

Conservation Planning Considerations for Outdoor Swine Operations



James T Green and Silvana Pietrosevoli

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Presenters for today



James (jim) T Green, Jr.
NCSU-NRCS-Retired



Silvana Pietrosevoli
CEFS-NCSU

Outdoor Hog Systems

- **Managed pasture** ...where intensive management and utilization of forage plants is desired for nutrition and soil protection.
- **Swine habitat** .. Where ground cover is desired to minimize soil and nutrient losses with little or NO expectation to meet nutritional needs of animals.
- **Dry Lot-Crop Rotation...** where ground cover is not expected but crops are frequently rotated on the sites to use the nutrients.

Historical Approaches to Managing Hogs Outdoors

- Nutritional
 - Most of early research was on the feed value of forage use
- Natural resource protection was not high priority.



Potential Environmental impact of Outdoor Hog Production

Animal activities/behavior

Grazing , Excavating “Rooting”
Trampling, Wallowing
Dunging areas



Ground cover destruction
Soil compaction
Nutrient loading

Run off
Erosion
Environmental pollution

When goal is to maintain ground cover

Stocking density

- wean to finishing animals.... <20 hd/acre
- gestating sows.... <6 hd/acre
 - timely feeding management
 - Rotational stocking

Duration of pasture use

- Weaning to finished 4-6 months with 2-4 months of pasture rest between groups

Managing hogs without regard to ground cover

- Controlling runoff to sensitive areas
- Controlling nutrient loading
- Integrating hogs into a crop rotation system.



Planning for outdoor hogs will require many of the Practices used for other livestock, but some, like the Watering facilities are not a “good fit”.

- Prescribed Grazing**
- Ground cover**
- Crop rotation**
- Critical area planting**
- Watering facilities**
- Pipeline**
- Buffers**



These conditions are relatively common and are not acceptable .





There is a need for a better understanding of the impact on runoff and water quality.





Hogs will destroy trees if given enough *exposure time*. They may be used to clear up areas for future crop or pasture.



Special ecosystem, Oak trees (14 adult oak trees/ac), native grasses, rosemary, thyme. **The Dehesa**

MAPA 2007 Standard:

Iberic pig “Pata negra”

Initial weight: 176-253 lb

Initial age: minimum 10 months

Stocking rate: 1.25 ac/pig

November to February



Photo courtesy of J-M Luginbuhl

Landscape position relative to surface waters is very important. For long term use of this area consider at least 100 ft of perennial vegetation buffers without animal use in the buffer.





Use appropriate buffers and keep safe distance from drainage ways.



Hogs typically create a “berm” around fence lines. If fence is on contour it can serve as a “level spreader” for runoff dispersion.



