



# The Whiteface

HEREFORDS — THE EFFICIENCY EXPERTS

NOVEMBER 2006

## A Refresher in Heterosis

If one thing should stick in the mind of the college freshman who has completed his or her first animal science course, it is that planned crossbreeding provides significant benefits to the livestock industry. Committed to memory is the definition of “heterosis” or “hybrid vigor” — the amount (percent) by which the crossbred average exceeds the average of the two (or more) parental purebreds for a measured trait.

Through mindful attention in class and practical application on the ranch, the student realizes the many opportunities to capitalize on breed complementarity and to make genetic improvement in lowly heritable traits via carefully designed crossbreeding systems.

Still, Dave Daley, California State University (CSU), Chico Animal Science Department program coordinator, says that the cattle industry has largely strayed from these important lessons in the last 15-plus years. Vertically coordinated beef marketing systems have become breed specific, generally Angus. He says that the unfortunate result of ignoring crossbreeding is the diminish of the positive effects of heterosis.

“As we turn the corner in the cattle cycle and begin to experience somewhat lower prices, I am confident that we can no longer forget how to reduce input costs, and heterosis has to be part of that equation,” Daley told listeners at the 2006 Beef Improvement Federation (BIF) Convention in April.

To help the cattle industry get back on track, Daley has taken the role of lead researcher in a project with Lacey Livestock and Harris Ranch Beef Co., a premier integrated beef alliance in California, studying the head-to-head, gate-to-plate effects of using Hereford bulls versus Angus bulls on an Angus-based cow herd.



The advantages of planned crossbreeding are well documented; yet, many cattle producers and beef marketing systems across the country are limiting themselves to one breed, largely Angus. The AHA and California State University, Chico are creating a refresher course in heterosis by testing the effects of using Hereford bulls versus Angus bulls on the Angus-based Lacey Livestock cow herd of central California.

### Research Review

The project is jointly funded by an American Hereford Association (AHA) research grant and the CSU, Chico Research Foundation – Agricultural Research Initiative.

John and Mark Lacey of Lacey Livestock have volunteered their commercial cow herd for three years of study.

Six hundred mature Angus-based cows were mated randomly to 12 Hereford bulls and 12 Angus bulls of comparable genetics. Each resulting calf has been DNA tested to a sire, and Hereford-sired calves will be compared to Angus-sired calves from weaning through the feedlot phase and all the way to the rail. Replacement females will also be followed through their first year of calving.

“The literature is clear, overwhelming and consistent regarding the benefits of capturing heterosis in beef production systems,” Daley says. Yet, a

refresher course never hurts, and real-life application is the best way to prove that crossbreeding generates economic returns.

“The AHA is proud to support this study that has the potential to interest more commercial cattlemen in crossbreeding, a production tactic that when executed correctly creates industry-wide gains,” says Jack Ward, AHA chief operating officer and director of breed improvement. “The Hereford-Angus pairing is a great example of breed complementarity, and we’re excited to see the results.”



Weaning weights and blood samples were taken on Lacey's calves in early September. Calf data is collected and recorded via electronic identification (EID) tags and a Gallagher scale head.



This year, 11 young Hereford sires were bred to Amana Farms' Angus-cross heifers in a National Reference Sire Program (NRSP) test. From this test, breeders will gain data on their yet unproven bulls, the AHA will gain data on the economic effects of heterosis, and Amana Farms will gain the traits they're seeking to improve – disposition, longevity, fleshing ability and efficiency.

# Finding the Next GREAT SIRE

The American Hereford Association's (AHA's) National Reference Sire Program (NRSP) tests young Hereford sires at cooperator cattle herds throughout the U.S. This year participating breeders delivered 11 bulls to Amana Farms, one of the largest integrated farming and ranching operations in the Midwest. Located in Amana, Iowa, the 2,200-head cow-calf operation is simultaneously testing the young sires and the economic effect of using Hereford bulls on Angus-cross heifers.

The 11 young sires and two proven artificial insemination (AI) sires (for comparison) were used to breed Amana

heifers beginning in late August. Birth, weaning, yearling and carcass data will be collected on the resulting calves.

Steers will be fed at the University of Missouri-Columbia, where researchers will collect feed efficiency data in an attempt to develop genetic or metabolic indicators related to the feed efficiency trait. The Hereford-influenced heifer calves will be kept as replacements in the Amana herd.

