Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Livestock Management
Sept. 2003
LM-8

The Hawaii Beef Industry: Situation and Outlook Update

Linda J. Cox[1] and Soot Bredhoff[2]
[1]Department of Natural Resource and Environmental Management; [2]retired ranch manager

Summary

The purpose of this report is to present qualitative and quantitative information on the situation and outlook for the Hawaii beef industry. Since 1986, Hawaii's market share of the local beef market has decreased from about 30 percent to less than 10 percent. Hawaii cannot compete in the production of grain-finished beef from the mainland USA because of the high cost of inputs here. Currently about three-quarters of all cattle marketed in Hawaii are exported to be finished and marketed in North America. Transportation costs and other challenges associated with shipping live animals may make exporting a less attractive marketing option in the future.

Shipping feeders remains the preferred option for many ranchers, particularly for the larger producers, because the local price is less than the price on the Mainland. Those retaining ownership on the Mainland generally get a better return than those selling at the ranch to out-of-state buyers.

Producers do not forage-finish more cattle for the local market for the following reasons. First, the forage-finished market cannot absorb the quantity of calves that producers would offer for sale at various times of the year. Secondly, forage-finishing a calf would require 24–30 months of pasture space that could be used to support a cow/calf unit that would return higher profits. Third, the climate may limit the producers' ability to grow forage. Lastly, many producers need the cash flow generated by sales and cannot wait the extra time required to finish the animal. The cull cows and bulls, however, are sold locally, because the animals cost 46 percent more to ship full grown.

Small producers are generally more willing to accept the lower prices being offered locally for cattle. They also may have more flexibility when it comes to feeding an animal in their pastures after it is weaned. Many have off-farm incomes that increase their ability to adjust to inconsistencies in yield.

The wide range in management styles has contributed to a lack of cohesiveness and cooperation among cattle producers across the state. However, some producer groups and individual producers have developed management protocols in efforts to capture a larger share of the local market that have proven successful. Cooperation was required to obtain a consistent supply of high-quality cattle for the local market. Producers were able to gain more power in the local market place by acting in a unified manner.

Because shipping nearly doubles the cost of imported feed, many people in Hawaii, including employees of CTAHR and other agencies as well as private-sector ranches and companies, have been looking for a more economical means of finishing cattle. Examples of ideas considered include the use of energy-enhanced roughage, locally grown corn, and various forage grasses and legumes. While some information about the nutritional effectiveness of these potential feeds or feed supplements is available, no comprehensive comparative economic analysis of the many finishing alternatives has been completed. This information void makes it difficult for producers interested in the local market to evaluate the alternatives.

The high yield variability associated with finishing cattle on range forage may make feedlots one of the key components for an increase in market share. The state has only one feedlot, located on Maui. The island of Hawaii has a site that has some of the facilities needed to operate a feedlot, but these facilities are currently

Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawaii at Manoa, Honolulu, Hawaii 96822. An Equal Opportunity / Affirmative Action Institution providing programs and services to the people of Hawaii without regard to race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status. CTAHR publications can be found on the Web site <http://www.ctahr.hawaii.edu> or ordered by calling 808-956-7046 or sending e-mail to ctahrpub@hawaii.edu.

leased for other purposes. Increasing feedlot capacity will not occur without an economical means of finishing cattle and a steady supply of cattle coming into the feedlot. The coordination between producers and the feedlot is crucial, since the number of animals coming in to be finished must be consistent enough to ensure that the local feed production enterprise and the feedlot remain viable.

Each island, except Lanai, has slaughter facilities with enough excess capacity to double weekly kills, assuming Molokai's facility is open. Competition among slaughter facilities occurs because the volume of locally slaughtered cattle is small. At the same time, slaughter facilities face increasing regulation, which will continue to drive up costs. Slaughter capacity and the ratio of chill space to processing capacity of each facility vary, with chill space being in shorter supply. Chill space is important because forage-finished beef is considered to be more palatable if it is aged at least two weeks, preferably three. Only one slaughter facility in Hawaii has installed tenderness enhancing technology, and this technology should be considered at other facilities. Moving carcasses from the slaughter facility to the chill space at another location is not cost effective in most cases. Coordination between finishing, slaughter, and processing is a key factor in maintaining the needed consistency in quantity and quality.

Forage-finished and "natural" beef is currently being retailed on Oahu, Maui, Kauai, and Hawaii. It is merchandized in a variety of ways, from beef sold at the lowest possible price in order to be competitive with imported beef, to that vended with a focus on higher quality at higher price. The biggest challenge at this point in the marketing channel is the consistency of quality and quantity. The development of a processed product could increase its shelf life and also provide a means of using the less desirable cuts.

A wide disparity of opinions exists about the size of the market for forage-finished beef. Some feel it is a small niche market, while others feel that given the growing concerns with food safety and nutrition as related to human health it represents a significant market segment. If consumers perceive Hawaii beef as a superior alternative to Mainland beef, then Hawaii beef will not be forced to be as competitive, in terms of price, with imported beef. For example, even though the prices of fish, other seafood, and poultry have increased, consumers have increased their consumption of these protein sources.

