

The Rhyme & Reason of Research



Who determines what research will be conducted?

It began in 1887 — the year the Hatch Experiment Station Act was signed to provide federal grants for agricultural research studies and a cooperative bond between USDA and the nation's Land Grant colleges. Farmers and ranchers across the nation would soon look to Land Grant college research studies to help improve their crops and livestock.

More than 100 years have passed since that historical act. We're now in the age of biotechnology, computers and the environmental movement. And along with all our advances, comes the need for more research studies and funding.

Bud Harmon, head of Purdue University animal sciences department, says, for the most part, it's not the university who determines which research projects will be conducted.

"Most of our research funding is acquired through competitive USDA National Research Initiative (NRI) grants. Our scientists find opportunities where NRI grants will fund research they're interested in, and then they apply for them," he explains. Each scientist has a very modest amount of discretionary money for research, but most funding comes through grants.

Another avenue is the beef checkoff-funded research program. Since 1976, when the Beef Research and Information Act was approved, beef producers have had the power to establish, finance and carry out a coordinated program of research. This Act also enabled producers to establish producer and consumer information programs for improving, maintaining and developing markets for beef cattle and beef products.

The \$1 beef checkoff, passed in a producer referendum vote in 1988, provides funding. The National Live Stock & Meat Board, Beef Industry Council, and the Beef Promotion & Research Board (Beef Board) oversee research projects and direct many to Land Grant universities. (See sidebar story on page 410.)

The National Cattlemen's Association has established a research and education committee. NCA members who serve on the committee have input on the direction

Seedstock producers rely upon scientific research studies to help improve cattle genetics, health, welfare, production efficiency, and ultimately, their own bottom line. You've discovered research is vital for product improvement and safety. It also keeps beef in a competitive position in the food marketplace.

But have you ever wondered who determines what research projects are conducted?

Are you concerned — with the growing threat of state and federal budget cuts, and U.S. Department of Agriculture (USDA) reorganization -whether your Land Grant institution can compete with private industry in the research arena?

Can you honestly say that research studies are practical and address your current needs? Or, in the pursuit of big grants and scientific wonders, is your university taking you for granted?

Back on the farm and ranch lay a few unsolved problems: reducing waste fat in market cattle, for one; how to improve feed and reproduction efficiency, for another. Topping the concern list is how to assure consumers our beef product is safe and healthful.

We set out to find the answers to these tough questions and provide some examples of research studies in progress. The good news is we found practical research alive and well at many Land Grant universities. And, thanks to your beef checkoff and Association membership dollars, progress is being made in solving industry concerns.

Still, this beef business is not an exact science. Too many variables and outside forces exist for that. What does the future hold for beef research? Only time and lots of trial and error will tell.

— *Jerilyn Johnson and Julie Grimes Albertson*

and goals of beef research. These recommendations or proposals are then submitted to the Beef Board for approval.

At the 1993 NCA Convention in Phoenix, the following research/education goals were made:

- Develop technology to value live cattle and/or carcasses based on boxed beef sales.
- Analyze economic effect of value-based marketing using strategic alliances in the production chain segments.
- Explore technologies and pricing mechanisms to improve the consistency of beef as a retail product.
- Develop baseline data on the effect of beef management systems on water quality, wetlands, wildlife populations and habitats, soil quality, soil erosion, wind erosion, and air quality.
- Develop technology to reduce the unit cost of beef production by a minimum of 10 percent before the turn of the century.
- Identify ways to reduce fat in the beef production system while improving beef quality and consistency.

Another important organization which influences university research is the Beef Improvement Federation (BIF). Formed in 1968, BIF is a coalition effort of the beef industry, university Extension and research organizations concerned with the performance evaluation of beef cattle. From the beginning, BIF has put ideas into action. Its purpose is to establish accurate and uniform procedures for measuring and recording performance records. It also helps member organizations develop performance programs and educational material.

Five committees have been formed under BIF to make recommendations and direct research studies. They are: central test and growth committee; systems committee; genetic prediction committee; live animal and carcass evaluation committee; and reproduction committee.

BIF conducts an annual meeting and research symposium. This educational event brings together breed improvement professionals from every major beef breed organization. Also in attendance are seedstock and commercial beef producers, Extension beef specialists, and breeding service and genetic companies.

Topics at the 1993 meeting included improving reproductive performance, mature cow size EPDs, birthweight and calving ease, and Integrated Resource Management.



Can Land Grant institutions compete with private industry in research study contracts and funding?

