Livestock Waste Management Practices for Pacific Islands

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Animal Waste Management Strategies
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In Pacific Island Cultures …
… the pig is very important!

Birth

First Birthday

Graduation

Marriage

Death

Water ……..

measure of wealth in island culture (“wai wai”)

the universal solvent

is the medium and carrier of nutrients.

this carrier causes potential pollution of our water resources (surface, ground, coastal).

Clean water is a valuable resource, why waste it?

Current Management Practices Observed in Many Small Piggeries

- Water based
- Direct discharge
- Cesspool
- Septic systems
- Uncontrolled flow

Alternative Manure Management Practices are needed …

- to avoid environmental degradation of our water resources
- to avoid possible human health problems
- to take advantage of the nutrients or “fertilizer” value for growing crops

Considerations in Selecting a Best Management Practice

- Manure production
- Location
- Technical viability
- Available resources
- Cost and economic feasibility
- Operational maintenance and effort

Keep in mind …

- There is no “free” system.
- In other words, there is no system that:
  - requires no inputs (labor, time, etc.)
  - requires no costs to maintain
  - will make manure “disappear”

- There are no “Perfect Systems”
- There are no “Silver Bullets”

Sharing of ideas

Use some the upcoming ideas and concepts and adapt them to your situation.

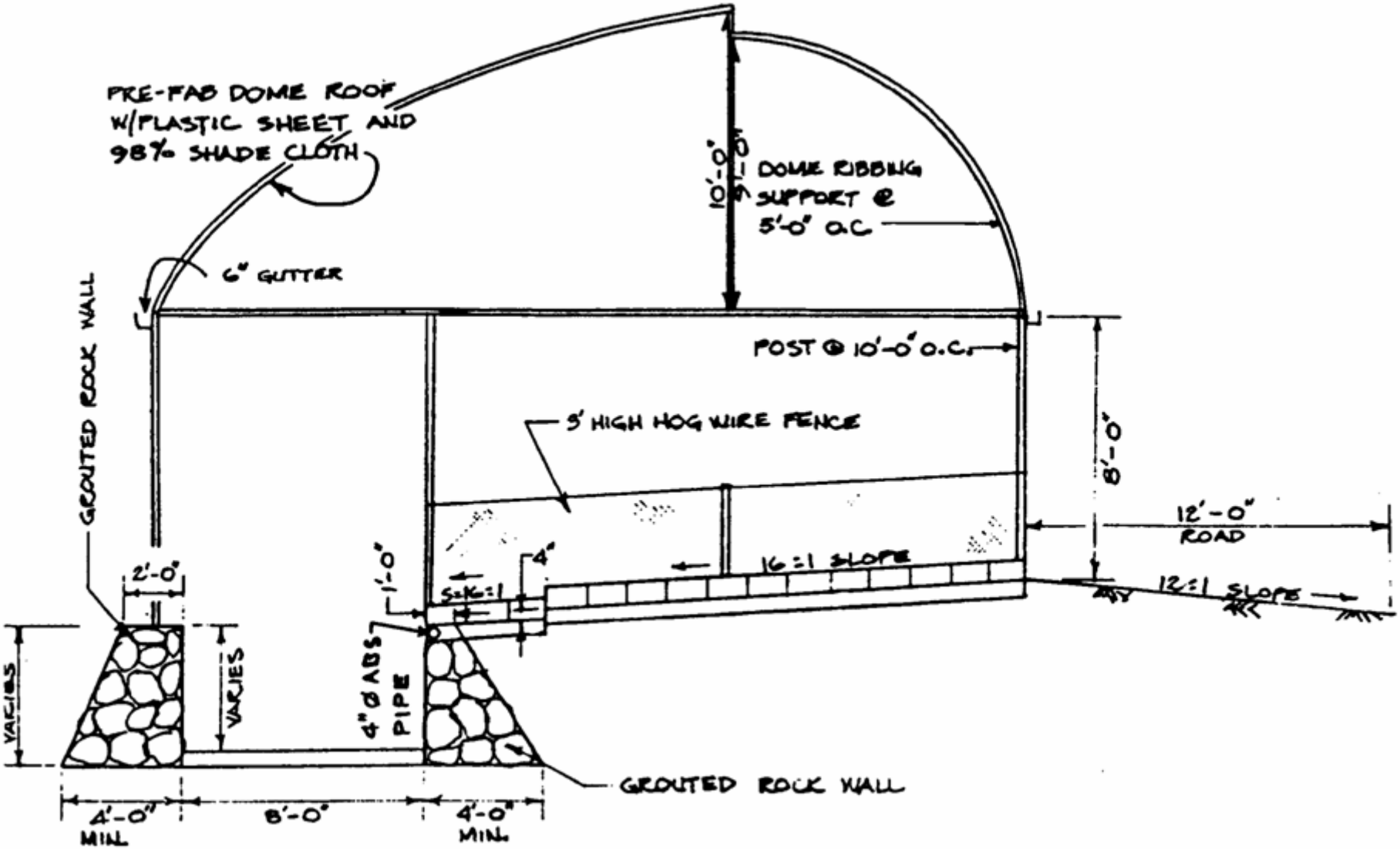
Work closely with your local technical, funding agencies who are working hard to improve the local conditions for the community.