Another challenge is to identify the target market for local beef. Roughly 80 percent of the state's population resides on Oahu, so selling to the local market requires shipping to Oahu, but locals may not pay a premium price for the product. The visitor population is a market segment that may be most able to pay premium prices. While the visitor group is dispersed throughout the islands, these consumers are often more discriminating, and a more sophisticated marketing strategy is required.

Getting cattle from the producer through the marketing channel and transformed into a cut of beef on the consumer's table will require cost-effective transportation. Shipping boxed beef between the islands costs about a third less than shipping live animals. Live-animal shipment also includes the cost of cleaning and preparing the shipping containers. Boxed beef is air-shipped by some producers, although these rates are 5 to 30 times higher than bulk rates by sea. A large increase in the marketing of boxed beef will require coordination with slaughter and processing activities.

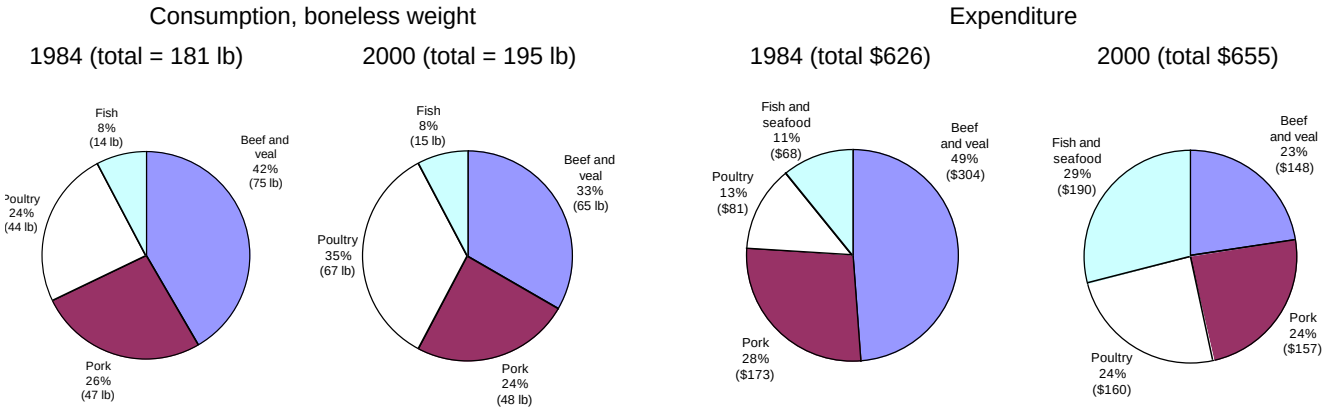
Coordination that helps move the beef from production locations to consumption locations in sufficient quantity and quality to satisfy the market must occur in order to increase Hawaii's share of the local beef market. Research is needed to determine the demand of the various market segments. In order to facilitate decision-making by everyone in the marketing channel, information should be collected from various locations across the state about the combinations of price, quantity, and form that will satisfy consumer groups.

Introduction

Hawaii's beef cattle inventory has declined steadily since the early 1970s, as has Hawaii's market share of the local beef market. In 1986, Hawaii's market share of the local market was slightly less than 30 percent, with an estimated 8000 feeders being exported that year. By 1999, it is estimated to have decreased to about 10 percent of the market (HASS, *Hawaii Cattle*; ESS, *Food Consumption*). Ranch numbers have also decreased, as have the number of slaughter and processing facilities (DBEDT).

Currently, Hawaii cannot compete in the production of grain-finished beef from the mainland USA because of the high cost associated with shipping grain. With the closure of the large feedlot and slaughter plant

Figure 1. U.S. per capita meat consumption and expenditures, 1984 and 2000.



on Oahu in 1991, weaned calves began to be shipped to the U.S. mainland and Canada to be finished and marketed. Currently about three-quarters of all cattle marketed in Hawaii are exported. Transportation costs and other challenges associated with shipping live animals to the U.S. mainland may make exporting a less attractive marketing option in the future. However, industry efforts aimed at reducing the cost of exporting cattle are ongoing.

Forage-finished and "natural" beef is now being marketed on all islands. Nutritional analysis indicates that forage-finished beef differs from grain-finished beef, with forage-finished beef having positive nutritional characteristics (Fukumoto et al. 1995, 1999). At the same time, forage-finished beef has been found to differ in appearance and taste from grain-finished beef (Cox et al. 1987). For a full discussion of the USDA definition of "natural," refer to Cox and Shehata (in preparation). Forage-finished beef may be a viable marketing alternative for Hawaii beef producers.

The purpose of this report is to present qualitative and quantitative information on the situation and outlook for the Hawaii cattle industry. The industry is divided into eight key segments that together must operate efficiently and effectively to ensure that the marketing channel is profitable. The segments include feed production and processing, cow/calf production, stocker production, feedlot and processing, wholesaling and retailing. Each segment has its own specific bottlenecks that will need to be addressed in order to ensure that the industry can maintain its market share.

A variety of interviews conducted across the state with people currently involved in the cattle industry contributed to this report. Various types of secondary data associated with cattle production, beef demand, transportation, and marketing are also presented. The final section includes a brief discussion of the future for the industry.

