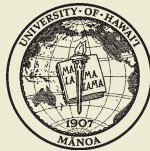


CTAHR **Beef Initiative**

2004 Update



**College of Tropical Agriculture
and Human Resources**
University of Hawai'i at Mānoa

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The CTAHR Beef Initiative

is a major endeavor and commitment of the University of Hawaii at Manoa’s College of Tropical Agriculture and Human Resources (CTAHR) to partner with the Hawaii beef industry to stimulate growth, economic diversification, and environmental sustainability for agriculture in the state. The initiative is inspired by Dean Andrew Hashimoto’s belief that the beef industry will continue to be a leader for the vision of agriculture in Hawaii and will remain an important contributor to diversified agriculture, the state economy, and Hawaii’s cultural heritage.



The objectives of the program

are to improve the competitiveness, profitability, and sustainability of the beef industry by

- Developing and implementing effective research and extension programs for animal production in Hawaii and other tropical regions
- Improving communications between the beef industry, interagency partners, and CTAHR
- Supporting the industry on legislative and other governmental issues, policies, and partnerships.

Program Phases

PHASE I

Economics and marketing
 Pastoral systems
 Genetics and biotechnology
 Outreach
 Mealani Research Station

PHASE II

Pastoral systems
 Genetics and biotechnology
 Meat science and technology
 Outreach
 Mealani Research Station

FUTURE AREAS

Value-added product development
 Emerging technologies
 New product evaluation
 Feed initiative, Oceanic Institute

Program contact:

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Economics and Marketing

Economic Analyses of Industry Production and Marketing Models

Linda J. Cox and Quincy A. Edwards

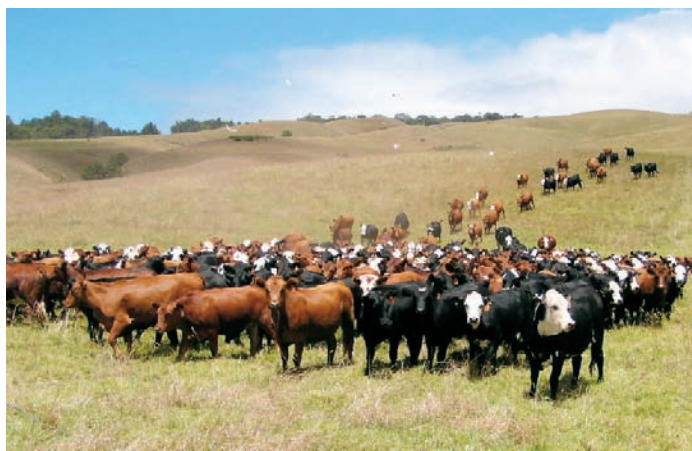
The foundation for success of any business is an understanding and knowledge of expenses and revenues. While this financial information is a key component of effective decision-making, many producers find the process of assembling the information and putting it into a usable format to be formidable. The overall objective of this project is to determine the estimated costs and benefits of various production/marketing strategies available to beef producers. If more cost-effective alternatives to the approaches currently in practice can be identified, they will be included in the analysis. This information will then be assembled into an expert-choice model that producers can use to evaluate their options as they make decisions. Organizational and educational assistance that support the overall program objectives will be provided.

Results to date:

- Developed Web-based and Excel-based *Cow-Calf Cost Calculator* and user guide
- Developed cow-calf cost of production survey and survey plan
- Developed Web-based and Excel-based *Marketing Options Calculator* and user guide
- Drafted strategic issues document based on input from the Hawaii Cattlemen's Council Executive Committee and input from industry members interviewed for *The Hawaii Beef Industry: Situation and Outlook Update*, CTAHR publication LM-8 (available at <http://www.ctahr.hawaii.edu/freepubs> under Livestock Management).

Future:

- Finalize both sets of calculators and user guides and begin their distribution
- Conduct field survey and draft report on benchmark cost-of-production information
- Launch program Web site.



Pastoral Systems

Interagency Weed Education Workshop

Phil Motooka and Lincoln Ching

Weeds in the tropics and subtropics, once established, thrive and develop into complex and difficult situations for the landowner or manager. The objectives of the workshop were to evaluate, demonstrate, and train participants in methods and strategies for effective and efficient management of noxious weeds in pastures, rangeland and sensitive natural area reserves.