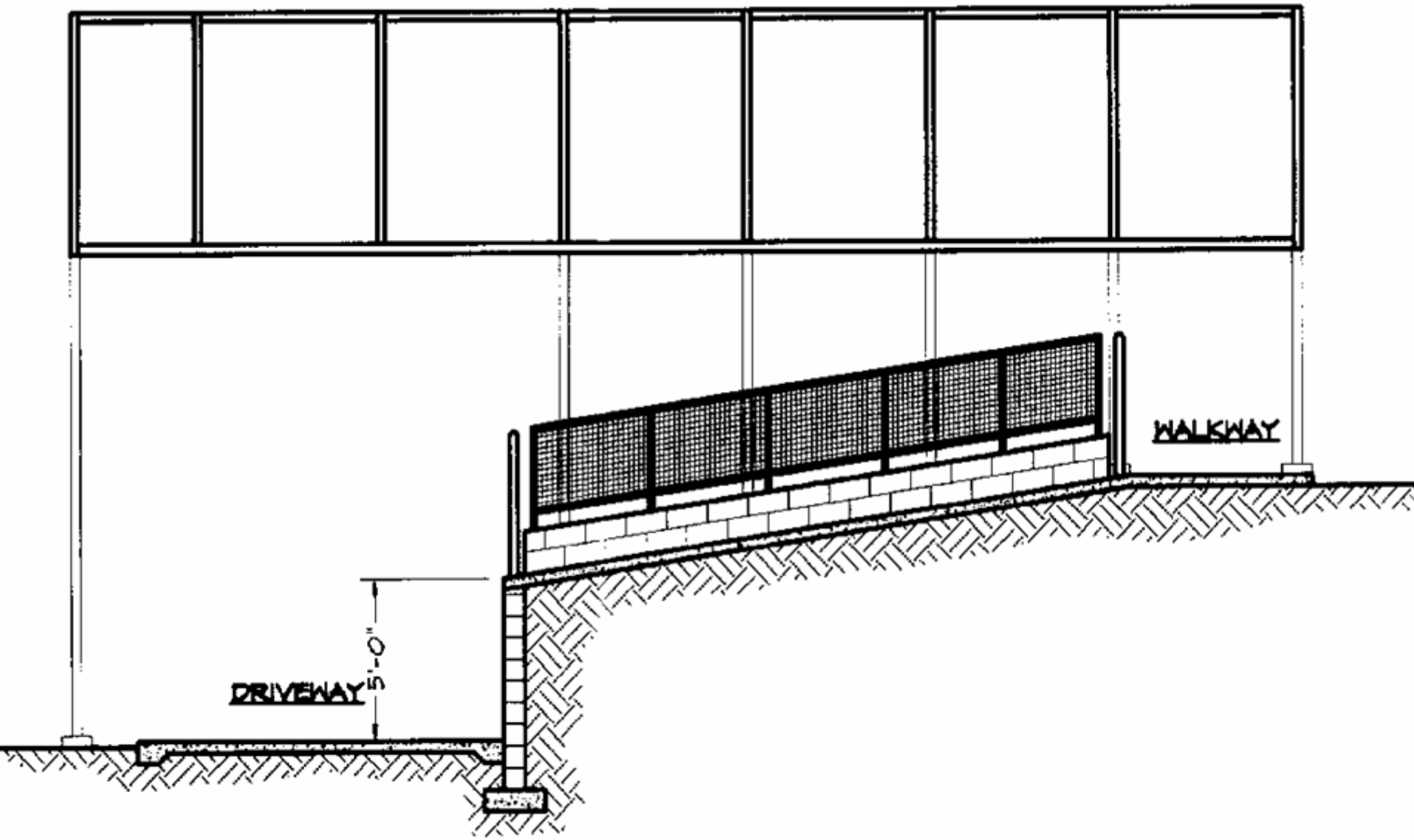
Hawaiian Modified Dry Litter Waste Management System

What if ...