Meat consumption in the U.S. mainland and Hawaii

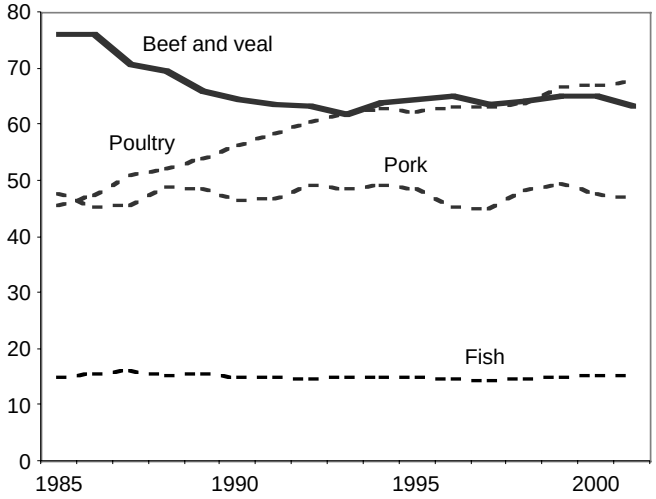
Per capita beef consumption in the USA reached a high in 1976 of 88.8 pounds per year and has generally declined since (ESS, *Food Consumption*). As Figure 1 indicates, the total per capita consumption of meat has increased since 1984, yet the consumption of beef and veal has decreased 10 pounds per person per year (ESS, *Food Consumption*; Cox et al. 1987). In the same period, poultry consumption increased more than 50 percent, from 44 pounds in 1984 to 68 pounds per person in 2000, while pork and fish consumption have remained at about 47.5 and 14.5 pounds person, respectively.

Figure 2 indicates that total expenditure per person per year on meat has increased slightly since 1984, while beef expenditure has decreased dramatically. If the 1984 expenditure is inflated to the year 2000, then expenditure on beef has been cut in half, from $304 per person per year in 1984 to $148 in 2000 (ESS, *Baseline Projections*). Expenditures on fish and seafood have almost tripled, even though consumption has remained at about 14.5 pounds per person. In the case of poultry, expenditure has increased by 100 percent, while consumption

increased by only half that amount. The price of fish and seafood and poultry has increased, and consumers have not responded to this increase with a decrease in the number of pounds purchased.

Consumption of beef and veal is expected to decline over the next 10 years. The population of the state is expected to increase, but not at a rate that is high enough to offset the decline in consumption. If the current projected per capita consumption is multiplied by the current and projected de facto population of the state (DBEDT), the 2001 consumption of beef was approximately 89.2 million pounds (retail weight of beef), and beef consumption is estimated to be 84.6 and 85.1 million pounds in 2005 and 2010, respectively. If this retail weight is converted to number of animals, around 200,000 head of cattle would be needed to meet the demand for beef (FSIS conversion factor: 1000 pounds [1 animal] live weight equals 450 pounds retail weight).

Figure 2. U.S. per capita consumption, boneless weight.



Feed production and processing

No commercial production and processing of feed as a commodity currently occurs in Hawaii. The cost of imported feed in Hawaii varies widely in response to a number of factors. For example, over the period of 1993–2000, Table 1 shows that the wholesale purchase price for corn varied as much as 42 percent from the average cost, and increased 43 percent in one year (NASS). The purchase cost of feed grain depends on international commodity rates as well as regional factors, such as the weather.

Because feed grains are produced in the Midwest, moved by rail to the West Coast, and shipped to Hawaii, transportation cost is a significant factor in the cost of feed in Hawaii. Shipping costs vary with the density of the grain, because they are based upon the size of the carrier and not the weight of the grain. The price of fuel is a significant cost for both ground and sea shipment.

Currently the cost of shipment is more than the purchase price for feed in most cases. For example, a combination feed of half corn and half barley costs approximately $225 per ton (Land O' Lakes). Because the average wholesale market price of corn and barley in a 1:1 weight ratio in the period 1993–2000 was $91.45, the shipping cost was approximately $133.55 (NASS). Thus the cost of shipping more than doubles the price of imported feed. Because of these high feed transportation costs, the cattle industry in both Hawaii and the U.S. mainland is organized to ship cattle to feed rather than feed to cattle.

Several alternatives for finishing cattle locally are currently under investigation by CTAHR, other institutions, and private businesses. The alternatives vary from common grains and silage to forage supplements and nontraditional means. The following discussion of alternatives provides a sample of the range of options under consideration.

One nontraditional alternative for finishing cattle that is currently being researched is called energy-enhanced roughage (EER) (Shehata et al. 2003). EER makes sugarcane, californiagrass, Guinea grass, or other suitable grasses, which are economically producible yet indigestible, into a digestible feed substitute. A recent trial at Paauilo used Guinea grass to produce EER. The economic analysis reported by Shehata et al. found that the costs would be competitive with the current cost of grain from the Mainland. In comparison with other feeds, it takes about 1.5 tons of EER to substitute for 1 ton of grain. Table 2 compares the estimated cost of shipping from the mainland ($133.55) with the wholesale prices of feed in 2000 and the cost of EER. The cost for EER includes startup costs and shipment from the processing facility to the feedlots. No inter-island shipping costs are listed for EER because the EER processing facility is assumed to be within 40 miles of the biomass produc-

Table 1. Wholesale price per ton of cattle feed, 1993–2000.