Results to date:

- A three-day workshop was attended by 33 participants from the Hawaii Department of Land and Natural Resources' Division of Forestry and Wildlife, the Hawaii Department of Agriculture, the Kauai Invasive Species Committee, and the CTAHR Cooperative Extension Service.
- Demonstration trials at eight sites on Kauai showcased the effective use of low-volume herbicide application methods to control invasive weeds in natural areas and pasture ecosystems.
- Trials evaluated eight herbicides on more than 20 weed species at the Kauai sites.

Field Trials for Pasture, Range, and Non-cropland Weed Control

Phil Motooka, Lincoln Ching, John Powley, Michael DuPonte, and Glen Fukumoto



Results to date:

A trial on Madagascar ragwort (a.k.a. fireweed, *Senecio madagascariensis*) was done on Maui to compare the efficacy of metsulfuron (Escort, Cimmaron; DuPont) and Dicamba DGA (Clarity, BASF) against MCPA (MCP Amine, Clean Crop), the currently recommended herbicide. Also, NuFilm IR (Miller Chemical and Fertilizer Corp.) was compared to Silwet L-77 (OSI Specialties) for improving the efficacy of MCPA. MCPA was effective at 1 and 2 lb (1 and 2 qt) active ingredient per acre. Nufilm was as effective as Silwet. Dicamba DGA was as effective as MCPA, but metsulfuron provided inadequate control. This was consistent with previous trials.

Two weedy species tolerant of triclopyr (Remedy, Dow) were susceptible to dicamba DGA. Infestations of Downy rosemyrtle (*Rhodomyrtus tomentosa*) on Kauai appear to be sensitive to as

little as 0.5 lb (1 pint) per acre of dicamba but need to be retreated at 6-month intervals, perhaps three times. Wedelia (*Spagneticola triloba*, formerly *Wedelia triloba*) was most sensitive to two treatments of dicamba at 2 lb (2 qt) per acre at a 3-month interval. MCPA at 2 lb/acre was a little less effective, but it may be more economical even if more treatments are required.

Several trials were conducted on Kauai and in Kau to evaluate very-low-volume basal bark application of triclopyr in oil at the base of woody plants. The chief advantage of the method is that little material is required, so it is useful in remote areas. Thus far, the method has proven effective in CTAHR trials on plume poppy (*Bocconia frutescens*), strawberry guava (*Psidium cattleianum*), guava (*P. guajava*), and ironwood (*Casuarina equisetifolia*), with results on black wattle (*Acacia mearnsii*) pending. Basal bark application of Stalker (imazapyr, BASF) in crop oil looked promising on fishing pole bamboo (*Phyllostachys* sp.) but not on *Bambusa* sp. in CTAHR-HDOA trials.

Control of *Schizachrium condensatum* (Kunth) Nees, Tufted Beard Grass

Mark S. Thorne and Lincoln Ching

The noxious grass *Schizachrium condensatum* is a weed concern on Kauai, where dense and dominant stands are becoming established on lands converted to pasture from sugarcane production. The grass thrives where soil quality is low. It is largely ungrazed by livestock and thus out-competes forage grass species. We are working to find an economical series of management practices to control this weed.

Results to date:

Recent efforts by ranch owners to control tufted beard grass with late fall mowing may prove effective, at least in the short term. In areas where soil quality is good, late fall mowing appears to allow the faster growing guineagrass the opportunity to shade out the slower growing weed grass. However, in areas of pasture where soil quality was poor, Guineagrass regrowth was slow, and it did not compete well against tufted beard grass. This suggests that if soil quality could be improved, desirable forages could become more competitive with this undesirable grass.

The pasture amendment trial being conducted on Kauai compares six treatments, including lime (CaCO_3) at 2 tons/acre, urea (46% N) at 150 lb/acre, and late fall mowing. The treatments are lime only, lime and urea, lime and mowing, urea only, urea and mowing, and lime plus urea and mowing. The remaining pasture serves as a control with no treatments. Lime and urea treatments were applied in April 2004. Response of guineagrass to the treatments was positive and rapid. By June 2004 guineagrass cover had increased over *Schizachyrium* cover by 15 percent. Late fall mowing treatments have yet to be applied. Monitoring and analysis of data continue at this time.

Forage Production Trials on Former Pineapple Lands

Mark Thorne, John Powley, and Glen Fukumoto

The cultural practices used in pineapple production are extremely intensive and essentially contrary to those used in a forage production system. The soils typically have low pH and low organic matter content, which tends to delay the plant successional process. Consequently there are many unknowns with regard to converting land from pineapple to forage production. The objectives of the project are to determine the time period and soil amendments required to initiate forage production, evaluate the most productive combination of forages, determine the full



production potential of the target combination, and evaluate factors that will contribute to the sustainability of the forage production system once grazing starts.

