbred calves. The research study in the 1990s that came
up with these figures showed that a straightbred cow with a
crossbred calf earned an average of $23.37 more than if she
had a straightbred calf. But a crossbred cow with a crossbred
calf netted $116.88 more than a straightbred cow with a
straightbred calf. This potential increase in profit is one reason
a number of producers went to crossbred cow herds.

During the past decade, however, with the increasing
popularity of “black” cattle and the drive toward more uniformity
and marbling, many of America’s commercial cow herds have
lost most of the heterosis they once had. Due to market pressures for
beef calves, many stockmen have been using bulls of just one breed,
and the replacement heifers then become more and more straightbred
with each generation.

Jim Gosey, retired University of Nebraska beef Extension specialist,
says the loss of heterosis in these herds shows up most quickly in
the traits that are least heritable and most associated with inbreeding
depression, namely reproduction (fertility), hardness and longevity.
The price paid for the loss of heterosis is cumulative — as a number
of very small losses add up and amount to a substantial sacrifice in
lifetime productivity.

As one cattle buyer observed a few years ago after a very cold
and slow spring during which feed supplies were short, most of the
cows in several herds he worked with were thin, and there was a
high rate of open cows after the breeding season. Interesting to note,
the cows that bred back the best and on time — in spite of the tough
conditions — were the old crossbred cows that were still in the herds.
The younger females that were a high percentage of straight breeding
didn’t do as well.

— Heather Smith Thomas
measure, and they are rarely tracked at the commercial level, but agriculture economist Vern Pierce, from the University of Missouri, states that they are of great benefit to cattlemen over the long haul.

Pierce analyzed the data from the Circle A research project in which 10 Hereford bulls were compared to two top Angus bulls, all bred to more than 600 commercial Angus cows.

One of the Angus bulls was the top bull in the breed for registrations in 2008. Economically relevant traits from birth to carcass were measured on every calf, and the replacement females from the project were followed through to their first pregnancy. Pierce reported that the baldie program would return $514 dollars per cow over 10 years or $50 per head annually due to $50 per head on an annual basis.

To make up this advantage, 500-lb. straight Angus calves would have to bring between $10 to $16 per hundredweight more than the baldie calves at the market. The reality is that many times producers see baldie calves bring more than the straight blacks when sold.

Baldie calves will qualify for every branded beef program in America. The message is clear, and we will continue to educate our commercial base of these advantages. If producers continue to avoid the Hereford breed because of the few red-hided calves they might produce, then I might just have to borrow a line from one of my favorite blue-collar comedians, Bill Engvall, when he says, “Here’s your sign.”

The continued practice of avoiding profitable genetic selection decisions because of hide color is just as ludicrous as charging a tax for cow flatulence.

Lacey’s continue to use Herefords

As a result of the outcome of the three-year Harris Ranch project, Mark and John Lacey have begun to use Hereford bulls on a full-time basis to develop baldie replacement females for their mature cow herd. During the last two years, the Lacey’s have bred nearly all of their straight Angus replacement heifers to highly proven AI sires with great success. Reports from the ranch suggest that the calves are easy calving and vigorous with a high survival rate.

Depending on the year and depending on the input costs, the Harris Ranch and Circle A studies have both proven that Hereford hybrid vigor generated from the crossing of the two most popular maternal breeds in America added $50 to $80 per head on an annual basis.

The baldie females brought $110 more than their straight black counterparts in Circle A’s production sale.