Livestock Nutrient Management Planning in Hawaii

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Conference on: Scientific, Regulatory and Cultural Factors Influencing Water and Environmental Issues in Tropical Pacific Islands

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Overview

- General perceptions of the livestock industry
- Livestock Industry in Hawaii
- Our Challenges
- Nutrient Management Education Program
- Perspectives
Waste from hog farm spills into river

Weakened by recent rains, an earthen dike collapsed at Oceanview Farms, spilling 25 million gallons of waste generated by about 10,000 hogs. Some of the waste flowed into two nearby tributaries of the New River.

About the lagoon:
- Covers 8 acres
- Is about 600 feet on each side (the length of two football fields)
- Walls are 12 feet high and 12 feet thick at the top
- The section that collapsed is about 25 feet wide.
Established paradigms .... difficult to change
Create positive perceptions ....
Livestock Industries in Hawaii

- Dairy ($28.1M)
- Pork ($4.4M)
- Beef ($19.2M)
- Poultry ($10.6M)

$68.3 Million * Farm-Gate Value
Generating $205 Million in Hawaii’s Economy

* Hawaii Agricultural Statistics Service, 2000
Characteristics of Hawaii’s Confined Livestock Industry

Small acreage
Mostly medium to small in size
One dimensional, i.e. no crop integration
Well established ➔ Aging industry
Agricultural lands are not protected
Zoning loopholes ➔ urban encroachment
Waste System

Collection, Storage, Utilization

- High water use systems 70.7%
- Controlled water use systems 48.2%
- Solid Separators 5.2%
- Lagoons 60.3%
- Containment tanks 15.5%
- On Farm Use 58.6%
- Off Farm Transfer 39.7%
Challenges for Island Ecosystems

We are all connected by water and literally surrounded by water!!

In Hawaii

551 Watersheds
376 Perennial Streams
457 Ground and Surface Water Sources
150 Water Delivery Systems
Concerns for Island Ecosystems

Limited land area

Flashy rainfall events and stream flow

Short distance to water resources

Fragile tropical ecosystems
Livestock Nutrient Management Education Program

- Deliver integrated education curriculum on various topics.
- To assist livestock producers in developing nutrient management plans.
- Foster adoption of BMPs/New Technology
Partnerships and Resources

- Livestock Industry Organizations
- CTAHR agents, specialist, researchers
- USDA Natural Resources Conservation Service
- Hawaii Association of Conservation Districts
- Hawaii State Department of Health
- USDA Cooperative State Research, Education & Extension Service
- Univ. of Guam/American Samoa Comm. College
- National LPES Program
Producer Education Workshops

- To date; 3 workshop series (2000, ’01, ’02)
- 12 workshops, total attendance 370 people
- Concepts (Ahupua’a, Shifting paradigms)
- Legal aspects (CWA, CZARA)
- Producer Forum
- Nutrient Management Planning
Surface

Ground

Coastal
Ahupua’a

Watershed

Land division, from the mountain to the sea

Harmony and sharing

Awareness of ecosystem relationships
Mineral Cycle

Atmosphere

Carbon and nitrogen
Paradigms

Definition: model, standard, example, pattern, principle.

“What is impossible to do today, but if it could be done, it would fundamentally change what you do”

Examples: ‘the Swiss watch’, ‘Mexico’s telephone system’
Paradigm Shift

Livestock Manure …..
Liability = odors, flies, pollution run-off/seepage.
Resource = organic fertilizer, soil amendment.