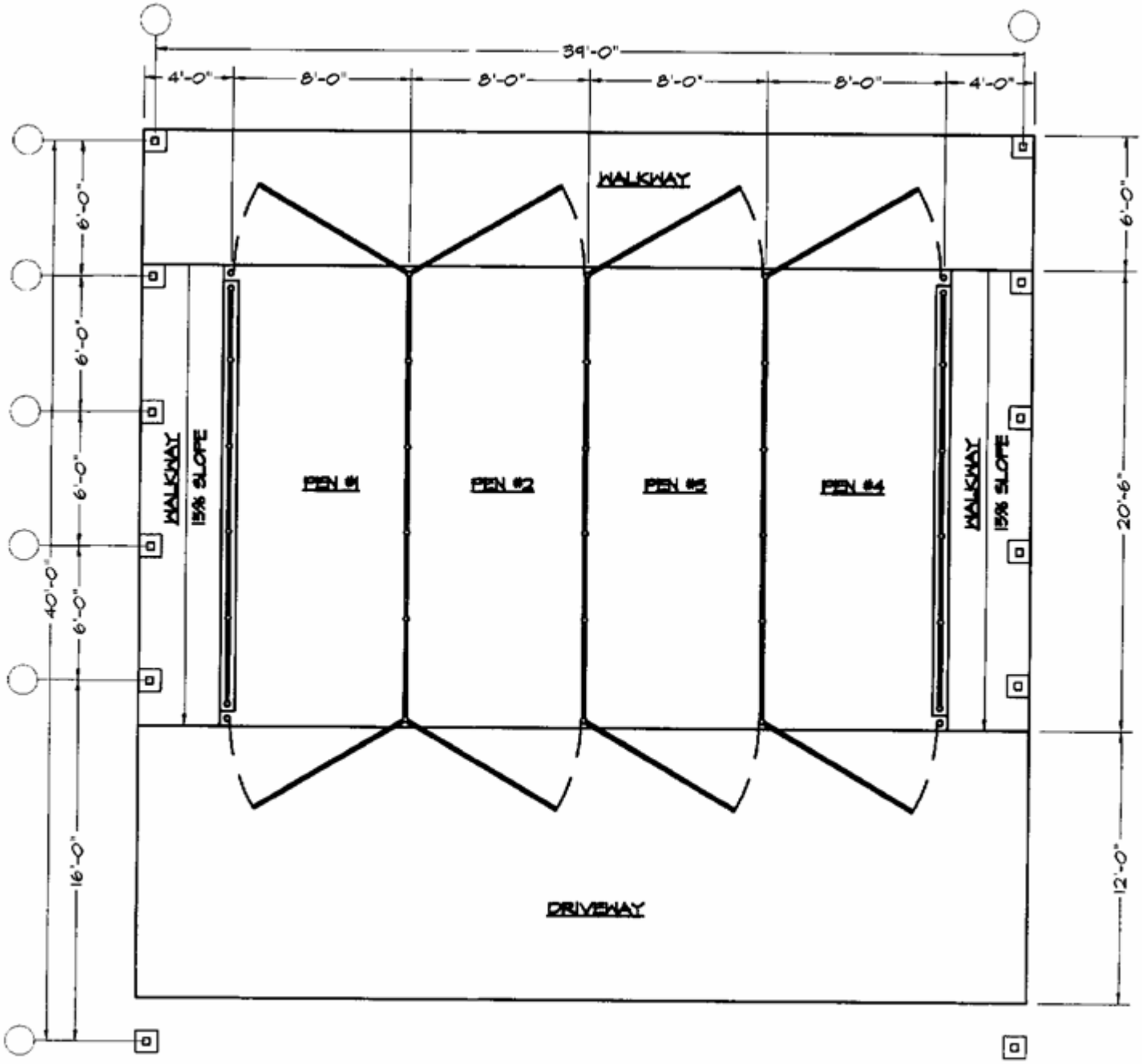
- a system that was low tech,
- the system was practical,
- use no water for pen clean up,
- creates no offensive odors,
- reduce fly breeding,
- creates a new product off the farm,
- makes the regulators happy ...

