



A Dairy Industry in Hawai'i?

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Abstract

In recent years, there has been much discussion and reporting on Hawai'i's need for food self-sufficiency or on the doubling of Hawai'i's food production. Meanwhile, the local dairy industry has all but disappeared. Attempts to restart a couple of megadairies have failed. This article lays out one person's opinion as to whether a dairy industry is warranted in Hawai'i and what it should look like. It does not deal with the causes of the closure of previous dairies, though it skims briefly over some of the reasons for the failures of the recent efforts to restart the industry. Drawing on the author's more than thirty years of experience with research and Extension in dairy sciences, this is an attempt to look into the future and discuss why dairies are needed and how such a dairy industry would look for an island community. It considers the events of climate change, consumer desires, and Hawai'i's geo-environmental factors. It is not extensive but rather highlights some crucial factors for consideration. It is the start of a discussion that should involve both policymakers and the public.

Keywords: dairy, Hawai'i, future, environment, climate change



Figure 1. Sea-level rise is evident all over Hawai'i. This picture shows the west corner of the Kualoa Regional Park, O'ahu. The picture was taken four hours after peak high tide on November 24, 2018. Over the past 30 years several coconut trees in the park have died, and the stubs are now in the ocean.

Introduction

I have opted to write an article about why we need a dairy industry and what form it could take. It seems ironic to pen such an article after the closing of Hawai'i's dairies and the failures of large operations to take hold in the Islands. Yet with more than thirty years of involvement in various forms of agriculture activities in the state of Hawai'i, dairy the foremost, I feel I have an insider's view of the industry. While one can pen an article about its failures and challenges, I would rather take a forward perspective, considering what the future can be. It is because of lessons learned

in the past that we can envision an industry which is more sustainable and resilient, able to face a future that is changing rapidly due to technologies and global economic events. The vision laid out here is not perfect or complete; it is one person's view of the complex economic picture for an island state.

Rationale for Dairies in Hawai'i

Climate Change – A drive along the coastline of each of the four major islands shows much evidence of coastal-zone erosion. This is evident of rising sea levels (1). Figure 1 shows the erosion at Kualoa Regional Park,

where sea-level rise has killed several coconut trees; in some cases the stumps are in water. Our coastlines have caved into the ocean, our beaches have washed away, and homes built along some of the coastlines are falling into the sea. Predictions are that the ocean level could rise 32 cm (12.6 in) in the next 40 years (2). This means that many areas in Honolulu, our major port of entry for food and other supplies, would be vulnerable. The infrastructure of Honolulu's urban core is old, and much of it was built before the contemporary phrases "climate change" or "global warming" were coined. The same can be said for the towns of Hilo and Kahului.

Since 2015, six storms have come close to the south shores of the Islands, the latest being hurricane Lane and Olivia. Hurricane Lane dumped over 130 cm (>50 inches) of rainfall on Hawai'i in August 2018. It came within 185 km (115 miles) of Honolulu, on the densely populated island of O'ahu (3). What if the storm had moved closer to O'ahu? In a span of 10 weeks (August to early October 2018), Hawai'i experienced hurricanes Hector, Olivia, Lane, and Walaka. Hurricane Walaka wiped out East Island in the northwestern region of the Hawaiian islands.

In fact, recently, in a single year, there were 15 named storms, depicted in an infrared satellite mosaic image (Figure 2), in the Central Pacific within the proximity of the state (3). Researchers at the University of Hawai'i

at Mānoa suggest that rising sea levels and increasing frequency of storms (4, 5) will make many of the urban areas of Honolulu's south shore vulnerable to damage (6). In the event that future storms were to hit the south shore of O'ahu, our food supply would be vulnerable. Honolulu Harbor's 153m (500 ft., Figure 3) entrance opens to the south face, and it is the main port of entry for all the state's supplies (7). These are considerable: Hawai'i imports some 80–90% of its food needs (8). Figure 4 shows Matson's cargo ship *Maunalei* bringing in supplies on November 18, 2018.

Climate change affects not only the Hawaiian Islands but also our main food suppliers in the West Coast of the U.S. mainland. Besides worsening droughts, there is an increase in wildfires, the aftermath of which exposes the bare land to greater risks of winter mudslides, increased damage in the event of earthquakes, etc.

