



# Management characteristics of beef cattle production in Hawaii<sup>1</sup>

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## ABSTRACT

A comprehensive life cycle assessment of the US beef value chain requires the collection of region-specific data for accurate characterization of the country's diverse production practices. Cattle production in Hawaii is very different from the rest of the country due to its unique ecosystem and geographic location. A survey of cattle producers provided information on herd size and characteristics, grazing management, forage and feed sources, and marketing. Ranch survey responses represented 44% of the state's beef cows with operation sizes varying from 5 to 10,000 cows. Most cows (79%) were maintained on operations that finished at least some of their cattle, and the majority of those operations finished cattle on forage without concentrate feeds. Cattle were kept on natural pastures ranging in size from 16 to 52,610 ha per ranch with a stocking rate of 2.4 ha/cow on cow-calf operations and 2.0 ha/animal on operations that included older growing animals. Common forage species were *Panicum maximum* (guinea or green panic grass), *Pennisetum clandestinum* (kikuyugrass), *Digitaria eriantha* (pangola or digitgrass), and *Trifolium repens* (white clover). Reported cow and finished cattle BW were  $498 \pm 52$  kg and  $493 \pm 75$  kg, respectively. More ranchers marketed their beef cattle through wholesalers or distributors (34%) rather than directly to consumers (24%), retailers (20%), or other channels (17%). Marketing under grass-fed certification was reported by 39% of ranches. Information obtained is being used to define management characteristics for modeling production systems and performing a comprehensive assessment of the sustainability of beef cattle production.

**Key words:** beef cattle survey, cattle management, grazing, ranch

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## INTRODUCTION

A full value chain life cycle assessment is being performed under the US Beef Sustainability Research Program with the aim of quantifying the sustainability of beef produced and consumed in the United States. In recognition of the diverse management systems shaped by variations in regional climate, natural resource availability, and culture, this assessment aims to provide a benchmark to aid decisions made along the value chain toward continuous improvement in sustainability based on the uniqueness of each region. Because of the unique climate and culture of Hawaii, a special survey was developed and used to study management practices of this state.

Hawaii maintains only 0.25% of the beef cows in the United States (NASS, 2017a); however, about 47% of the state's 72,800 brood cows are produced on 2 operations that have consistently ranked among the top 25 cow-calf operations nationwide (NCBA, 2014b, 2015, 2016, 2017). Locally, the Hawaii beef industry contributes significantly to the state's economy, with beef being Hawaii's second highest ranking agricultural commodity (NASS, 2017b).

Hawaii consists of 5 counties on 8 major islands. The 4 main counties, starting from the largest herd size are, Hawaii, Maui, Kauai, and Honolulu. Total pasture area in the state is about 308,000 ha, with most on the Island of Hawaii (Melrose et al., 2016). Ecosystems of the state vary from the low-lying coastal plains of the Pacific to high altitude tropical forests where cattle grazing occurs up to 2.5 km above sea level (CTAHR, 2001). Presently, most calves are exported to the mainland for finishing due to lack of available finishing pasture and no other destocking options.

Because of its distant location and unique ecosystem, certain management practices differ considerably from those of the mainland. Our objective for surveying Hawaii beef producers was 2-fold. The first was to gather information on feed and forage types currently used to raise livestock. This establishes a baseline to which alternative feeds and agricultural by-products may be compared as

the state considers doubling local food production to meet sustainability goals. The second was to characterize production practices for developing representative production systems for comprehensive life cycle assessments.

## MATERIALS AND METHODS

A survey was developed to collect information on herd size and characteristics, grazing management, forage and feed sources, production costs, and marketing practices. The survey questions (Supplementary Information SI; <https://doi.org/10.15232/pas.2017-01691>) were developed by the Hawaii Cattlemen's Council (HCC) and the USDA-ARS with assistance from industry stakeholders and technical advisers including the state range extension specialist. To encourage participation, effort was made to keep the length of the survey as brief and easy to complete as possible while gaining information pertinent to satisfying the study's 2 goals. This resulted in a total of 50 questions. Administration of the survey was done both online and in person by the HCC. Participation by respondents was voluntary. A total of 140 producers in the counties of Hawaii, Maui, Kauai, and Honolulu received invitations containing the internet address to the survey through the HCC's email listserv. In-person interviews were conducted on the operators' ranches; at national, state, and local beef producers' meetings; and at other locations convenient for the participants.