Modified Dry Litter System

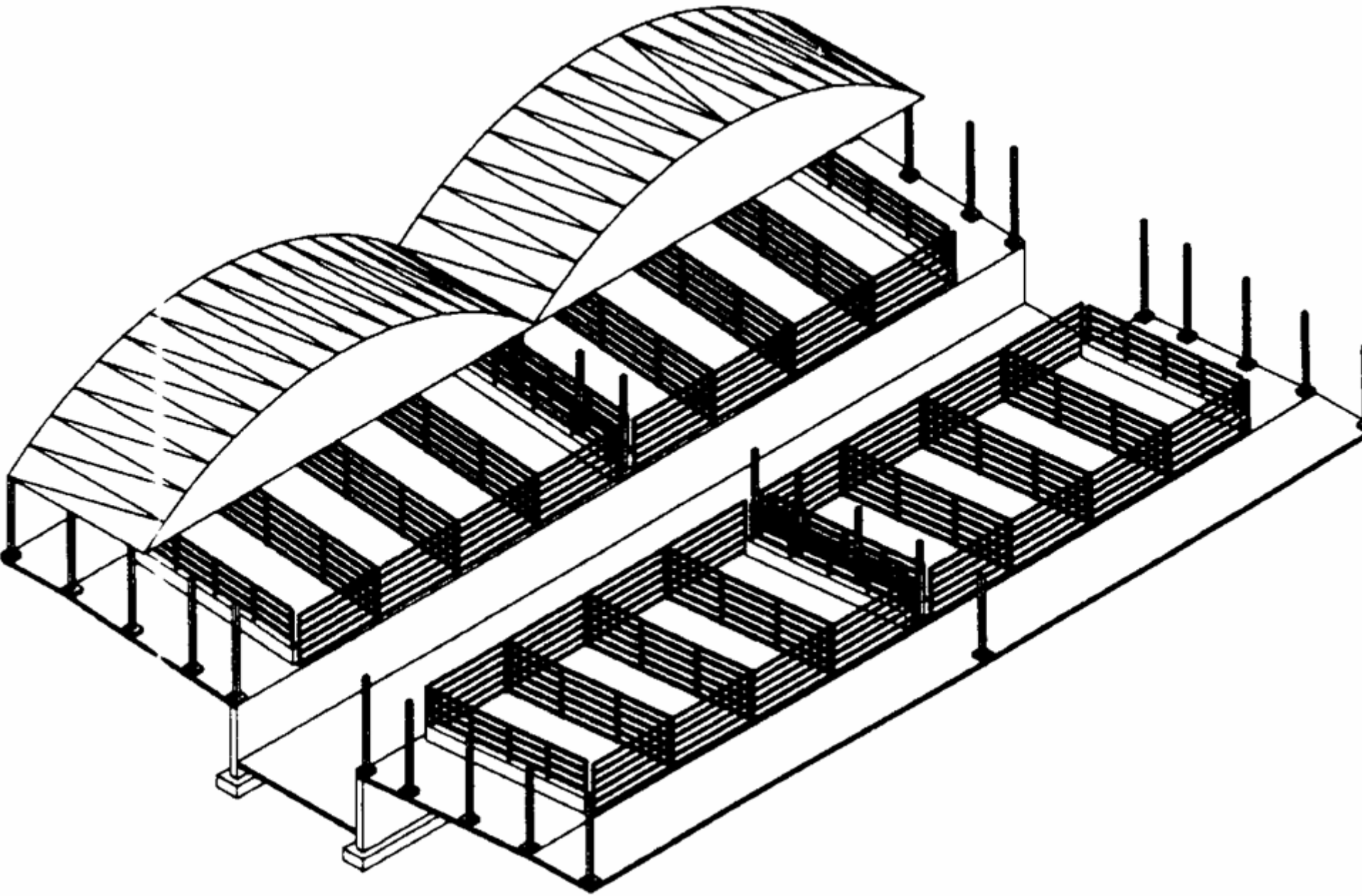




RIGHT SIDE ELEVATION



ONE MODULE PEN PLAN



Pen Slope Descriptions

Horizontal: Vertical Ratio	Percent	Degree
40:1	2.5	1.43
20:1	5.0	2.86
13:1	7.7	4.40
10:1	10.1	5.71

Effects of Slopes

40:1 slope (2.5%) **20:1 slope (5 %)** **10:1 slope (10 %)**

Carbon Materials

- Macadamia nut husk
- Commercial tree trimmings
- Hay, Panicum maximum

- Corn cobs
- Combinations
- Paper, Coconut husk?

Animal Performance

5 Trials, 7 week run, 204 Nursery pigs

4 Slopes, 3 Carbon materials

Start weight- 25 lbs; End weight 95 lbs.

Average Daily Gain = 1.30 – 1.32

Feed Conversion Ratio = 1.63 –1.85

4 15 '97

2
5 15 '95

5 15 '95

Odor, Hydrogen sulfide

Pen Slopes	40:1	20:1	10:1	Conventional
Production	44–53	28–46	11–18	30 – 54
Storage	6-20	2-11	5-6	66 – 98
Transport				112 - 144

Compost Product

RAW MATERIAL	pH	OC	N	C:N	P	K
MNH	6.2	41	1.2	34	-	-
TT	6.0	48	1.3	31	-	-
COMPOST						
MNH	6.0	38	2.8	13	0.6	2.9
TT	7.0	38	1.6	23	-	-

Utilization … Key Component

Advantages

- No water is used in pen washdown
- No discharge of effluent from the pen
- Carbon interaction with nitrogen in the co-composting process reduces odors.
- Low to moderate level of management to operate. The pigs do the work.
- Organic fertilizer by-product for crop use or sold as compost at favorable returns

Disadvantages

- Consistent supply of carbon is required adding effort in acquisition, transportation and storage.
- Cannot be adapted to existing piggeries with flat floors.
- Composting of resultant litter will require additional management