Hence, some form of a more sustainable and resilient food supply for this state is critical. Dairy is an important component of such a food supply.

Children's Nutrition – Milk is a major component of many children's diets, especially those under 4 years of age. Calcium and phosphorus, in the right proportion, are critical for bone growth and other cellular development. Milk is a good source for vitamins and other minerals (9). Together, these nutrients help bone development,

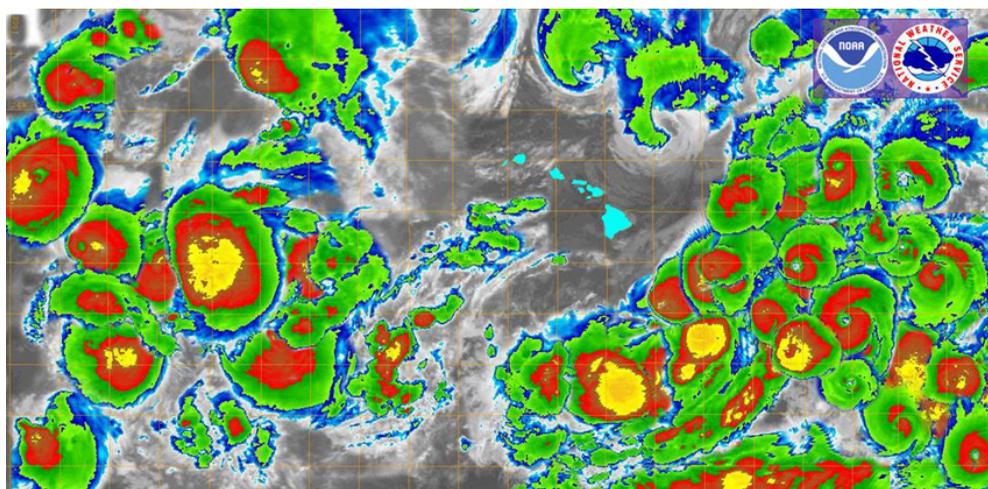


Figure 2. This mosaic of satellite images shows 15 tropical storms that reached the Central Pacific basin but missed the Hawaiian Islands in 2015 (adapted from Khan, 2015, who credited K. Kodama of the National Weather Service, Honolulu office, for the picture.) <http://wxshift.com/news/this-map-shows-how-lucky-hawaii-has-been-this-hurricane-season>



Figure 3. The 153-meter (500-foot) entrance to the Honolulu port, taken from Sand Island beach park, O'ahu.



Figure 4. Matson's cargo ship *Maunalei* entering the mouth of the Honolulu port.

cellular differentiation and growth, and fluid balance in the body, and they play a role in enzyme functions and free-radical removal.

Fluid milk is a highly perishable product. Pasteurization prolongs the shelf-life of milk when it is kept under 7°C. Ultra-pasteurized milk (in Hawai'i, it is usually packaged in ½-gallon cartons with a cap), can be kept for a much longer time (> 5–6 weeks). However, ultra-pasteurization lowers the concentration of some water-soluble vitamins.

Any disruption of our food supply chain would deprive the children a valuable source of nutrients in their diet. What does a parent tell a one-and-a-half-year-old asking for milk when there is none available in the stores? Having local dairy production would ensure that the dietary needs for this vulnerable group in our community could be met.

Adult Nutrition – Similarly, milk and/or milk products are highly helpful for the well-being of our kupuna population as well. The vitamin D in milk, along with the vast array of minerals, especially calcium and phosphorus, help to fend off osteoporosis. Milk's other minerals are also helpful: for instance, potassium helps to prevent hypertension and heart attack (10). Individuals who drink milk have higher glutathione in their brain scans, and the glutathione in milk has been shown to reduce oxidative stress in the brain (11).

Open Space – More than 67% of Hawai'i's residents were willing to pay for there to be open space, according

to a 2008 survey (12). This confirmed an earlier study conducted in 1995 and published in 1997 (13). However, for the Islands, open space without productivity seems to provide little to no value to address our food security. Pasture land or ranch land counts as open space to many. Ruminants convert forages that human cannot consume into high-value food items, especially milk and meat, while green pastures dancing to the tune of the trade winds and dotted with cattle provide a peaceful vista that soothes the soul (Figure 5).