Water tank design for hogs not same as for cattle



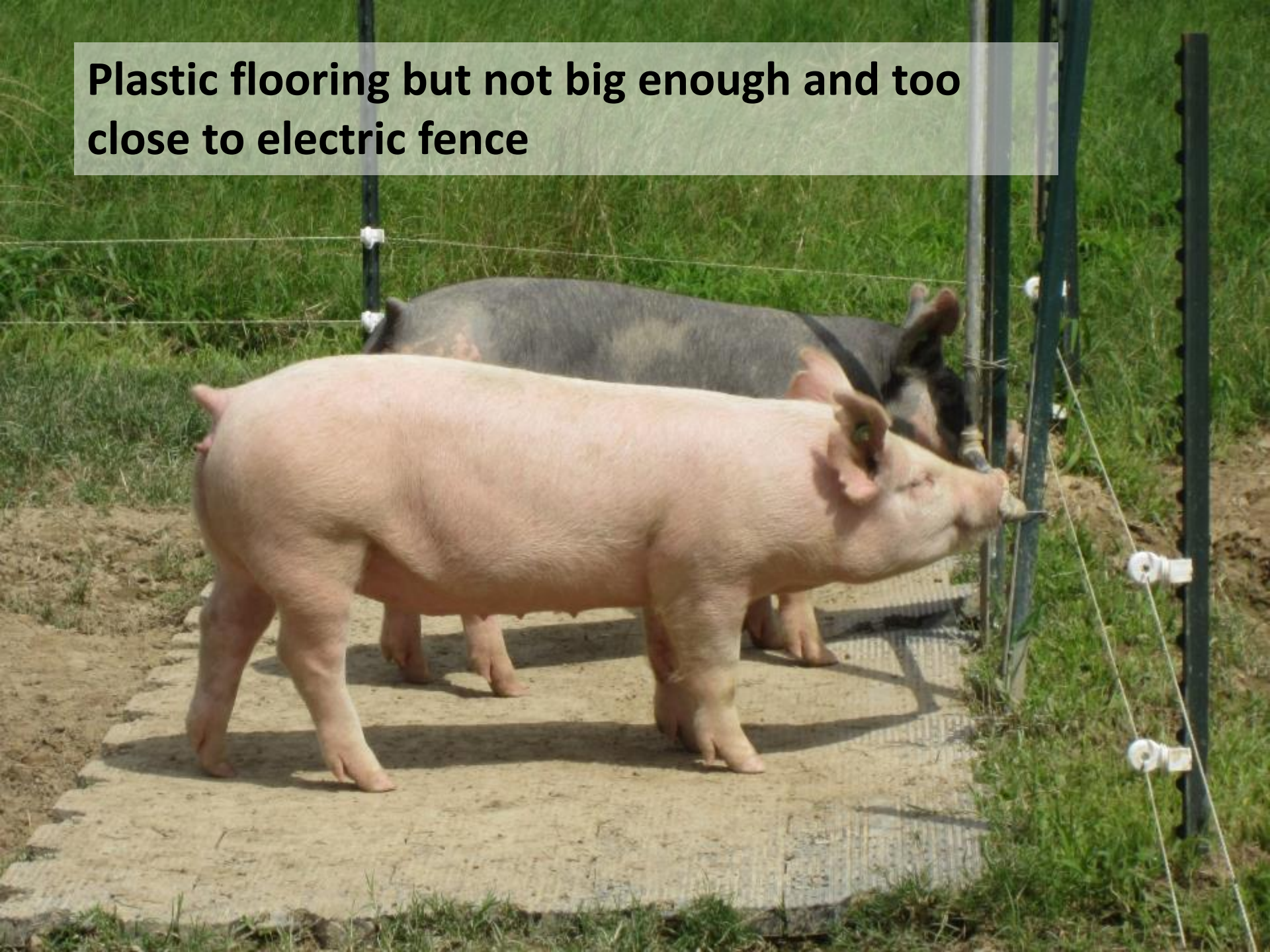
Surface reinforced with Geotextile fabric and gravel but can be damaging to hog feet



CONCRETE SLATS... water can infiltrate beneath feet and not run to edge where a wallow will be created.



Plastic flooring but not big enough and too close to electric fence



Platform of wood + Metal; if mobile it could reduce amount of soil disturbance.





Wallow tips

- Large enough for twice the intended numbers of sows
- Wallows should not be thick mud – they should be fluid
- Fresh water should be available in the wallow
- During very hot times, the wallow should be shaded

Wallow Examples



Wallows for cooling on fine texture soil with buffers can be effective



An electric offset wire inside of a permanent fence keeps hogs from rooting soil onto the woven wire. To minimize soil coverage of the electric wire it must be at least 18" off the woven wire fence and at least 12" above the soil surface.