Benefits to the Watershed

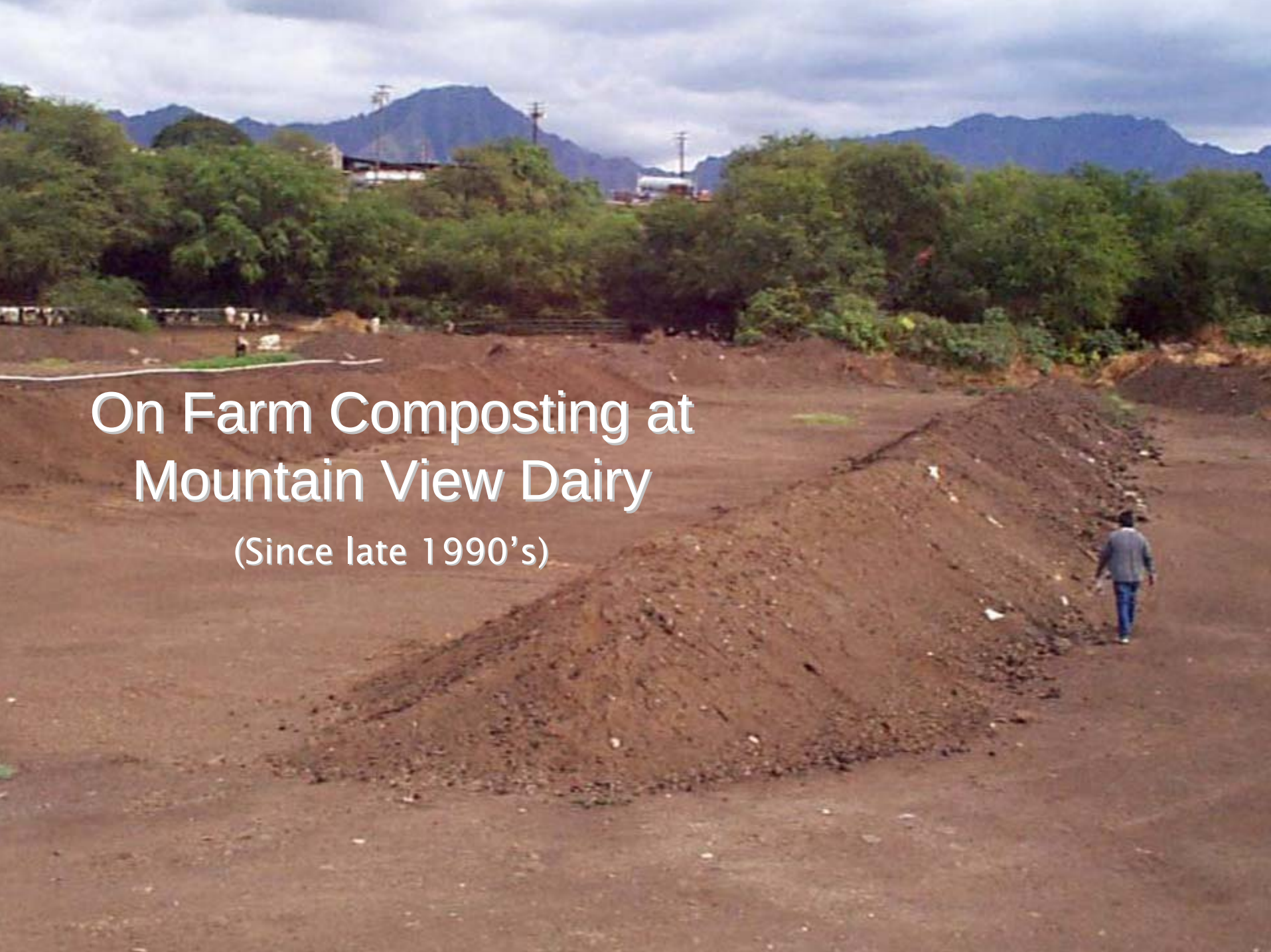
- Water conservation.
- Protection of surface, ground and coastal waters.
- Nuisance vectors are minimized.
- Odors drastically reduced.
- Recycling of greenwastes, other carbon and organic material.