Results to date:

Plot set-up and base-line soil sampling was completed on January 2004. Treatments included application of lime at 2 and 5 tons/acre for evaluation of two forage grasses (guineagrass and green panic grass) and two forage crops (pearl millet and 'Haygrazer', a sorghum-sudangrass hybrid). In addition, a comparison between no nitrogen fertilizer and a low application rate of urea (150 lb/acre) will be evaluated.

Future:

Additional trials will be established using the legume perennial peanut (*Arachis pintoi*) and possibly other grasses. In establishing a sustainable forage production system, forage grasses are the foundation of the system. Forage legumes then provide a secondary forage source that increases the overall quality of the forage system.

Genetics And Biotechnology

Cattle Genetics and DNA Technology

Jinzen Yang, Baoping Zhao, Michael DuPonte, Glen Fukumoto, and Robert Ferreira

Animal production traits such as growth rate, reproduction, body frame and structure, and adaptability to tropical environments are controlled by genes, in most cases multiple genes. A gene is a fragment of DNA that encodes a protein sequence. Microsatellites are short, tandem, repeated DNA segments in the genome that have been very useful for animal genetic analysis and selection. The microsatellite marker varies among individuals sufficiently to allow its pattern of inheritance to be



tracked through families, which has several practical applications for cattle breeding, including individual DNA identification, paternity testing, molecular markers for production traits, and predicting hybrid vigor. The long-term goal of this project is to establish standard DNA analysis methods and to apply DNA-based testing to cattle selection and crossing for better forage utilization and meat quality. The objective for the first year is to establish the method of genomic DNA isolation and to develop a cattle parentage test using DNA microsatellite markers.

Results to date:

- Established a standard laboratory protocol of DNA isolation from cattle blood samples; the yield and quality of the genomic DNA from cattle blood were very good
- Developed an animal-use protocol for taking blood samples approved by the University of Hawaii Institutional Animal Care and Use Committee
- Collected blood samples from all 280 cattle at the Mealani Research Station and 100 cattle from Kipukai Ranch
- Completed DNA isolations from 40 cattle samples from Kipukai and 220 from Mealani Research Station, so DNA samples are available to the current research project as well as for other purposes
- Partially developed polymerase chain reaction primers design for 20 DNA microsatellite markers, which will be used for DNA parentage testing (polymerase chain reaction is a technique used to make a huge number of copies of a gene)
- Searched candidate genes for animal growth and meat tenderness traits.



Meat Science and Technology

Nutritional and Eating Quality of Locally Produced, Pasture-Finished Beef

Yong S. Kim



Pasture-finished beef appears to have unique nutritional qualities that are positively associated with human health. Those nutritional properties include a lower amount of intramuscular fat, higher amounts of omega-3 fatty acids and unsaturated fatty acids, and a higher intramuscular content of conjugated linoleic acid (CLA). The potential health benefits of CLA have been well documented. However, not enough information is available regarding the content of CLA in pasture-finished beef. Furthermore, current USDA nutritional composition data do not provide the vitamin and mineral content of pasture-finished beef, even though meat is an important source of many vitamins and minerals in addition to its prominent role as a protein source in the human diet. Thus there is a need to analyze the composition of these nutrients in locally produced pasture-finished beef to understand its nutritional contribution.

According to previous studies by the investigator and others, pasture-finished beef is generally less tender than grain-finished beef. This is probably due to many factors including different ages at slaughter, animal handling practices, and breed. Recent results from our laboratory indicate that some locally produced forage-finished beef is as tender as grain-finished, choice grade beef. It is important to understand what factors contribute to variations in beef tenderness.

Objectives:

- Examine the fatty acid composition and CLA content of pasture-finished beef produced in Hawaii
- Determine the content of some vitamins and minerals in pasture-finished beef
- Identify factors affecting beef tenderness and develop methods to improve it.

Mealani Research Station

New Directions for the Mealani Beef Herd

Wayne Nishijima, Trent Hata, Milton Yamasaki, Michael DuPonte, Mark Thorne, and Glen Fukumoto

In 2000, CTAHR's research station system underwent a critical review and evaluation in an effort to transform the research programs to meet future needs. In 2002, administrative oversight of research projects utilizing Mealani's beef cattle resources and management of the herd was transferred to the CTAHR county administrator for the island of Hawaii. A new direction for the herd and pasture systems has been set forth that encourages partnership with the industry on future research endeavors.