The lovely vistas of Waimea on the Big Island are valuable open space for locals and tourists alike. These are pasture lands with cattle, such as Parker Ranch, Kahua Ranch, and Pono-holo Ranch. The Kualoa Ranch on the north shore of O'ahu is similar. Besides providing open space, properly managed pasture provides food, vitamins, and minerals for human needs via animal protein.

Meanwhile, the grasses sequester carbon dioxide (CO₂) and store it underground, reducing the amount of carbon in the atmosphere, thus aiding in correcting global warming scenarios. The average grassland can sequester 15 tons of CO₂ per acre (14). Given that we have tropical grasses here in Hawai'i and a year-round growing season, it is likely more carbon can be stored in our soils (15). More recent studies suggest properly managed grasslands and pastures are more reliable carbon sinks than those that are not managed, in terms of the numerous wildfires that have occurred due to climate change (16). This is especially true for many of the western states, which have seen an increase in the number of wildfires and the size of these fires (17).



Figure 5. Heifers grazing on pasture add value to the open space and a picturesque sense of countryside.

Research by Prof. Hamilton at the University of Hawai'i-Mānoa also suggests that Hawai'i faces increasing drought due to long dry periods in summer and predicts the increase of fires (18) for that reason. Grasslands can go up in fire too, especially during drought season. However, grazing helps to manage the density of the grasses. It reduces the "matting" or accumulation of old vegetation which becomes fuel in a fire.

Local Milk Production – Any form of a dairy industry in the state of Hawai'i must take into consideration some real factors and emotions/sentiments on the ground. The concept of large megadairies with several thousand milking cows has been vocally rejected. Such farms, even though they may be family owned, are perceived to be industrial food complexes that violate humane care for animals, are money-centered destroyers of the environment, etc. The new generation does not trust or want mega or industrial farms. They want their food to come from sources where there is consideration for the environment and where the food is grown in a holistic manner. The animals in such farms should be treated humanely and cared for. This is best illustrated by the concept of levels of care promoted by the grocery chain Whole Foods Market, a subsidiary of megamarketer Amazon.

We are the only state in the country that has a year-round growing season for forages. "Grass-fed" milk or yogurt or butter is precisely that, dairy products from cows that were fed with grass, which can also be pre-

served in the form of hay, haylage, or silage. No dairy farms in the continental US can claim to have their cattle fed on pasture all year round. Such circumstances give rise to a unique niche marketing opportunity for Hawai'i products.

The French have a butter that they claim to be unique, "Beurre d'Échire" or Échiré, the cream of butters (20). This butter comes from a region of France where pasture and legumes grow all year round, allowing the cows to graze (21), and this circumstance allows for a highly valued product.

The benefits of a pasture-based dairy industry and the nutritional advantages of such milk and milk products have been discussed (19). Cattle grazing on pasture produce unique properties in their milk, namely higher omega 3 fatty acids, higher beta carotene, and higher concentrations of conjugated linolenic acids (CLAs) (19). CLAs have been demonstrated to have anti-cancer properties (19).

At the same time, we in Hawai'i have to live with the realization that food importation is a necessity and fact of life. There is no way to stop interstate commerce. There will always be a sector of the population, be it in the supply chain or in the demand sector, for whom price is the major factor in deciding on the purchase of an item, and imported items still tend to be less expensive to the consumer. Hence, local food production must address niche markets, in order to give Hawai'i an advantage and to provide the consumer with a choice.

New Consumers – Millennials, in general, prefer life experiences as gifts or for their ventures (22). They do not wish to accumulate tangible materials but rather life experiences that they can share with their friends and talk about during cocktail parties, to enjoy and participate in adventures that are in line with their core values (23, 24).