Private industry has entered the picture with multi-million dollar research and development (R&D) accounts. On top of their R&D list is biotechnology studies for cloning, gene mapping and splicing. Many universities have jumped on the biotechnology bandwagon; a few have even redirected ag research programs and curriculum to it.

Meanwhile, many animal scientists have left academia for the greener pastures of private industry. Federal and state government budget cuts and Extension Service trimming in the last five years forced many out.

Purdue's Bud Harmon, having worked in private industry for several years, has a unique perspective of both university and private research.

"I would say they (public and private research) are very similar. Both have to have a strong basic research component. However, I don't see us as competition, but as companions working with industry."

Another Land Grant university that has an important stake in the research arena is the University of Missouri-Columbia. Scientists at MU's Agricultural Experiment Station rank among the best in the nation in their ability to win research dollars for their projects.

"Our scientists ranked ninth out of all institutions in the United States competing for USDA-NRI grants in 1992," says Bruce Bullock, MU associate dean for agricultural research. Altogether, MU Ag Experiment Station scientists received 16 NRI grants totalling \$2 million.

Colorado State University, Fort Collins, has also evolved as a leader of animal and equine science research. Garth Boyd, CSU Extension beef specialist, believes universities can most definitely compete with private industry.

"Land Grant universities offer a significant bargain," Boyd says. "They can offer unbiased, quality research. Graduate students perform the research, so it's a valuable training opportunity."



Is research conducted by Land Grant universities practical to the beef industry?

"I believe it depends on the university," Boyd says. "Many universities are focusing on biotechnology and hoping for practical applications. At Colorado State we try to ensure research is practical and applicable."

Beef research projects conducted at CSU focus on cow-calf management, cattle feeding and management, reproduction and meat technology.

The largest of Missouri's USDA-NIR grants in 1992 went to its animal science department. They will receive more than

Association Sponsored Research Paves Way for Breeders



The American Angus Association sponsors research studies at several Land Grant universities each year. These important research projects are focused on helping Angus breeders in the areas of performance and breed improvement. Sponsored studies first have to be approved by the Association Board of Directors.

Here are five examples of 1992-93 research projects:

University of Georgia — "Effect of Sire Birthweight EPD on Progeny Pelvic Area, Calf Birthweight and Calving Ease."

University of Florida — "Impact of Bulls Selected for Marbling from a National Sire Evaluation on a Single Cow Herd."

University of Arizona — "Growth Hormone Polymorphism in Angus Cattle."

University of Kentucky — "Relating Differences in Parental Birthweight EPDs to Resulting Sires Actual Measurement Variation in Beef Cattle."

University of Michigan — "Effects of Selecting for High Maternal Traits vs. Selecting for High Lean Growth Traits."



\$650,000 for the study of reproductive biology of animals.

Bullock says reproductive problems annually cost the livestock industry billions of dollars. MU animal scientists are currently studying hormone treatment, cloning and other techniques to solve these problems.

Research in Progress

From time to time, breeders read about new technologies being developed by universities in their state or region. However, information from other parts of the country may not reach you.

Here's a sampling of what's being studied at Land Grant universities across the country in the area of beef production. Are these studies practical? You be the judge.

Vitamin E Enriched Steers

A University of Wisconsin-Madison research project has shown steers fed extra vitamin E produce steaks that stay fresh-looking longer on supermarket shelves.

If adopted, the supplementation technique could save the beef industry hundreds of millions of dollars each year.

Experiments in the lab, in feedlots and in supermarket meat cases showed vitamin E supplementation extended the case life of retail beef cuts by up to five days. The treatment didn't affect meat flavor, animal performance or carcass composition, says Dan Schaefer, an animal scientist at Wisconsin's College of Agriculture.

Vitamin E supplementation slows the browning that occurs in cut beef, preserving the bright red color consumers prefer.

In feedlot trials, steers consumed a corn-based diet for 38 to 309 days. Control steers received 100 international units (IU) of vitamin E, which occurred naturally in their feed; supplemented animals received 250 to 2,000 IU. Schaefer found 500 IU of vitamin E for 100 days to be the most cost effective.

Feedlots would pay about \$3 a head to feed enough vitamin E to do the job, Schaefer says. He thinks a premium of \$6 per head (\$1 per hundredweight of carcass) would pay for the vitamin E and provide a profit incentive. Multiplied by 26 million head — the average number of fed cattle processed each year — the treatment would cost packers about \$156 million.