Year	Corn[1]	Barley[2]	Corn + barley 50/50 mix	Cottonseed meal 41% protein	Soybean meal 44% protein	Alfalfa meal (dehydrated)
1993	89.29	86.52	87.90	180.50	179.80	124.70
1994	80.71	88.26	84.49	129.40	152.50	118.40
1995	115.71	125.65	120.68	208.80	225.10	130.40
1996	96.79	119.13	107.96	207.50	260.40	142.70
1997	86.79	103.48	95.13	162.60	175.00	126.80
1998	69.29	86.09	77.69	132.20	132.00	101.50
1999	65.00	92.61	78.80	130.20	131.99	101.55
2000	66.07	91.74	78.91	146.50	160.03	97.59
Avg.	83.71	99.18	91.45	162.21	177.10	117.96

[1]Price per ton for corn based on a conversion of 56 lb/bushel. [2]Price per ton for barley based on a conversion of 46 lb/bushel.

Table 2. Cost comparison for cattle feed.

EER[1]	Corn[1]	Barley[2]	Corn + barley	Cottonseed meal	Soybean meal	Alfalfa meal
Price	224.00	78.91	66.07	146.50	160.03	97.59
Total cost[2]	224.00	225.00	212.16	292.59	306.12	243.68

[1]Price is for 1.5 tons, which is the equivalent 1 ton of other feeds. [2]Includes the cost of shipping to Hawaii; based on a personal communication with Land-O-Lakes. No cost is added to EER for reasons stated in the text.

ers. If an EER processing facility is not created on every island, then inter-island shipping is needed.

The costs of inter-island shipping is considerably less than the roughly $130 per ton for shipping from the Mainland. For example, to ship 24 tons of corn and barley feed between the islands would cost around $20 dollars per ton (Young Brothers, Land-O-Lakes). To illustrate how rising shipping costs would affect Hawaiian beef, if both shipment costs were to increase 50%, then the shipment of Mainland grains would increase to about $195 per ton, while inter-island shipment would increase to $30 per ton.

No cost estimates are available for the other alternative feeds that are under investigation. One of these options is locally grown corn for feed and silage (Brewbaker 2002). Research in corn production has been an ongoing program in CTAHR for many years, and currently 2000 acres of corn are involved in an experiment to make silage for milk cows (J.L. Brewbaker, personal communication). Two of the relatively high cost factors involved in corn production in Hawaii, irrigation and pesticides, have been reduced, making it more competitive to produce corn as cattle feed. Hybrids that can be grown year-round have also been developed.

Another option to bolster the effectiveness of forage finishing is to introduce improved grasses and legumes into pastures. For example, kikuyugrass provides high quality pasture at higher elevations in the tropics and subtropics. This forage is better suited for grazing than mechanical harvesting, though it has been made into silage (Hanna et al. 2003). It also has been shown to produce promising weight gains when combined with legumes.

Perennial forage peanut is a legume that can be grown in lowland Hawaii, and research has shown that supplementing pastures of Guinea grass with forage peanut leads to almost doubling daily weight gain compared to pure Guinea grass pastures (Mathews et al. 2000). The seed is relatively expensive, but the additional nitrogen supplied by this legume eliminates the need to add 100–300 pounds of nitrogen per acre per year. The reduced need for nitrogen fertilizer would save about $47–140 per acre. This indicates that forage peanut has the potential to make forage finishing more eco-

nomical in Hawaii's lowlands.

No other information on other types of feed grains or alternative feeds is currently available for Hawaii. A few private businesses are looking at various alternatives for finishing cattle, but no information has yet been made public. This information void, particularly the lack of cost data, is an area that could benefit from additional research.

Cow/calf and stocker production

The number of cattle and calves, excluding milk cows, in the state in 2002 was 142,000, a decrease of 15 percent since a six-year high in 1998 (Table 3). During the same period, cattle and calves in the counties of Kauai and Hawaii decreased only 6 and 11 percent, respectively, while in the counties of Maui and Honolulu, the decrease was 31 and 39 percent, respectively. Thus, inventories have decreased more on Maui and Oahu than on Hawaii and Kauai since 1998.

Looking at marketing, as indicated in Table 4, the number of animals sold increased from 37 percent of the beginning inventory in 1997 to 42 percent in 2002. The percentage of animal exported also increased during this period, from 67 percent in 1997 to 72 percent in 2002.

In 2001, there were statewide sales of approximately 31.5 million pounds live weight (HASS, *Statistics of Hawaii Agriculture*), or 17.3 million pounds dressed weight (0.549 conversion factor, HASS, *2001 Cattle*). If the industry doubled its production over ten years, it would still supply less than half of the state's projected consumption of 85.1 million pounds.

Hawaii's large ranches have been gradually decreasing in size over the years as development has bid up the price of land and drawn agricultural lands into higher valued commercial and residential use. A few large ranches still remain, with many being engaged in some form of land development rather than agricultural production as their primary source of profitability. Generally, the ranching portion of the business is not viewed primarily as a profit center but as a part of a joint objective that includes maintenance of a lifestyle and an opportunity to engage in land stewardship.