Results to date:

- Condensed dual calving seasons down to a single season, with calving in April
- Achieved a 45-day breeding season using the latest technology in estrus synchronization
- Focused artificial insemination selection on extremely well proven Angus and Hereford sires, targeting carcass traits expected progeny differences (EPD) for marbling, ribeye area, backfat, and low birth weight
- Re-established a computerized recordkeeping system using the Cow Herd Appraisal of Performance Software (North Dakota State University)
- Established an intensive culling program.

Future:

Provide an annual herd update to industry.



Improving Pasture Value by Protein Banking

Tropical grasses have high dry matter yield but are generally low in digestibility and crude protein content. In spring 2005 the protein bank system will be established in four 3-acre paddocks and evaluated for animal production. The paddocks will be planted with *Leucaena leucocephala* variety KX2, developed by CTAHR horticulturist James Brewbaker. The protein-bank system is already used in Australia and Florida and will add a more nitrogen to the pastoral ecosystem to improve production on established kikuyugrass pastures. Another legume with potential to increase nitrogen levels in the pastoral ecosystem is perennial peanut (*Arachis pintoï*). Future plans include over-seeding by range drill to evaluate establishment, persistence, and changes in forage quality.



Results to date:

- Forage crude protein (CP) and acid detergent fiber (ADF) contents were analyzed and compared between grasses and leucaena (whole plants, 1/2-inch stem diameter) at 12 weeks after planting at Mealani Research Station, with the following results:
 - Established 4800 leucaena seedlings
 - Established perennial peanut by rooted and unrooted cuttings into a continuously grazed paddock (Dec. 2003).

Future:

Purchase no-till range seed drill for expanding the use of legumes and other forages in the pastoral system.



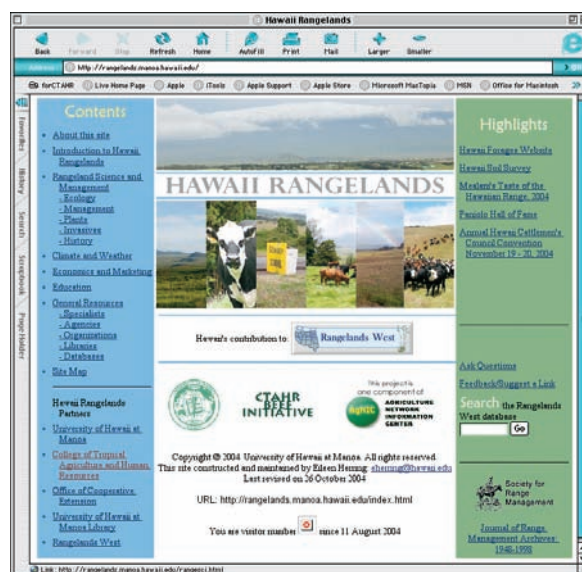
Outreach

Hawaii Rangelands Web Site

Eileen C. Herring, Mark S. Thorne, and Glen Fukumoto

The Hawaii Rangelands (<http://rangelands.manoa.hawaii.edu/>) Web site is a collaborative effort among western land grant universities to create an electronic network that will provide ready access to sources of rangeland information. Rangelands West (<http://rangelandswest.org>) is a partner in the AgNIC Alliance, a national effort to create an electronic network that will provide seamless access to distributed sources of agricultural information, subject-area specialists, and other resources in a manner in which the location of these resources is clear to the user.

As a component of Rangelands West, the Hawaii Rangelands Web site provides specific, local information on pasture and range systems as well as links to several Hawaii databases and industry sites. Our mission is to provide electronic access to grazing land information and rangeland management resources related to Hawaii and the Pacific. Links from the Hawaii Rangelands Web site also provide access to other western United States rangeland information.



8th Mealani Forage Field Day Spotlights Grass-fed Beef

Mark Thorne



Presentations at this year's field day—"Grassfed, Meeting a World of Demand"—addressed the obstacles and opportunities faced by Hawaii's beef industry and the steps needed to ensure greater sustainability in this agricultural sector. The event included panel discussions on beef production and marketing; issues relating to land, water, and coordination between state government and the local beef industry; and CTAHR research. CTAHR participants included Linda Cox, Mike DuPonte, Glen Fukumoto, Wayne Nishijima, and Mark Thorne.