Getting the Most From Your Bull

Research conducted by University of Georgia, Colorado State University and University of Nebraska-Lincoln concluded

that increasing bull-cow ratios can improve profit margins with healthy breeding stock and good management.

As a rule of thumb, one bull is used for every 20 to 25 cows in the breeding herd. These studies suggest the ratio could be increased to 35 to 40 cows per bull.

The increased workload on the bull shouldn't extend the calving season or reduce the calf crop. However, it would reduce costs by cutting investment in bulls and costs of maintaining them, according to the recent studies.

The bulls should be two years old or older with prior breeding experience. They should be in good physical condition and structurally sound. A large scrotal circumference measurement of 36 centimeters or greater also helps.

If estrus synchronization is used to get the cows into heat near the same time, then the ratio of 25 cows to one bull appears adequate, according to a Colorado State study.

Younger bulls, such as a 15-month-old bull with a scrotal circumference of more than 34 centimeters, will cover 20 to 25 females without decreasing pregnancy rates.

In a three-year study at Georgia, researchers compared ratios of 25 and 40 cows per bull during a 90-day breeding period that began April 1. The bulls were two and three years old. Results showed no difference in pregnancy or calving rates.

At Colorado State, ratios of 50 to 1; 25 to 1; and 16 to 1 were compared. Estrus synchronization was used on heifers in the study. The bulls were two- and three-year-olds with prior breeding experience.

Analysis showed the optimal rate for synchronized heifers was 25 to 1. The breeding costs ranged from a low of \$11.44 to a high of \$39.45.

Milk EPD Does Predict Production

Kansas State University researchers analyzed milk yield data from 114 Angus and 82 Simmental cows to determine if milk EPD is, in fact, related to actual milk production and calf weaning weight. Following is a brief summary of results:

- A 1-pound change in a cow's milk EPD resulted in a change in 205-day milk yield of 42 and 69 pounds for Angus and Simmental, respectively.
- A 1-pound change in total 205-day milk yield resulted in a change in 205-day calf weaning weight of .014 and .032 pound for Angus and Simmental, respectively.
- A 1-pound change in a cow's milk EPD resulted in a change in 205-day calf weaning weight of 4.64 and 3.74 pounds for Angus and Simmental, respectively.

The KSU researchers concluded milk EPD does, in fact, predict milk production differences. Furthermore, milk EPD appears conservative in its estimates of differences in calf weaning weight.

Fescue Feed Supplement

Feeding supplements of rye, Caucasian bluestem and soy hulls to young stocker cattle on endophyte infected fescue pasture paid off big in research trials at the University of Missouri-Columbia.

"The supplemented cattle reached the feedlot sooner, were a lot bigger and had more valuable carcasses," said Jim Williams, MU animal scientist who conducted this study.

"That means the producer who feeds supplements not only gets bigger profits, he gets the money faster — an advantage to the producer who borrowed money and wants to pay it back fast to save on interest costs."

In this study, cattle were compared under six different management conditions. "Cattle on corn and rye did best on the pasture with average daily gains of more than two pounds per day," Williams says. "The poorest producers were those that received only fescue pasture. Their average daily gains were less than three-quarters of a pound a day."

Those on Caucasian bluestem gained 1.3 pounds a day; those on soy hulls, 1.5 pounds a day.

The bottom line was return to management. Those on the rye returned \$135 per head, those on the fescue plus Caucasian bluestem, \$74 per head. Next highest return was those on fescue plus soy hulls, \$55 per head. Returns to management on the two fescue-only treatments was only \$40 to \$50 dollars per head.

Electromagnetic Scanning

Electromagnetic scanning devices can be used to accurately measure lean meat content of beef carcass quarters and boxed beef cuts, research at Iowa State University shows.

The scanning devices are currently used in pork processing plants, but little work has been done with this technology as it applies to beef, says Gene Rouse, ISU animal scientist.

A scanning machine was tested on beef quarters and cuts at the ISU meats laboratory. Researchers found a high correlation between the measurements made by the machine and the more traditional method of separating lean meat from bone, fat and other tissue, and then weighing it.

Electromagnetic scanners evaluate meat by measuring the absorption of en-

Continued on page 410

ergy by lean tissue within an electromagnetic field. Lean tissue, fat and bone all absorb energy at different rates.

Rouse says one beef processor, Beef Specialists of Iowa, is testing the technol-

ogy to sort beef cuts by lean content. "This gives packers an alternative to chemical analysis or cutting tests to determine lean yield of a carcass or cut," he says.

Editor's note: Information for these articles was provided by university Extension communications and agricultural information departments.

