Recovery of Tropical Pastoral Systems

Dwayne Cypriano (Hawai‘i – Farmer/Rancher Grant)

Project Number: FW03-018

Title: Recovery of Tropical Pastoral Systems

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Dwayne and Tammie Cypriano

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Situation:

Sugarcane dominated Hawai‘i agriculture for more than 100 years – a powerful economic force that claimed the best cropping lands in the islands. Sugarcane acreage reached its peak in the late 1960s, but began to decline in the 1980s and 1990s for a variety of reasons including costly labor and competition from other countries and artificial sweeteners.

Sugar production methods typically depleted soil nutrients and organic matter, and, as sugar plantations closed, scant vegetation left soil vulnerable to erosion, threatening coastal areas and streams.

Production on post-sugarcane lands is marginal and requires extensive costly inputs. A potentially sustainable approach is to employ a planned grazing system that adds in and recycles nutrients and organic matter.

Objectives:

1. Initiate a nutrient cycling program on depleted sugarcane lands
2. Evaluate various nitrogen-fixing legumes and forages and their nutritive values
3. Describe the incorporation methods for soil amendments and planting procedures
4. Develop guidelines for estimating costs of initiating nutrient cycling
5. Measure cattle performance by average daily gain and pounds produced per acre
6. Evaluate the economics using a comparative partial budget

Actions:

Dwayne and Tammie Cypriano, and their sons, Austin and Jacob, are a life-long ranching family operating DTB Ranch on the Hāmākua Coast of the Big Island. They raise 47 breeding cows on 100 acres.

Their 17-acre project site, divided into two equal pastures, one to be treated and the other to serve as a control, had these characteristics:

- Kūka‘iau Soil Series
- 40-60 inches of rain a year
- 1,500-feet elevation
- Three years out of production after last sugar harvest in 2000
- Existing forages: volunteer cane seedlings, guinea grass and weedy forbs

Each 8.5-acre pasture was split into three 2.75-acre paddocks and stocked with four head (0.47 AU/acre/year). Paddock rotation was triggered when 50% of available forage mass was utilized.

The treatment paddocks were limed with crushed coral at 3 tons per acre and fertilized at 0.5 tons per acre of a balanced fertilizer (16-16-16). Application rates were lower than lab-recommended rates of 5 and 2 tons per acre, respectively.

<u>These legumes were planted by seed:</u>

- perennial peanut (*Arachis pintoi*)
- white Dutch and red Dutch clover (*Trifolium repens*)

<u>And these grasses:</u>

- “Callide” Rhodes (*Chloris gayana*) (seed)
- Giant Bermuda (*Cynodon dactylon*) (seed)
- “Mealani” pangola (*Digitaria decumbens*) (vegetative)
- “Hosaka” kikuyu (*Pennisetum clandestinum*) (vegetative).

The producer provided “sweat equity” for the project, including labor, tractor work (disc, fertilizer and lime applications), perimeter and cross fencing, water system installation and livestock mineral supplementation.

DTB Ranch on the Hāmākua Coast of the Big Island of Hawai‘i.

The control pasture is on the left, the treated pasture on the right.

The control pasture showed a high level of broom sedge.

The treated paddock showed improved availability of desired forage species.

Results:

<u>Improved forages and carrying capacity</u>

- Applying lime and fertilizer helped establish seed legumes, except for Rhodes and Bermuda grass.
- Compared with the control, establishing legumes increased nitrogen cycling.
- Volunteer guinea grass and vegetatively cultivated pangola and kikuyu grasses significantly improved forage diversity and productivity.
- After six months, forage cover in the treatment paddocks was nearly 100% and was greater than in the control.
- Sustainable benefits included improved water cycling, improved nutrient cycling and reduced soil erosion.
- Treated vs. control paddocks: Desirable forage 64% vs. 36%, undesirable forages 31% vs. 52%, bare ground 5% vs. 12%.

<u>Improved cowherd performance</u>

- Weaned calf weights at five months increased by 13%, to 430 pounds from 380.
- Cows in the treatment unit maintained higher body condition scores (8-9) and higher first-service conception rates than those in the control, resulting in no lag time in the calving interval.
- Carrying capacity doubled in the improved paddocks to 1 animal unit per acre per year from 0.5 animal units per acre per year.
- The grazing period in the treatment paddocks was three times longer (three weeks) than in the control (one week).

Potential Benefits:

- Sustainable benefits included improved water cycling, improved nutrient cycling and reduced soil erosion.
- Benefits observed in the treatment unit relative to the control include improved ranch economics, higher revenues per calf and an increase in total herd revenues because of an increased stocking rate.