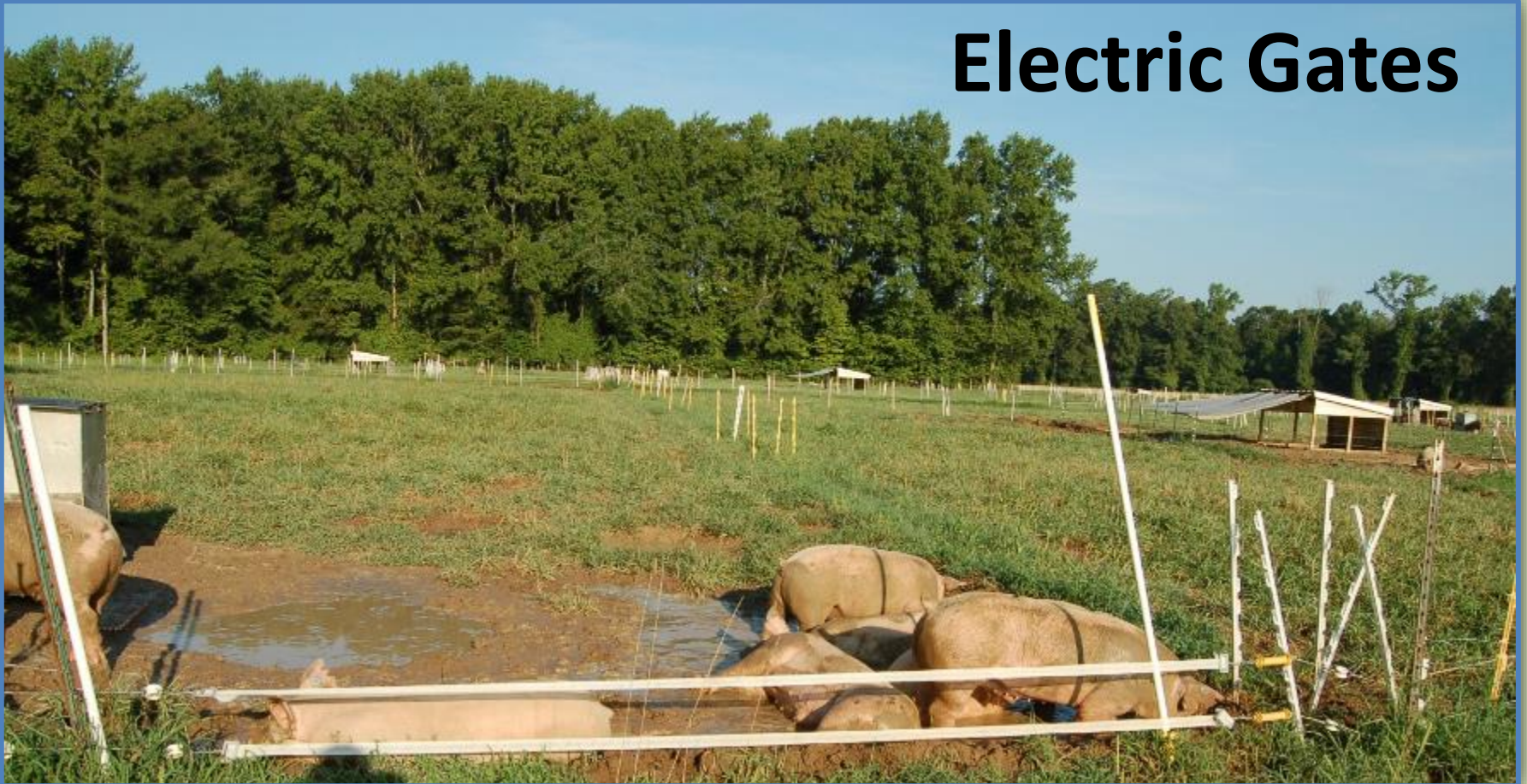


Use a different type of wire for gates because hogs may "balk" at crossing through an area where HT wire reminds them of a shock

The position of these offset wires keeps hogs off the woven wire, but they are too close to prevent soil from being rooted onto the woven wire. The wood offset could easily be extended to prevent soil contact with woven wire.



Electric Gates



Gates need to be visible and appear different from the fence, otherwise pigs won't go through

Do not locate feeders or drinkers close the gate; animals will concentrate their activity there and the entrance will be converted in a wallows.

Role of forages in pastured pork operations

A photograph of a brown pig grazing in a lush green field. The pig is the central focus, shown in profile from the side, facing right. It has a yellow ear tag on its left ear. The background is a dense field of green grass and some small white flowers.

Vegetative ground cover: Trampling and rooting resistance : Tall fescue, KY bluegrass, reed canarygrass, Bermudagrass, Bahiagrass

Source of nutrients Alfalfa, White and red clover, Smallgrains, Ryegrass, Brassicas, Sudangrass, Millet, Crabgrass

Annual forage species are more sensitive to animal damage than perennials with rhizomes and stolons.



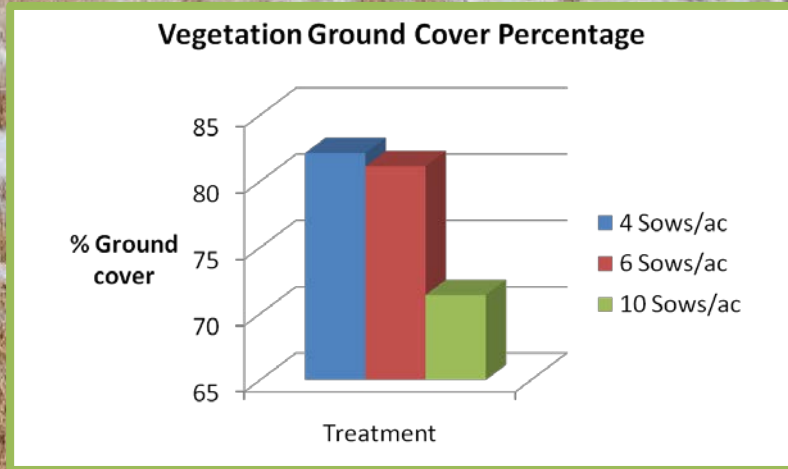
Sudangrass



Sudangrass with 30 pigs/ac for 12 weeks

Bermudagrass is most tolerant of hog activity

Three stocking rates: 4, 6 or 10 sows/ac, rotational management



To reduce ground cover damage and soil compaction provide “toys”, hidden food, mulch.