Among the featured speakers were Mr. Kit Pharo, a rancher from Cheyenne Wells, Colorado (www.PharoCattle.com), who gave the keynote address, State Representatives Dwight Takamine and Cindy Evans, and Ms. Diane Ley (HDOA). The rancher panel consisted of Donn Carswell, Princeville Ranch; Dr. Calvin Lum, Northshore Cattle Co.; Rich Habein, Habein Livestock; and Greg Friel, Haleakala Ranch. Major funding was provided by the Natural Resources Conservation Service, Grazing Lands Conservation Initiative. Other support was received from the Mauna Kea Soil and Water Conservation District, the USDA Farm Service Agency, R.R. Olson, BEI Hawaii, DuPont Inc., United Horticultural Supply, Allied Machinery, Kamuela Deli, and Gaspro.



Future:

Develop a CTAHR Beef Initiative Web site where stakeholders can get updated information about projects, find links to resources, and provide input and suggestions to the program.

Community Outreach

9th Taste of the Hawaiian Range Food Festival

A record crowd of nearly 1900 fans of forage-fed meat attended the 2004 *A Taste of the Hawaiian Range* food festival, held this year on September 24 at the Hilton Waikoloa Village on Hawaii. The “Taste” is an educational event to raise public awareness of livestock agriculture and support for local agricultural products in Hawaii. Thirty-two chefs donated time and expertise to the event, which is coordinated by CTAHR’s Cooperative Extension Service and Mealani Research Station. An additional 37 booths featured displays by vendors, agricultural associations, and CTAHR. Twenty-four Big Island producers donated vegetables to complement the beef, buffalo, pork, mutton, lamb, goat, poultry, and sausages provided by Hawaii ranches and the Hawaii County 4-H Livestock Program. In all, eighty-nine individuals and businesses contributed to make the event possible. This year the “Taste” introduced a new feature: awards to local producers recognizing their dedication to the food show and the community. Rancher and CTAHR Board of Advisors member Monty Richards was named Outstanding Rancher, and Larry and Bobby Nakamoto of Nakamoto Farms tied with B.E.S.T. Farms in the Outstanding Farmer category. Governor Linda Lingle recognized each award recipient with a proclamation.

Many donors, sponsors, supporters, and volunteers from CTAHR and the community make the “Taste” possible. In addition to CTAHR coordinators, the event’s planning committee included representatives of the community and

local businesses: Gene Erger (community volunteer), Rick Habein (Habein Livestock Co.), Chef Willie Pirngruber (Hilton Waikoloa Village), Chef Miles Togikawa (Waikoloa Beach Marriott), Tom Asano (Kulana Foods, Ltd.), Mary Leleiwi (Big Island Farm Bureau), and Craig Pagaduan, Len Hiraoka, and Leanne Pletcher of the Hilton Waikoloa Village.



Scholarly Achievements

Presentations

- Cox, L.J. Today's research, tomorrow's standards. 2004. Panel presentation, 8th Mealani Forage Field Day, CTAHR, University of Hawaii at Manoa, September 24, 2004, Kamuela, Hawaii.
- Cox, L.J. Calculating the cost of production for a cow-calf operation. Presentation to the Hawaii Cattle Producers Cooperative Association Annual Meeting, May 22, 2004, Kealahou, Hawaii.
- DuPonte, M., L.B. Larish, and K. Dinges. 2004. What's bugging your neighbor? IPM livestock complaints issues with DOH Vector Control program. Poster, 8th Mealani Forage Field Day.
- DuPonte, M., and K.K. Lee. 2004. Three simplified estrus synchronization programs for Hawaii's beef breeding season. Poster, 8th Mealani Forage Field Day.
- Fukumoto, G.K. 2004. Pieces to the puzzle: Research components conducted at Mealani Research Station. Poster, 8th Mealani Forage Field Day.
- Kim, Y.S., J. Dobbs, M. DuPonte, and H. Zaleski. 2004. Eating quality of locally produced beef as compared to mainland grain finished beef. Poster, 8th Mealani Forage Field Day.
- Sako, G., M. DuPonte, K.K. Lee, and K. Dinges. 2004. Senecio ragwort, a proactive study on Hawaiian Home Lands. Poster, 8th Mealani Forage Field Day.
- Yang, J., B. Zhao, M. DuPonte, G. Fukumoto, and R. Ferreira. 2004. Genetic improvement of Hawaiian cattle through DNA technology. Poster, 8th Mealani Forage Field Day.