Shipping feeders to the Mainland remains the preferred option for many ranchers, particularly the larger producers. Large operations have a payroll to meet and therefore rely more heavily on the higher prices that can consistently be obtained on the Mainland. At the same time, large producers have become efficient cow-calf producers with an overall objective of selling their animals after they are weaned. Cull cows, however, are sold locally, because the animals are too large to be shipped.

Producers would keep cattle in the state if they could realize an economic benefit. The current local price for animals under 30 months old is around $0.90 per pound dressed weight. According to producers, this is not enough to find marketing cattle in Hawaii competitive with exporting.

Forage finishing remains relatively expensive compared to cow-calf production, particularly for large operations, because of the large carrying capacity required to finish the animals. Forage finishing is also more risky than cow-calf production. For example, the onset of a drought may force ranchers to reduce their herds as the carrying capacity of the pastures is reduced. Hawaii's cattle market cannot absorb large numbers quickly, like the export market does. Therefore, a large increase in animals being sent to slaughter will cause a sharp drop in prices.

The small producers are generally part-time operators that face challenges with economies of scale in shipping cattle. Since they are likely to have off-farm income, they are more willing to accept the lower prices being offered locally for cattle. They also may have more flexibility when it comes to feeding an animal in their pastures after it is weaned.

The wide range in management styles has contributed to a general lack of cohesiveness and cooperation across the entire cattle production sector statewide. Producers that export cattle have similar objectives and therefore are able to work together. For the industry to secure a larger share of the local market, operators should be encouraged to work together toward horizontal coordination in the marketing channel in order to more closely control the quantity and quality of production. Product consistency allows producers to gain more power in the marketplace. Some producer groups and individual producers have developed management protocols that have proven successful in efforts to capture a larger share of the local market. Cooperation was required to obtain a consistent supply of high-quality cattle for the local market. Producers were able to gain more power in the local marketplace by acting in a unified manner. As this success grows and producers gain a

Table 3. Cattle and calves, excluding milk cows, statewide and by county, 1000 head.

		County			
Year	State	Hawaii	Maui	Honolulu	Kauai
1984	207	131.2	39.4	20.6	15.3
1997	157	115.9	27.1	4.5	10
1998	167	121.9	29.7	5.7	10.4
1999	160	116.8	27.7	6.1	9.6
2000	151	111.0	25.8	5.6	9.5
2001	140	105.6	19.5	3.4	10.8
2002[1]	142	108.9	20.3	3.5	9.7

[1]HASS, *2001 Cattle.*

Table 4. Cattle and calves: inventory and disposition (1000 head).

Year	Inventory (Jan. 1)	No. sold	Exports
1984[1]	201	65	N/A
1997[2]	157	58	39
1998	167	67	44
1999	160	74	57
2000	151	73	51
2001	140	59	46
2002	142	59	42

[1]Peter Garrod et al. 1987. [2]HASS, *Hawaii Cattle.*

larger market share, marketing orders and cooperatives will become more viable. Then, the economies of scale that can be realized with vertical integration become more feasible.

Feedlots and processing facilities

Each island except Lanai has slaughter facilities with excess capacity, although not every processing facility has excess capacity. Only one slaughter facility, in Hawaii has installed tenderness-enhancing technology based on low-voltage carcass stimulation. Offal is a concern, because all slaughter facilities in the state dispose of offal at their local landfills. The only feedlot in the state is located on Maui, with a capacity of 950 head. The cost per pound of gain is $0.60, with the typical animal coming in at 700 lb and leaving at 1050 lb, for a total charge of $210. The average feedlot expenditures per head on the Mainland varies from about $150 to $225, which includes feed, veterinary care, branding and other services (source: Hawaii Cattle Producers).

The island of Maui has one slaughter facility that can handle about 100 head a week with chill space at the same capacity. Currently, the facility is killing about 25 head a week. They are processing some of the cattle they kill, although they are turning away some requests to process carcasses. Producers indicate that they have some challenges in working with this facility, as far as scheduling and price discovery.

Molokai has a new slaughterhouse that is expected to be in full operation in the second half of 2003. The plant can slaughter up to 25 head a day and has chill space for 25 head. It is expected to operate two days a week.

The island of Hawaii has three slaughter facilities. Currently, about 130 head per week are slaughtered on Hawaii, yet each one could nearly double the number of animals killed. Since this island produces the most cattle, the large number of cull cows available on Hawaii is sufficient to ensure that its facilities have sufficient numbers to remain in operation.

Kauai has three slaughter facilities that are now killing around 35 head a week. This amount could be doubled, if necessary. Processing is more of a bottleneck, because chill space is very limited at two of the facilities. Some excess chill space is available at one facility, but transportation from another slaughter facility does not appear to be feasible. A relatively new slaughter facility, currently not in operation, is for sale, and its operation near a residential area may be a challenge due to noise levels associated with its operation. Currently no slaughter facility is operating on a full-time basis. Competition among slaughter facilities has contributed to animosity among the group.