Composting:
On-Farm Projects in Hawaii and American Samoa
Beneficial Utilization

“Organa Grow”
On-farm Composting at Hawaiian Fresh Egg Farm

(Composing started ‘90’s, New system since 2003)

Video



On Farm Composting at Mountain View Dairy

(Since late 1990's)

American Samoa Project

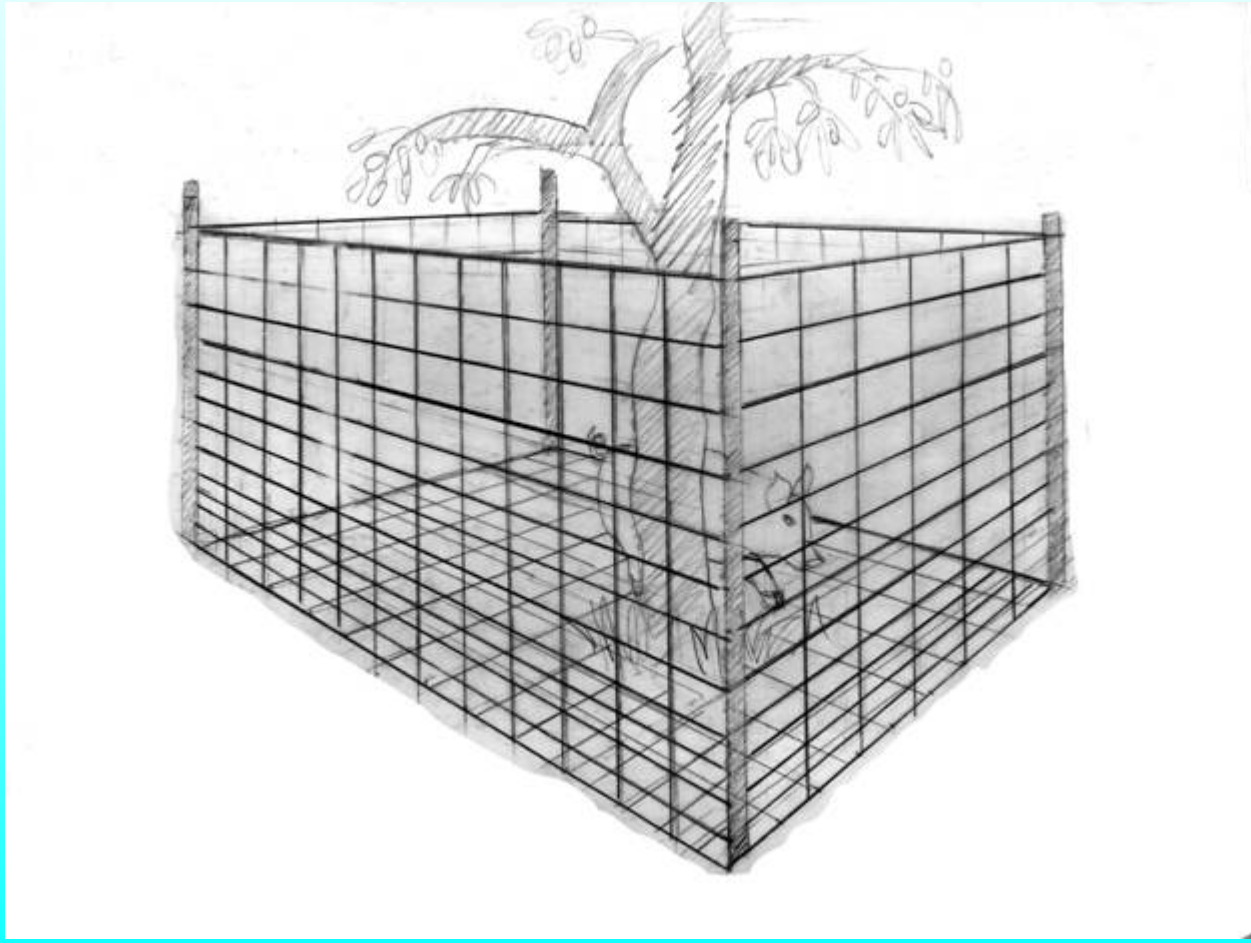
- **Composting**

Small Scale Composting Bins

- Minimum size is about one cubic yard.
- Constructed from various materials
- Be creative