For consistency, operation types follow previous definitions given by Asem-Hiablie et al. (2016). A ranch is defined as an operation that predominately includes cattle on pasture or rangeland. This includes cow-calf operations where weaned calves are sold and cow-calf and stocker operations where weaned calves are grown on pasture until they are ready for the finishing phase. Ranches also include cow-calf-to-finish operations where calves are weaned, raised, and finished on the same operation. Most operations in Hawaii keep cattle on grazing lands year-round, including some finishing of animals. Because feedlot finishing is not common in Hawaii, the ranch survey sufficiently met the needs of all operations.

Data were summarized using descriptive statistics. Summaries of management practices were explored for trends by farm size and operation type. Where a linear correlation was found, the coefficient of determination ( $r^2$ ) was used to measure the relationship between the 2 variables. In summarizing the survey data, some results were expressed on a per-animal basis. On cow-calf operations, the number of animals was specified as the average number of cows maintained annually. Calves, bulls, and replacement heifers were not included in this count because they were considered approximately proportional to the number of cows. Thus, results were expressed per cow or cow-calf pair. On other operations, the total number of stocker and feeder cattle was included.

## RESULTS AND DISCUSSION

### Ranch Types and Sizes

Survey responses were received from 56 Hawaii ranches, which together maintained a total of 32,327 beef cows. The total number of brood cows and corresponding responses per county were as follows: Hawaii (22,218 cows;  $n = 27$ ), Maui (5,255 cows;  $n = 12$ ), Kauai (3,901 cows;  $n = 10$ ), and Honolulu (953 cows;  $n = 7$ ). The total cows in the 4 counties represented 44% of the 72,800 beef cows raised in the state as reported by the National Agricultural Statistics Service (NASS, 2017a). A total of 140 producers received the survey, giving an approximate response rate of 40%.

Over half (57%) of the responding ranches maintained only cattle, and the remainder raised additional livestock species including goats, sheep, pigs (county of Hawaii only), elk, and poultry (Table 1). Survey questions were developed to address the specific issues of cattle production (Supplementary Information SI; <https://doi.org/10.15232/pas.2017-01691>). In some cases, pastures were shared with other animal species, so total area provided may be greater than that required by cattle alone. As a check, the stocking rate of cattle-only operations was compared with that of other operations.

The majority of participating ranches (60%) indicated finishing of at least a portion of their cattle (Table 1). One stocker-to-finish operation was also reported. Finishing in Hawaii has become challenging due to limited feed availability, lack of auction markets, limited packing facility capacity, and high costs of production. No commercial feedlots, that is, operations solely finishing cattle predominantly on high concentrate diets, were reported. Our data suggest that about a quarter of the calves produced are finished and marketed for beef within the state, with the remainder transported to the mainland for finishing. This ratio is supported by the NASS (2017a) survey data.

Individual herd sizes ranged from 5 to 10,000 cows, with a mean and median of 588 and 150 cows, respectively (Table 2). In terms of mean count, Hawaii county herds were the largest (828 brood cows) followed by Maui, Kauai, and Honolulu at 438, 390, and 136 brood cows, respectively. Overall, 40% of the responding ranches were small, maintaining 100 cows or less. Considering the small size, they maintained just 3.3% of the brood cows. According to NASS (2017a) census data, almost 24% of the beef cows surveyed in the state were on ranches maintaining less than 100 cows. This indicates that our survey was biased toward larger herds, but the survey results still reflect good representation of a wide range in ranch sizes.

Most the Hawaii ranches (68%) maintained some stocker cattle, and 56% of these were categorized as small operations (maintaining 100 stockers or less). These smaller operations maintained 5.6% of the stockers reported. A

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