On Oahu, a cooperative currently operates a slaughter facility that is killing around 25 head a month and has a monthly capacity of 100. This facility will be closed soon and another will open that has the slaughter capacity, along with processing and chill space, for at least 100 head a month. A large processing facility with excess chill capacity is also located on Oahu, although the operation has declared bankruptcy. Uncertainty about the processing plant has likely affected the cattle market.

Wholesaling and retailing

Forage-finished and "natural" beef is currently sold in Hawaii. The beef is merchandised using a variety of marketing strategies. At one end of the strategy spectrum is the approach of trying to maintain a low price as a means of remaining competitive with imported beef. At the other end are the strategies that focus on higher quality beef that commands a slightly higher price. In general, the forage-finished and "natural" beef is merchandised as a healthier alternative to imported beef, although the marketing strategies of Hawaii producers are not as sophisticated as those found elsewhere. A marketing strategy needs to incorporate the elements of price, place, promotion, and product to establish a clear identity in the mind of the customer. For example, a discount clothing store will not be expected to have high prices, the best service, lots of attractive advertising, and be located in an upscale district, while customers will have different expectations of a store selling designer clothing.

On Kauai, one group of producers has adopted a low-margin, commodity approach. The beef is moved quickly and efficiently to market without aging or the use of a private label. The other producers selling forage-finished beef on Kauai use slightly more merchandizing, since they identify the producer or processor. The customer base in all cases is the local population that is loyal to the retailer. Vertical integration from production to retailing appears to be a successful means of differentiating the product in order to command a higher price.

On Maui, Hawaii, and Oahu, the marketing strategies focus to a large degree on merchandising the product to the target customer. Direct retail sales do occur, while wholesale sales to retailers and restaurants are most common. Since the bulk of the state's population resides on Oahu, it is likely to be the market of greatest interest. On Maui, given the large numbers of health food retailers and the frequency of "healthy" alternatives found at food service establishments, the population base of residents and visitors would be a good target market as well.

The biggest challenge for wholesalers and retailers in marketing forage-finished beef is the consistency of the product's quality and quantity. Forage-finished beef may be highly variable in quality, particularly given the range of quality standards used by producers across the state. At the same time, quantity varies due to weather conditions and the management approaches of producers. Finishing in feedlots reduces these sources of variation and can produce a natural product, although the beef may not be classified as forage-finished. The Hawaii Department of Agriculture has a certified federal meat grader who can grade the quality of a carcass based on USDA grading standards. Currently, the hourly cost of these services to producers and slaughter facilities is prohibitive. The economics of finishing clearly remain a challenge.

Another approach to coping with variations in quantity and quality is to develop a processed product that extends the shelf life of the beef while at the same time allowing the quality to be more highly controlled. Beef cuts from the front parts of the animal are more difficult to market because these cuts are seen as less desirable. Grinding the low quality beef into hamburger is one option. However, the price of hamburger is generally not sufficient to make this an economically viable solution. These cuts would be well suited to be developed into a value-added product that would be seen as convenient and nutritious by consumers. By combining beef with other less expensive ingredients, the product could be sold at a relatively high price.

An informal survey of retail prices for Hawaii beef in May 2003 (Table 5) found them similar to the U.S. average retail prices in March 2003 (ERS). The prices in Hawaii are not consistently higher or lower nor do they vary from the U.S. averages in a consistent percentage. Considering the high cost of production for Hawaii producers, the marketing strategies for selling beef locally do not appear to result in a premium price.

Most of the retail vendors surveyed were small, privately owned stores away from major business districts or large chain stores that are not primarily food vendors. However, a few of the more developed product lines had more market penetration. The displays for the meat were generally not designed to catch the eye, since they had no point-of-purchase material. In addition, the packaging typically did not advertise all of the features of the beef. Point-of-origin information, such as the name of a ranch or processor, was generally included. Vacuum packaging was used by some of the vendors.

Local producers should view their ability to market their product at prices competitive with beef from the U.S. mainland as an accomplishment. Local consumers bought forage-finished beef before grain finishing became the norm in Hawaii. This beef was often tough,

Table 5. Average retail beef prices for selected cuts in Hawaii (May 2003) and the USA (March 2003).

Cut	Hawaii average	U.S. average	Hawaii-U.S. difference (%)
Sirloin	$ 3.70	$ 3.96	–0.26
T-bone steak	3.64	6.58	–2.94
Ground chuck	2.50	1.90	+0.60
Chuck steak	2.29	2.13	+0.16
Ground beef	1.83	1.92	–0.09
Ground beef, extra lean	2.19	2.66	–0.47
Stew beef	2.59	3.08	–0.49

with a strong flavor. As a result, the customer would purchase local beef only if the price was discounted. Progress has been made by some suppliers to develop more consistent quality. To get a price premium for local beef, more information on exactly what consumers are willing to pay for is needed.

An ongoing study (Shehata and Cox, unpublished) found that on the U.S. mainland, forage-finished and "natural" beef sell in health food stores at about a 20 percent premium over beef in a supermarket. Their survey of vendors found that Hawaii beef is seen as having potential, but there is a need to establish a marketing strategy that can produce a competitive brand. In order to develop this strategy, more information about the target clients is needed. Hawaii's high visitor counts offer the possibility that this group may experience Hawaii beef in the state and then purchase it after returning home, so this group's preferences and willingness to pay are essential to the development of a marketing strategy for a premium beef product.