Final ground cover* (%) in bermudagrass paddocks managed with different stocking rates in a continuous system during a 12-week finishing period.



60 pigs/ac
2 batches of pigs
90 d of utilization/batch of pigs



15 pigs/ac
2 batches of pigs
90 d of utilization/batch of pigs

Rooting damage is more severe when the grass is short.



Ray Cooper farm TN



Implement rotational management



One day occupation

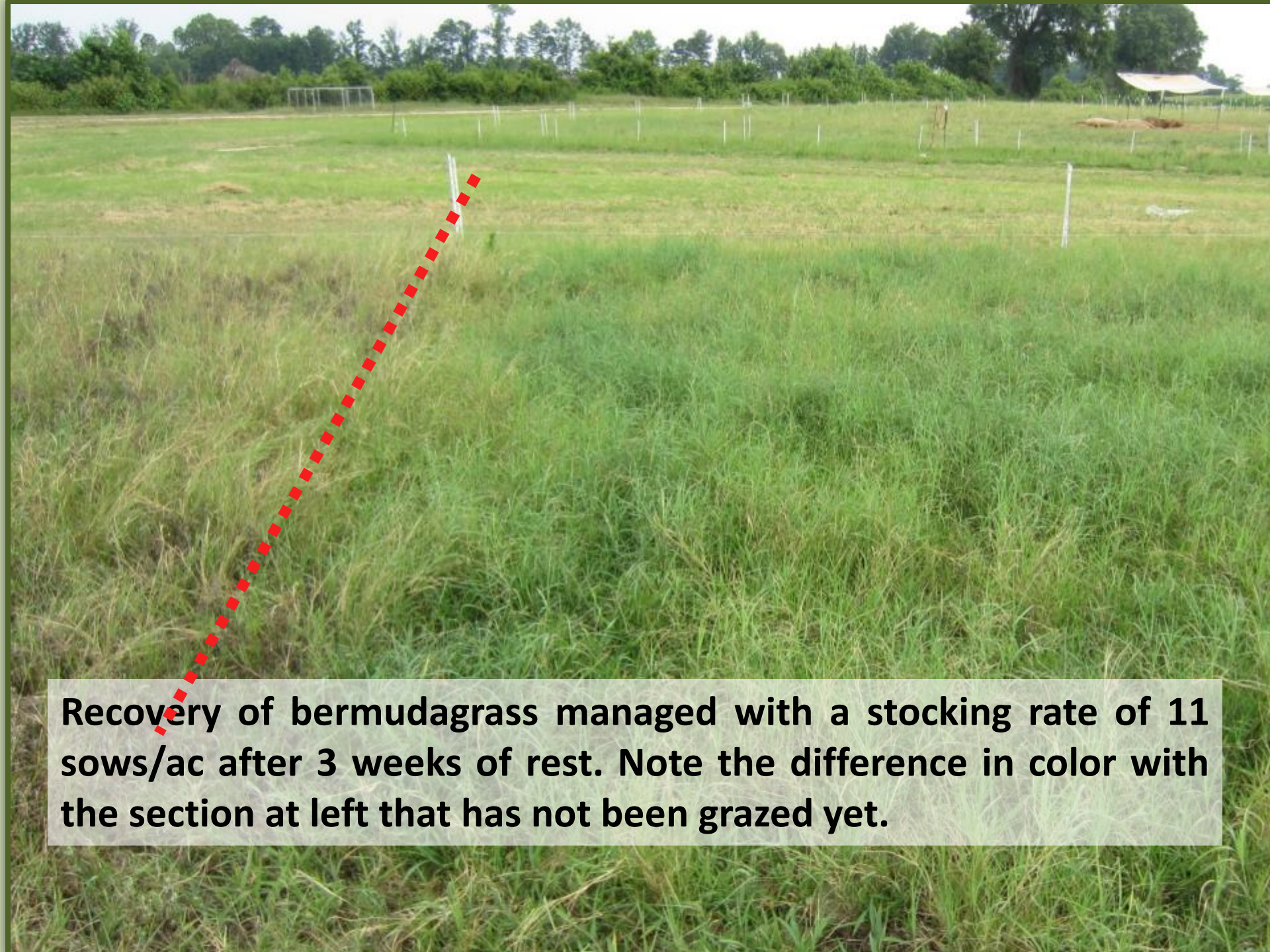
One day rest

One week rest

0.37 ac bermudagrass divided in 9 sections: 1 HUA and 8 grazing paddocks

Period of occupation: 1 week

Stocking rate: 4 sows per paddock, equivalent to 11 sows/ac

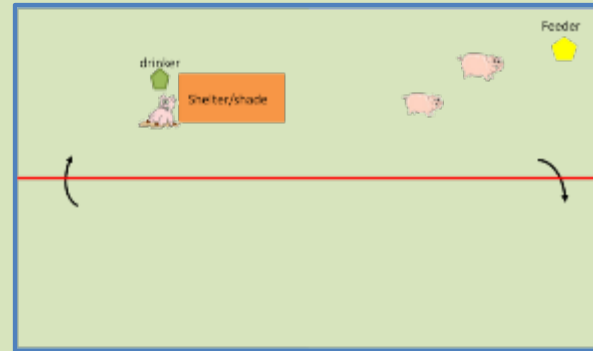