Grant Proposals Funded

- Fukumoto, G.K. 2004. A Taste of the Hawaiian Range Food Festival. County of Hawaii Department of Research and Development, and the Hawaii Tourism Authority. \$30,000.
- Thorne, M.S. 2004. Mealani Forage Field Day Educational Outreach. USDA-NRCS Grazing Lands Conservation Initiative Program. \$10,500.
- Thorne, M.S. 2004. Best Management Practices for the Sustainable Productivity of Hawaii's Range and Pasture Lands. USDA-CSREES Integrated Hatch-Smith Lever Project. \$50,000
- Thorne, M.S. 2004. Hawaii Grazing and Livestock Management Academy. USDA-NRCS. \$53,152

Grant Proposals Submitted but Not Funded

Kim, Y.S., G.K. Fukumoto, and M.W. DuPonte. 2004. Improving the competitiveness of Forage-finished beef through enhancement of meat quality. Submitted to CTAHR for Integrated Hatch-Extension Project funding. Proposal request, \$150,000.

Thorne, M.S., L. Cox, and H. Keyser. 2003. Best Management Practices for the Remediation of Former Sugarcane and Pineapple Lands for Cattle Production in Hawaii. Submitted to CTAHR for USDA-CSREES Tropical and Subtropical Agricultural Research program funding. Proposal request, \$226,200.

Thorne, M.S., L. Cox, J. Deenik, and H. Keyser. 2004. Best Management Practices for the Conversion of Abandoned Crop Lands into Sustainable Forage Production Systems. Submitted to USDA National Research Initiative Competitive Grants Program. Proposal request, \$797,846.

Thorne, M.S., L. Cox, J. Deenik, and H. Keyser. 2004. Sustainable Forage Production on Former Sugarcane and Pineapple Lands. Submitted to USDA-CSREES Western Region Sustainable Agriculture Research and Extension Program. Proposal request, \$73,098.

Grant Proposals Pending

Thorne, M.S., L. Cox, J. Deenik, and H. Keyser. 2004. Best Management Practices for the Remediation of Former Sugarcane and Pineapple Lands for Sustainable Livestock Production in Hawaii. Submitted to CTAHR for USDA-CSREES Tropical and Subtropical Agriculture Research program funding. Proposal request, \$262,200.

Beef Initiative Team Members

Extension Agents and Specialists

Glen Fukumoto, county extension agent, livestock programs, HNFAS, Kona Extension Office

Michael DuPonte, county extension agent, livestock programs, HNFAS, Hilo Extension Office

Lincoln Ching, county extension agent, livestock programs, HNFAS, Lihue Extension Office

John Powley, county extension agent, livestock programs, HNFAS, Kahului Extension Office

Phil Motooka, PhD, extension specialist, weed management, NREM, Kona Extension Office

Mark Thorne, PhD, extension specialist, pasture and range management, HNFAS, Kamuela Extension Office

Linda Cox, PhD, extension specialist, community economic development, NREM

C.N. Lee, PhD, extension specialist, reproductive and environmental physiology, HNFAS

Mealani Research Station

Wayne Nishijima, PhD, CTAHR county administrator, Hawaii

Milton Yamasaki, manager, Mealani Research Station

Trent Hata, academic support, PEPS, Beaumont Agricultural Research Center

Researchers

Jinzeng Yang, PhD, researcher, animal biotechnology, HNFAS

Yong S. Kim, PhD, researcher, muscle biology, HNFAS

Administration and Other Participants

Rachel Novotny, PhD, chair, HNFAS

Dale Uno, director, CTAHR Office of Communication Services

Eileen C. Herring, librarian, science and technology reference, UH Manoa

Harold Keyser, PhD, CTAHR county administrator, Maui

Quincy A. Edwards, research associate, NREM

Acronyms:

HNFAS—CTAHR Department of Human Nutrition, Food and Animal Sciences

NREM—CTAHR Department of Natural Resources and Environmental Management

PEPS—CTAHR Department of Plant and Environmental Protection Sciences

Funding Sources

United States Department of Agriculture, Cooperative State Research, Education, and Extension Service (USDA CSREES) Special Grant 2002-34172-12400, Hawaii Agricultural Diversification, New Crop/Product Development and Marketing

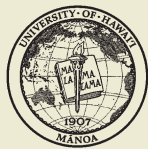
USDA-CSREES Special Grant, 2004-34172-15187, Hawaii Agricultural Diversification, New Crop/Product Development and Marketing

Cooperating Agencies

Hawaii Department of Agriculture, Plant Pest Control Branch

Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife

USDA Natural Resources Conservation Service



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