Industry organization

While each segment of the industry has challenges that have been discussed here, the overall organization of the industry is also an issue. For the industry to work together, its overall organization will need to be examined to determine if it can be organized more effectively. Since the state is composed of various islands, transportation cost between islands is a key cost component. This section presents some information on transportation that can be used to evaluate spatial efficiency.

Table 6: Costs for shipping between islands.

	Other islands –Hawaii	Between other islands
Feeders		
To island	$759.75	$748.39
Return	$87.00	$87.00
Total cost	$846.75	$835.39
Number of head	65–70	65–70
Cost per head	$12.10–13.03	$11.93–12.85
Liveweight (pounds)	30,000	30,000
Cost per pound liveweight	$0.03	$0.03
Cattle, cows, bulls		
To island	$759.75	$748.39
Return	$87.00	$87.00
Total cost	$846.75	$835.39
Number of head	35–45	35–45
Cost per head	$16.60–24.20	$18.56–23.87
Liveweight (pounds)	30,000	30,000
Cost per pound liveweight	$0.03	$0.03
Boxed beef, by pallet		
To island (per 2000 lb)	$71.35	$69.81
Dressed weight (pounds)	16,470	16,470
Total cost	$587.57	$574.89
Liveweight (pounds)[1]	30,000	30,000
Cost per pound liveweight	$0.02	$0.02

[1]Liveweight conversion factor 0.549 (HASS, *2001 Cattle*).

The inter-island cost of shipping boxed beef is less than the cost of shipping live animals, as shown in Table 6. If the boxed beef is converted into a live-weight equivalent, then the cost is one-third less for boxed beef. This reduction in cost exists for deliveries between all islands.

The cost of shipping calves to the U.S. mainland is more than eight times as much as shipping them between the islands. The shipment of calves to the Mainland is about 25 cents per pound (Hawaii Cattle Producers Coop), as compared with close to 3 cents per pound for shipping calves around the islands (Young Brothers).

Vendors of "natural" beef air-ship between the islands and to the U.S. mainland. As indicated in Table 7, air shipment rates are significantly higher than water shipment costs, and may cost over $1 per pound, but the delivery time is under two days. The minimum charge for boat shipment is not economical if the shipment is small and, particularly in the case of direct sales, air-shipment is consistent with the merchandising of a premium product.

Table 7. Air-shipment rates for boxed beef, inter-island[1].

Type	25 lb	$/lb[2]	50 lb	$/lb[2]	100 lb	$/lb[2]	150 lb	$/lb[2]
Fed Ex[3]	13.06	0.29	19.59	0.22	32.66	0.18	45.72	0.17
HA-Priority[4]	47.25	1.04	47.25	.52	88.00	0.48	132.00	0.48
HA-General[4]	28.00	0.61	28.00	0.31	50.00	0.27	75.00	0.27

[1]Tax not included. All weights are total weight, including packaging.
[2]Converted to liveweight equivalent using conversion factor of .549 (HASS, *2001 Cattle*).
[3]Costs are the same for overnight and two-day delivery.
[4]HA = Hawaiian Air Cargo; "Priority" is put on a plane within 6 hours, and "General" is put on a plane within 24 hours.

Conclusions

Shipping feeders remains the preferred option for many ranchers, particularly the larger producers. They can consistently get a higher price on the Mainland than they can get locally. Small producers are generally more willing to accept the lower prices being offered locally for cattle. They also may have more flexibility when it comes to feeding an animal in their pastures after it is weaned.

Cooperation is required to obtain a consistent supply of high quality cattle needed to capture a larger share of the local market. The high yield variability associated with finishing cattle on range forage may make feedlots one of the key components for an increase in local market share. Research into alternative cattle feeds is ongoing, but the information is difficult to locate, and little analysis has been done. Work on a situation-and-outlook report for alternative feeds is needed.

No comprehensive, comparative economic analysis of the many finishing alternatives has been done. This lack of information makes it difficult for producers interested in the local market to evaluate the alternatives. The coordination between producers and feedlots is crucial, because the number of animals coming in to be finished must be consistent enough to ensure that the local feed producer and the feedlot remain viable. More information about the cost of producing forage-finished beef is needed to determine the economic incentives needed to increase production.

Competition among slaughter facilities occurs because the volume of locally slaughtered cattle is small and all existing facilities have excess capacity, although chill space is in shorter supply. Coordination between production, finishing, slaughter, and processing is a key factor in maintaining the needed consistency in quantity and quality. Efforts to facilitate communication and coordination need to be ongoing.

Forage-finished and "natural" beef is currently being retailed on Oahu, Maui, Kauai, and Hawaii. The biggest challenge at this point in the marketing channel is consistency of quality and quantity. Development of a new processed product could increase shelf life and also could provide a means of using the less desirable cuts. Efforts are needed to produce a product that will meet the needs of the industry and satisfy the demands of consumers. At the same time, quality-enhancing technologies need to be investigated as a means of reducing risk.