Beneficial Resource … not Liability
Nutrients … not Waste
BMP Implementation in Hawaii

• Lagoon Management
• Solid Separation
• Composting
• Modified Dry Litter System
• Utilization: Effluent transportation, Irrigation
• Covered Storage
• Other Technology
Opportunities/Needs

• Beneficial use of nutrients
• Good Compost Market

• Cost effective nutrient recovery technology for retention facilities (lagoons)
• More research in the area of nutrient utilization, movement in tropical soils
Beneficial Use Project in Pacific Basin

- Foundation for Organic Resources Management
- USDA-NRCS
- American Samoa Community College
- Cooperators

- www.pigsinparadise.info
Current Project Focus

- Developing guidance document for Producer Comprehensive Nutrient Management Planning
- Pilot workshop, Spring 2003
- General workshop, 2004
- Currently there are 26 plans being developed
Components of a Nutrient Management Plan

• Production
• Collection
• Storage
• Treatment
• Transfer
• Utilization
• Record Keeping/Monitoring
Regulations

- U.S. Environmental Protection Agency
- December 15, 2002
- Revised Clean Water Act for CAFO.

- www.epa.gov/npdes/caforule
Level playing field

- The “one size fit all” mentality is bad policy.
- Tropical/Sub-tropical island ecosystems are unique & require unique solutions, eg. 140+ soil types.
- Need a “beneficial balance” equation incorporating environmental, economic and social factors.
- State flexibility is the key for these island ecosystems; use local science-based knowledge
Composting

- Compost and manure (soil amendment) products imported into the state are not regulated.
- It is accepted that our local commercial composters and on-farm composters require an approved management plan and either a general permit or minor source exemption from our regulators.
Store-Shelf Survey of Compost Products in Hawaii

(M.W. DuPonte, G.K. Fukumoto and N. Ke’ala, 1999)

• Screening evaluation compared 13 samples

• Quality indicators

  • pH
  • Corn germination
  • Nitrate
  • Ammonia
  • E.coli
  • Salmonella

• Targets

  • pH: 6.5-8.0
  • Corn germination: > 80%
  • Nitrate: < 300 ppm
  • Ammonia: < 50 ppm
  • E.coli: 0 cfu
  • Salmonella: 0 cfu
Store-Shelf Survey

**Unacceptable Characteristics**

- **8, pH**  
  (5.8 – 9.0)
- **9, Corn germination**  
  (8 = 0%)  
- **2, Nitrates**  
  (high = 750 ppm)
- **7, Ammonia**  
  (high = 2,239 ppm)
- **6, E.coli**  
  (40 – 1,400 cfu)
- **1, Salmonella**  
  (*S. cholerasuis*)

AgriEnergy Resources, Princeton, IL
Conclusions: Store-Shelf Survey of Compost Products in Hawaii

- Not all compost is good compost
- Imports were not properly composted
- Products were highly variable
- Excessive nutrients/unbalanced
- Contained phytotoxins
- Contained pathogens
- Need parity for Hawaii’s composters.
Larger Picture ... Nutrient generators:

<table>
<thead>
<tr>
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<th>20-years ago</th>
<th>Today</th>
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</thead>
<tbody>
<tr>
<td>Fertilizer imports</td>
<td>169,409 tons</td>
<td>98,103 tons</td>
</tr>
<tr>
<td>Livestock AU</td>
<td>40,619 AU</td>
<td>20,018 AU</td>
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<tr>
<td>Resident</td>
<td>964,691</td>
<td>1,211,537</td>
</tr>
<tr>
<td>Converted</td>
<td>192,938 AU</td>
<td>242,307 AU</td>
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<tr>
<td>Visitor</td>
<td>3,934,504</td>
<td>6,948,595</td>
</tr>
<tr>
<td>Converted</td>
<td>786,901 AU</td>
<td>1,389,719 AU</td>
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Comparison of Imported* Nutrients and Livestock-generated Nutrients

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
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<tr>
<td>Imports, tons</td>
<td>15,080</td>
<td>2,240</td>
<td>9,662</td>
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<tr>
<td>Livestock, tons</td>
<td>1,525</td>
<td>383</td>
<td>812</td>
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<tr>
<td>% of import</td>
<td>10.1</td>
<td>17.1</td>
<td>8.4</td>
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*Imports does not include data on various organic soil amendments.
Mahalo

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