Home Composting Bins

Portable Dry Litter Pen

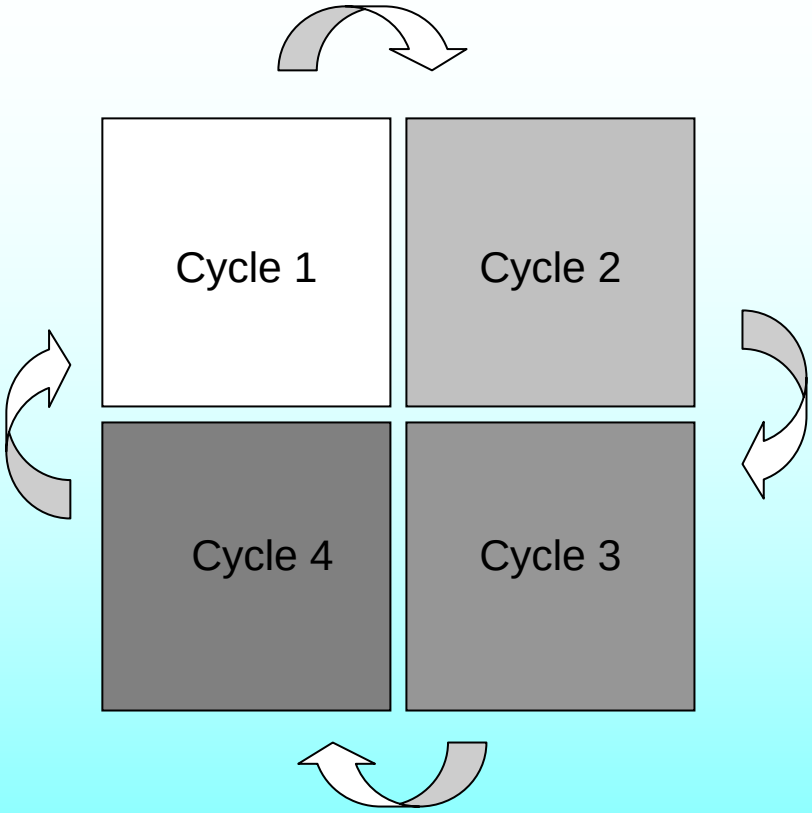


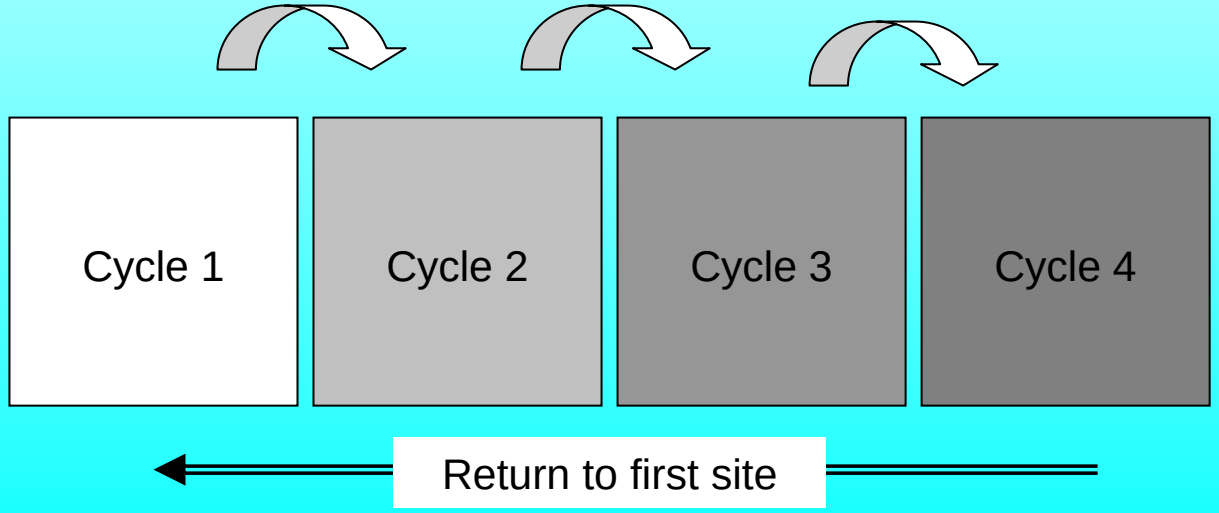
Advantages

- No water is used in pen washdown
- No discharge of effluent from the pen
- Low level of management to operate
- Low capital and operating cost
- Organic fertilizer by-product
- Requires a small “footprint” or land area

Disadvantages

- Consistent supply of carbon is required
- Applicable for very small scale operations
- Requires rotation/relocation every 4-5 months
- Cannot be used on steep or rough terrain
- Should not be used over critical water groundwater recharge areas


Cycle 1
Cycle 2
Cycle 4
Cycle 3


Cycle 1
Cycle 2
Cycle 3
Cycle 4
Return to first site

Dry Litter Portable Pen

Effluent Irrigation

Effluent Drip Irrigation

- This system was developed in Pohnpei, USDA NRCS Pac-Basin.
- The system is a way of directly applying effluent water to crop land
- The simple gravity flow system takes nutrients from the up gradient piggery to the down gradient crop land

Effluent Irrigation

Advantages

- Excellent management option for liquid material
- The gravity flow system is low-cost and easy to install
- Low level of management to operate and easy to maintain
- Nutrients in the effluent provide an organic fertilizer to enhance crop production