John McGrath, farm manager, explains why Amana Farms has turned to Herefords. "We are at a crossroads and are trying to find a different direction to go," he says. The farm is looking to achieve higher levels of heterosis, and to improve disposition, longevity, fleshing ability and overall efficiency.

On the NRSP side, John Ramer of Ramer's Herefords, Fitchburg, Wis., is grateful to have the chance to test his bull, Felton's Mo 612, at Amana Farms. "An 'outstanding' unproven bull can be really exciting," he says. "But his value is limited to that excitement. To be really economically valuable, beef genetics must be proven. This test is an invaluable opportunity to get a substantial amount

of proof on a bull that certainly appears to be outstanding."

Breeders can also gain such proof by testing bulls at the Olsen and Stahly ranches, which have offered their herds to the NRSP for several years.

Olsen Ranches Inc., Harrisburg, Neb., is operated by father-son duo, Art and Douglas Olsen. Olsens maintain a Hereford and Red Angus-based cow herd and were recognized for their progressive ranch management as the 2004 Beef Improvement Federation (BIF) Commercial Producer of the Year.

Olsens test about eight new Hereford sires annually. This year they added further value to the test by ultrasounding all heifers from the young sires.

For additional research purposes, half of the steer calves harvested this fall received implants. The implanted steers will be compared to the steers without implants to document differences in growth rates, meat quality and overall profit between the two systems.

Mike and Judy Stahly of Stahly Ranch manage a Hereford-Angus-cross commercial operation in Cavour, S.D., with their son and daughter-in-law, Doug and Chris, and their sons, Spencer and Mason. The family usually tests two to three new sires each year, AI-breeding between 120 and 150 cows.

Mike says one of the greatest breeder benefits of the NRSP is the opportunity to get carcass data on young sires' offspring. Stahlys background the steer calves together and then send them to one feedlot. The consistency in feeding and handling the steers and the opportunity to follow them through to harvest returns valuable carcass insight often difficult to obtain.

Other herds will join the NRSP next spring. Thanks to all cooperators who make it possible to test young Hereford genetics, build accuracy and find the breed's next great sires. For more sire information or to inquire about participating, contact Jack Ward, AHA chief operating officer and director of breed improvement, at (816) 842-3757 or [jward@hereford.org](mailto:jward@hereford.org).

Research  
Review



# Hereford Breed Increases Muscle

by Craig Huffhines, AHA executive vice president

The Hereford breed has made a major advancement in carcass composition the last 10 years by increasing ribeye area significantly, thereby affecting the value of commercial Hereford cattle.

## Research Review

Ribeye areas from more than 100,000 head of fed steers and heifers of Hereford influence — steers and heifers meeting Certified Hereford Beef® (CHB) live animal and carcass parameters — were measured at the National Beef Packing Co. LLC processing facilities in Liberal and Dodge City, Kan., utilizing unbiased electronic visual imaging technology. Analysis of the data has quantified the ribeye area distribution across a large population of Hereford-influenced cattle, establishing a benchmark for the breed. The dataset represents the single largest breed-specific benchmark to date and unveils an interesting breed trend.

The 2005-06 Hereford ribeye area survey indicates without a doubt that the breed has improved ribeye size and ribeye per hundred pounds of carcass weight significantly the last 10 years. Average ribeye area was 13.5 inches in the more than 100,000 steers and heifers measured throughout the year, with an average carcass weight of 808 lb. or 1.67 square inches per hundredweight (cwt.) carcass.

In 1996 the American Hereford Association (AHA) funded a Hereford Type Change Study at Colorado State University (CSU) to compare Hereford breed trends from the 1950s through the 1990s. CSU scientists organized the unusual study as they artificially mated straightbred commercial Hereford cows to representative bulls from the 1950s, 1970s and 1990s. The calves from that study were fed out to a specific fat thickness end point and the results were reported at the World Hereford Conference.

The results of the study vividly described the progression the breed had made in birth weight, weaning and yearling growth, carcass weight, muscling, and quality grade throughout 40 years of selective breeding. Interestingly enough, from 1950 to the mid-1990s, finished live weights of steers improved by 178 lb. while feed conversion remained similar across the generations. On the other hand, ribeye area only improved .8 of an inch despite more than 100 lb.

of improvement in carcass weight. As a result of the study,

Gary Smith, CSU meat scientist, made the statement, “The Hereford breed must cautiously improve muscling, gradually ‘turning up the dial’ while never sacrificing time honored traits such as fertility, efficiency and doability in the cattle.”