Do You Know Where Your Checkoff Dollars Are Going?



Approximately 8 cents of your national beef checkoff dollar goes to research programs. Since the beef checkoff program began in 1988, 8 percent of total revenue has been spent on research.

In 1993 the National Live Stock & Meat Board is allocating \$5.8 million of its \$53.2 million beef programs budget for beef research. Thirty-seven percent of beef research funds are targeted for product development and research; 32 percent to market research, 20 percent to nutrition research, 6 percent to meat science; and 5 percent to research monitoring and communications.

Research programs provide the means to develop nutrition information and studies supporting beefs role in a healthful diet, product development, consumer information, and to track the pulse of the consumer marketplace.

BEEF NUTRITION

The core of nutrition research in 1992 was represented by 19 ongoing studies in four broad categories meeting distinctive needs for food service, retail and consumer information channels:

1. Meat nutrient composition – to determine the composition of meat as eaten and as affected by new technologies.
2. Meat's nutritional role in the diet – to

explore meat's dietary role in active, physically-fit lifestyles, as well as in various stages of the life cycle and in weight control diets.

3. Nutrient interaction and bioavailability – to identify and characterize the dietary benefit of trace nutrients unique to meat.
4. Diet health issues – to understand the relationship between food components and heart disease, cancer and other degenerative diseases. This area of research also explored the effect of minerals on immune function.

Nutrition research also played a major role in both voluntary and mandatory meat labeling initiatives through the results of:

•**The Data Base Study**—addressing issues brought forward in comments to USDA regarding the near-prohibitive cost of individual processed meat product nutrient analysis to many small and mid-size meat processors. In a final revised proposal, USDA used these results to allow the use of Handbook 8 information for calculating nutritional profiles of meat and meat products.

•**The Fat Trim Study**—investigating whether most consumers trim and discard fat from meat before or after cooking. Meal scraps and leftovers were collected from a sampling of consumer households and evaluated for meat-trimming practices.

Results indicated that, while many consumers do trim some fat before eating meat, education and information programs need to reaffirm the fat-trimming message.

PRODUCT TECHNOLOGY

A total of 18 ongoing studies provided evidence to fill voids in the food safety data base and investigated ways to reduce or eliminate microbial contamination in the food chain.

Studies also focused on providing consistent, tender products. Research projects were directed in the areas of innovative technology, byproduct utilization, microwave cookery, beef quality and composition, and food safety.

•**Beef Violative Residue Study**—conducted at Colorado State University

used a risk assessment approach to evaluate the safety of the U.S. beef supply.

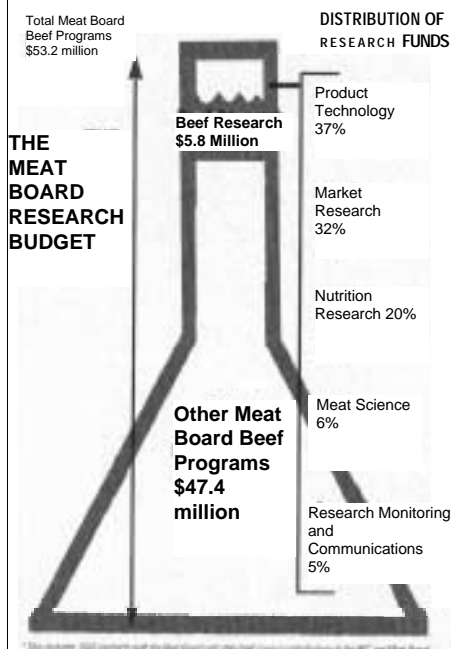
More than 1,700 samples of beef were gathered from eight processing plants nationwide in a search for residues of growth promotants, animal health products, contaminants and 25 pesticides. For each sample, results showed that any residues present were well below government tolerance levels.

These results were communicated to consumer and industry media, as well as industry groups that conduct beef export marketing programs.

•**Food Safety**—The HACCP/OAR (Hazard Analysis and Critical Control Points/Organic Acid Rinse) project investigated the efficacy of carcass rinses in reducing microbial numbers on beef and pork carcasses. First-phase results showed that, because of the rinse-caused change on the outside of the carcass, bacteria cannot grow and reproduce.

Results were shared with USDA's Food Safety and Inspection Service (FSIS). In November 1992, FSIS approved the use of pre-evisceration organic acid carcass sprays in beef processing plants.

Editor's note: Information provided by the National Live Stock & Meat Board.



THE MEAT BOARD RESEARCH PROCESS