Disadvantages

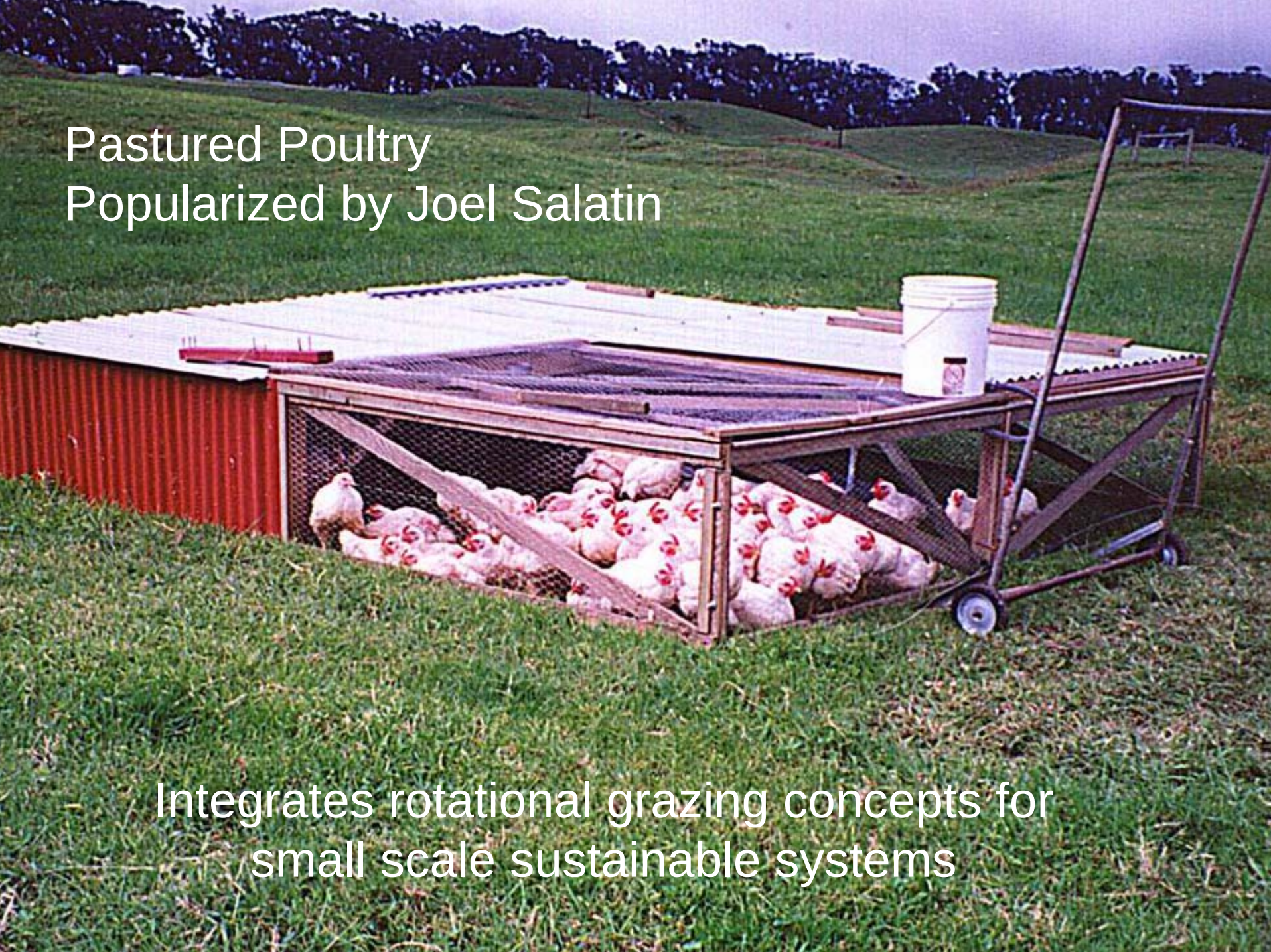
- A solid separator is require to separate out the solids and pig hair in order for the drip system to be effective
- Consistent effort is required to manage the system (keeping drip holes unplugged)
- The effluent contains pathogens which would require precautions in crop selection and direct contact

http://www.pigsinparadise.info

2003 Environmental Award from U.S. E.P.A. Region 9

Talofa !!

Grazing Cage


Pastured Poultry
Popularized by Joel Salatin
Integrates rotational grazing concepts for
small scale sustainable systems

Advantages

- Manure is distributed in controlled area
- Recycles nutrients to plants
- Adjustable up to 150 square feet.
- Low cost & Easy to operate
- Can be used for layers and broilers
- Saves feed costs
- Weed control
- Health forage-based eggs or meat

Disadvantages

- Dry season forage growth is reduced, slow down rotation to allow longer rest periods
- Pen must be rotated, depending on the number of animals; more animals = faster rotation

Highlight Notes

- Three layers
- 30’x50’ area within fruit tree planting
- Forage: Perennial peanut (Arachis pintoi)
- Rotation 60-75 days in 35-40 moves
- 25-30% feed savings due to forage supply
- Nutrient cycling
- Weed control
- FRESH EGGS

Dankulu Na Si Yuus Maase

Mahalo