Recovery of bermudagrass managed with a stocking rate of 11 sows/ac after 3 weeks of rest. Note the difference in color with the section at left that has not been grazed yet.

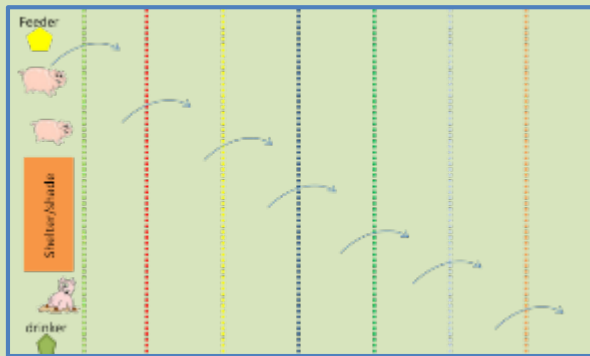
How to Implement rotations



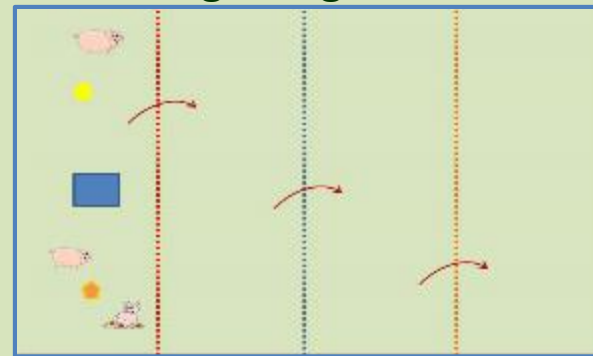
Continuous system Periodic movement of feeder and drinkers



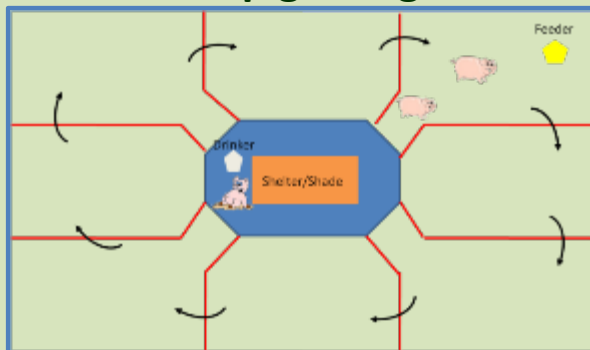
Alternate grazing



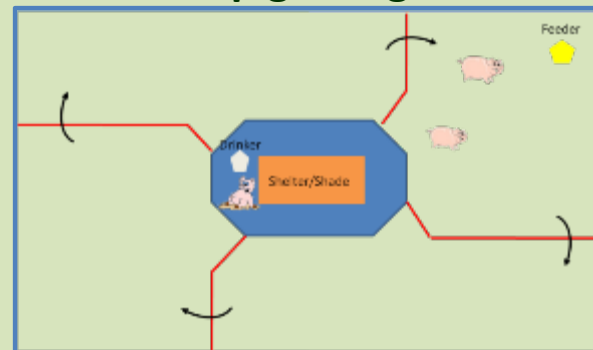
Strip grazing w 1-8



Strip grazing w 9 - 12



Rotational Grazing w 1- 8



Rotational Grazing w 9 - 12

The next few slides will show an example of how we planned a 13 acre farm to manage 9 sows, 2 boars and finish pigs from two farrowings annually.