Figure 6 shows a recent cheese-making class held on a Friday evening in Kaka'ako. Millennials flocked to the small room to taste different types of locally made cheeses and soft dips presented by Naked Cow Dairy. They forked out a handsome sum of money to learn how to make mozzarella, not necessarily because they want to make the cheese for the next pizza they eat, but rather for the experience of learning and sharing with their friends. At the end of the class, they purchased cheeses and dips and took home the cheese they had made. Such individuals want new, unique experiences. They are will-



Figure 6. A Friday evening learning cheesemaking in Kaka'ako.

ing to pay for them. They are part of the 79% of Hawai'i residents who think that the challenges Hawai'i faces are solvable (12). Hence, they are willing to support what is good for a local island-based economy in the middle of the Pacific. It is about “we” versus “me.” Environment and sustainability are important issues to this generation.

Rural Economic Diversification – Whether Hawai'i has local milk production or not is basically a public policy issue. The question has socioeconomic implications. The rural districts of every island need a viable economic base. These areas cannot be “bedroom” communities, their residents waking up early to fight the traffic for jobs in the urban core. Besides clogging the highways, the traffic jams and long hours of commute put stress on families. Children have fewer opportunities to see their parents. Parents are worn out or are deprived of the privilege of participating in their children's school activities. We cannot keep building freeways. A vibrant agricultural base with value-added activities not only serves to provide food for the Islands; it would also ensure a more resilient economic base for the state, especially in times of global catastrophe.

The very nature of our ports and the Islands' demand for food warrants a reexamination of small dairy operations that are vertically integrated.

What Would a Dairy Look Like?

Smaller vertically integrated dairies, operations that produce milk, process it, and make dairy products, are not new. They exist from coast to coast. Just a few examples are Mountain Dairy, CT (25), Ropp Jersey Cheese, IL

(26), Strauss Family Creamery, CA (27), and Ploughgate Creamery at Bragg Farm, VT (28). These operators are niche marketers that appeal to certain consumers and the tourist's experience. Such operations have survived for generations. Technological advances in the industry offer new operation options that did not exist before, such as automatic feeders, robotic milkers, wireless digital identification monitors, computerization of operations, etc.

Any dairy farm in this state must take into consideration the geo-environmental uniqueness of Hawai'i's topography, history, weather, and local communities. Recent attempts to build large dairies failed due to the lack of recognition for these factors. Large dairies with thousands of lactating cows confined in a small area are not suited for Hawai'i. No single dairy can supply all the milk Hawai'i needs. Large dairies would require huge acreage to produce feed and address nutrient-management issues. Land suitable for such functions is scarce here.

New dairies must address the issues of nutrient management, feed supply, labor needs, market niche, and animal well-being. Such operations must be stewards of our resources; they must be environmentally sound, recycle farm products “in-house,” and be visitor destination or agritourism sites. The animals in such farms must be accorded a “natural setting,” with limited amounts of confined space. This is evident in the recent passage of proposition 12, in California (29).

We are basically an urban state, one with a growing population that is very distant from how and what it takes to produce the food we consume daily. New dairies or farming operations should consider themselves as venues to educate the urban public. Millennials want to learn and be engaged with their sources of food. There has always been an enthusiasm to participate in bottle-feeding a calf, petting a tame cow, watching cows being milked, etc. Agriculture tourism can be an additional stream of income for a dairy. Properly landscaped farm sites also provide much-needed getaway venues from the hustle and bustle of a city.

Summary

Hawai'i, as the most populated and isolated islands in the center of the huge Pacific Ocean, must examine, earnestly, the economic activities that can ensure that the needs of its vulnerable population are met in event of catastrophic events. Global climate changes, rise of

sea levels, increased drought, and wildfire events can affect us all. A dairy industry or dairy farms in the Islands should not plan to totally replace milk imports but to provide insurance against natural events beyond our control. On a daily basis, these operations are niche-product producers that embrace new consumer trends and the visitor industry. Such an operation must be forward thinking, employ the most modern technologies, and embrace the opportunity to engage with its consumers. It must promote the concept of nurturing the land that feeds and houses us in an island-based community. It is best to have smaller, vertically integrated, pasture-centered dairy operations. The government must facilitate and engage in the public-private enterprise, as existing laws and regulations determine its fate. Whether there is a need for a dairy industry to address the vulnerable times is a public policy matter.

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