A wide disparity of opinions exists about the size of the market for forage-finished and "natural" beef. Some feel it is a small niche market, while others feel that, given the growing concerns with food safety and nutrition, it represents a significant market segment. If consumers perceive Hawaii beef as a superior alternative to Mainland beef, then Hawaii beef will not be forced to be price-competitive with imported beef. Research is needed to determine the demand of the various market segments. In order to facilitate decision-making by everyone in the marketing channel, information should be collected from various locations across the state and on the U.S. mainland about the combinations of price, quantity, and form that will satisfy consumer groups. Once more information about various consumer groups is known, then efforts will be needed to assist industry participants to develop a marketing strategy or strategies.

If all calves were kept in the state, then the value added to the animals would circulate in the local economy rather than being exported out of state. While the economic impact of selling the calves locally cannot be exactly determined, a rough estimate of the po-

tential economic benefit can be made. Assuming that a finished animal produces a carcass valued at $600 and the value of the stocker that was produced locally is $270 (Shehata and Cox, unpublished), then $330 is added to a calf after the animal is exported from Hawaii. Therefore, the 42,000 calves exported in 2001 could have added nearly $14 million to the value of the industry if they had been finished and slaughtered locally. To capture this additional value, a comprehensive, coordinated marketing strategy is needed by the industry.

Acknowledgments

This research was partially funded by the offices of economic development for Maui and Kauai counties. The authors gratefully acknowledge the assistance of all those who participated in the survey. The support of the Hawaii Cattlemen's Council and Bobby Ferreira, chairperson of its marketing committee, is also gratefully acknowledged.

References

Brewbaker, James L., 2002. Field corn hybrids for Hawaii. Hawaii Foundation Seed Facility, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa.

Cox, Linda J., Catherine G. Cavaletto, Sandra L. Kunimoto, James C. Nolan, Jr., Shwu-En Chen, and Peter V. Garrod. 1987. Evaluation of beef rib roasts available to Hawaii consumers. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Research Series 052. 11pp.

Cox, Linda J., and Sabry Shehata. The demand for natural and organic beef. CTAHR Livestock Management publication (manuscript under review).

DBEDT (Hawaii Department of Business, and Economic Development, and Tourism). Hawaii state data book, 1997–2002.

ERS (Economic Research Service, U.S. Dept. of Agriculture). 2003. Retail scanner prices for meat.

ESS (Economics and Statistics System, U.S. Dept. of Agriculture). 1998. Food consumption, prices, and expenditures 1970–1997.

ESS. 2003. Agricultural baseline projection tables to 2012.

Federal Express. 2003. Rate finder, www.fedex.com.

FSIS(Food safety inspection Service) 2003. Focus on: Beef…from farm to table.

Fukumoto, G.K., Y.S. Kim, K.H. Kim, and H. Ako. 1999. Carcass and meat quality characteristics of forage-based beef. Proceedings of Food for Health in the Pacific Rim, 3rd International Conference of Food Science and Technology. Food and Nutrition Press, Inc., Trumbull, CT 06611.

Fukumoto, G.K., Y.S. Kim, D. Okuda, and H. Ako. 1995. Chemical composition and shear force requirement of loin eye muscle of young, forage-fed steers. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Research Extension Series 161.

Garrod, Pete, Linda J. Cox, Charles Ingraham, Stuart Nakamoto, and John Halloran. 1987. The Hawaii beef industry: situation and outlook. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Information Text Series 029. 21 pp.

Hanna, Wayne W., Cesar J. Chaparro, Bruce W. Mathews, Joseph C. Burns, and James R. Carpenter. 2003. Perennial pennisetums. University of Hawaii at Hilo, College of Agriculture, Forestry and Natural Resource Management.

HASS (Hawaii Agricultural Statistics Service). 2001–2003. Hawaii cattle., 1999, 2002, 2003.

HASS. 2003. 2001 Cattle, milk, and hog highlights. Statistics of Hawaii Agriculture. Hawaii Department of Agriculture and U.S. Department of Agriculture Statistical Reporting Service.

Hawaii Cattle Producers Cooperative. 2001. Pasture and feedlot results. Private export detail.

Hawaiian Airlines. 2003. Hawaiian Airlines cargo: cargo services: interisland rates.

Land-O-Lakes, 2003. Estimated wholesale prices for grain given over telephone, from Hawaii and Portland, Oregon.

Mathews, B.W., J.R. Carpenter, E. Cleveland, Z. Gibson, and R.Y. Niino-DuPonte, 2000. Perennial forage peanut (*Arachis pintoi*) in pastures for raising replacement heifers/stocker steers in Hawaii. J. Hawaiian Pacific Agriculture 11:1–20 (2000).

NASS, 2002. Agricultural statistics, 2002. USDA National Agricultural Statistics.

Shehata, Sabry, Linda J. Cox, and Mike DuPonte. 2003. An assessment of economic feasibility for energy enhanced roughage as cattle feed. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Livestock Management 7.

Shehata, Sabry, Linda J. Cox, and Michael DuPonte. Assessing the need for branding Hawaii's naturally produced beef. CTAHR Livestock Management publication (manuscript under review).

Young Brothers, Ltd. 2003. Calculation of freight.

Young Brothers, Ltd. 2003. Local freight tariff no. 5-a.