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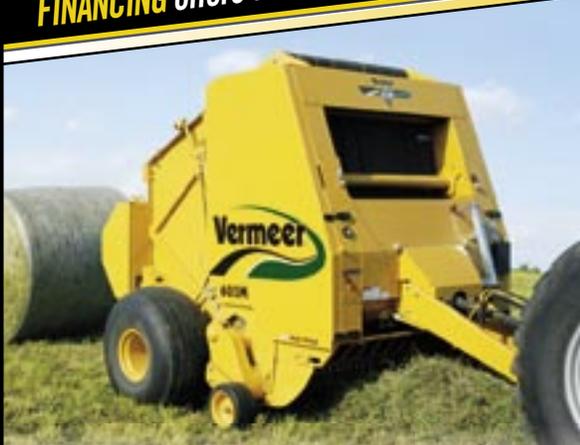


Studies show that in the past 10 years, average ribeye area of Hereford-influenced calves has increased by more than 1 square inch and .03 inch per 100 lb. of carcass. In 1996 Hereford breeders were encouraged to gradually “turn up the dial” on muscling, and their commitment to doing so has clearly paid off.

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During the last 10 years, Hereford breeders have focused on modern technology in order to make better selection decisions in the area of carcass composition. The use of ultrasound technology, implementation of carcass expected progeny differences (EPDs) beginning in 1995 and a more aggressive focus on selecting for muscle shape all played a role in the decade-long breed trend. The increase in ribeye size can be attributed to heavier cattle, but composition has changed as well, as evident by the change in ribeye area per cwt.

The 1996 study reported a 12.3 average ribeye in the 1990s model cattle weighing an average of 1,261 lb., with an average carcass weight of 760 lb. or 1.61 square inches per cwt. of carcass. The population of Hereford cattle measured within the 2005-06 National Beef annual production indicated a major economically relevant change in the commercial pool of Hereford cattle, improving more than 1 square inch of ribeye area and .03 inch per 100 lb. of carcass. Had the cattle been fed to lighter endpoints this year, we would have seen an even higher ribeye per cwt. result.

## Quantity and quality, all in one

While yielding more muscle, modern Hereford genetics continue to produce high-quality meat. In March 2006 a beef checkoff funded executive summary titled "Pre-Harvest Cattle Management Practices for Enhancing Beef Tenderness" was published. A portion of the summary is dedicated to the management of genetic inputs for positive tenderness effects, and Table 1 references research data from the 2005 findings of scientists from the U.S. Meat Animal Research Center (MARC), Clay Center, Neb.

In 2005 Tommy Wheeler, acting research leader for the Meat Safety and Quality Research Unit, and his MARC colleagues – Mohammad Koochmaraie, director; Steven Shackelford, food technologist; and Larry Cundiff, geneticist – published in the *Journal of Animal Science* the results of a trial testing the tenderness of steaks from seven industry-dominant cattle breeds. Steaks were tested using the Warner-Bratzler shear force method, as well as by a trained sensory panel.

Table 1 in the checkoff summary compares the carcass quality and beef tenderness characteristics of the seven dominant breeds – Hereford, Angus, Red Angus, Charolais, Gelbvieh, Limousin and Simmental.

The shear force results in the table show that the Hereford steaks were comparable in tenderness to those from their British counterparts, Angus and Red Angus.

"Since 65% of the Hereford steers graded Choice or higher compared to 88% and 90% for Angus and Red Angus, respectively, this tenderness measure proves that Hereford cattle do not necessarily need excess amounts of marbling to produce tender beef," says Jared Long, Certified Hereford Beef (CHB) LLC account manager and University of Georgia meat science masters graduate.

Wheeler adds, "We, and others, have published data that indicates marbling only explains about 10% of the variation in tenderness. Most of the variation in ribeye steak tenderness is explained by variation in protein degradation by the calpain enzyme during the aging process. This explains how we can get tender meat even with low levels of marbling."

Although it's not included in the checkoff summary, MARC's published data shows that the trained sensory panel rated the Hereford steaks as equal to the other British breeds in not only tenderness, but juiciness and beef flavor intensity as well.

The bottom line is that Herefords are able to produce steaks as tender, juicy and tasty as those from breeds noted for higher levels of intramuscular fat. Hereford producers, packers and retailers have an immense opportunity to fill the demand for lean, quality beef product, as demanded by the growing health-conscious consumer segment.



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