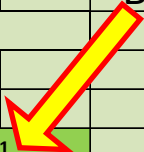
Schedule of animal management activities for three farrowing cycles. Based on three groups, each with three sows, from farrowing through Gestation.

	Year 1												Year 2											
	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	
Sow Group	BREEDING HERD 3 groups of 3 sows																							
	<i>FIRST REPRODUCTION CYCLE</i>																							
1	FARROWING+ LACTATION	BREEDING	GESTATION on pasture 1																					
2		FARROWING+ LACTATION	BREEDING	GESTATION on pasture 2																				
3			FARROWING+ LACTATION	BREEDING	GESTATION on pasture 3																			
	<i>SECOND REPRODUCTION CYCLE</i>																							
1								FARROWING+ LACTATION	BREEDING	GESTATION on pasture 1														
2									FARROWING+ LACTATION	BREEDING	GESTATION on pasture 2													
3										FARROWING+ LACTATION	BREEDING	GESTATION on pasture 3												
													<i>THIRD REPRODUCTION CYCLE</i>											
1													FARROWING+ LACTATION	BREEDING	GESTATION on pasture 1									
2														FARROWING+ LACTATION	BREEDING	GESTATION on pasture 2								
3															FARROWING+ LACTATION	BREEDING	GESTATION on pasture 3							

Potential schedule of animal management activities for three growing-finishing cycles. This schedule is based on the pigs from three groups of three sows.

		Year 1												Year 2												
		January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November		
Sow Group	FINISHING.....WEANERS TO MARKET ANIMALS																									
	FIRST FINSIHING CYCLE																									
	1			WEANERS	FINISHING GROUP 1 ON PAD 1																					
	2				WEANERS	FINISHING GROUP 2 ON PAD 2																				
3					WEANERS	FINISHING GROUP 3 ON PAD 3																				
SECOND FINSIHING CYCLE																										
1								WEANERS	FINSIHING GROUP 4 ON PAD 4																	
2									WEANERS	FINSIHING GROUP 5 ON PAD 5																
3										WEANERS	FINISHING GROUP 6 BACK ON PAD 1															
THIRD FINSIHING CYCLE																										
1																										
2																										
3																										

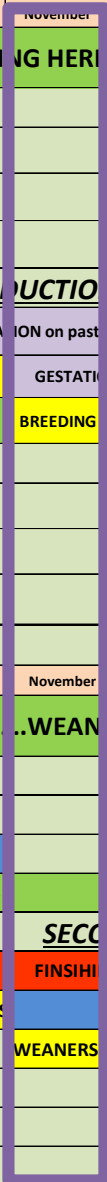
Back to 1st pad



Note the various production phases for any month.

		Year 1												Year 2																									
		January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November															
Sow Group		BREEDING HERD 3 groups of 3 sows																																					
FIRST REPRODUCTION CYCLE																																							
1		FARROWING+ LACTATION	BREEDING	GESTATION on pasture 1																																			
2			FARROWING+ LACTATION	BREEDING	GESTATION on pasture 2																																		
3				FARROWING+ LACTATION	BREEDING	GESTATION on pasture 3																																	
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1				WEANERS	FINISHING GROUP 1 ON PAD 1																																		
2					WEANERS	FINISHING GROUP 2 ON PAD 2																																	
3						WEANERS	FINISHING GROUP 3 ON PAD 3																																
SECOND FINISHING CYCLE																																							
1														WEANERS	FINISHING GROUP 4 ON PAD 4																								
2															WEANERS	FINISHING GROUP 5 ON PAD 5																							
3																WEANERS	FINISHING GROUP 6 BACK ON PAD 1																						
THIRD FINISHING CYCLE																																							
1																WEANERS	FINISHING GROUP 7 ON PAD 2																						
2																	WEANERS	FINISHING GROUP 8 ON PAD 3																					
3																		WEANERS	FINISHING GROUP 9 ON PAD 4																				

Pigs

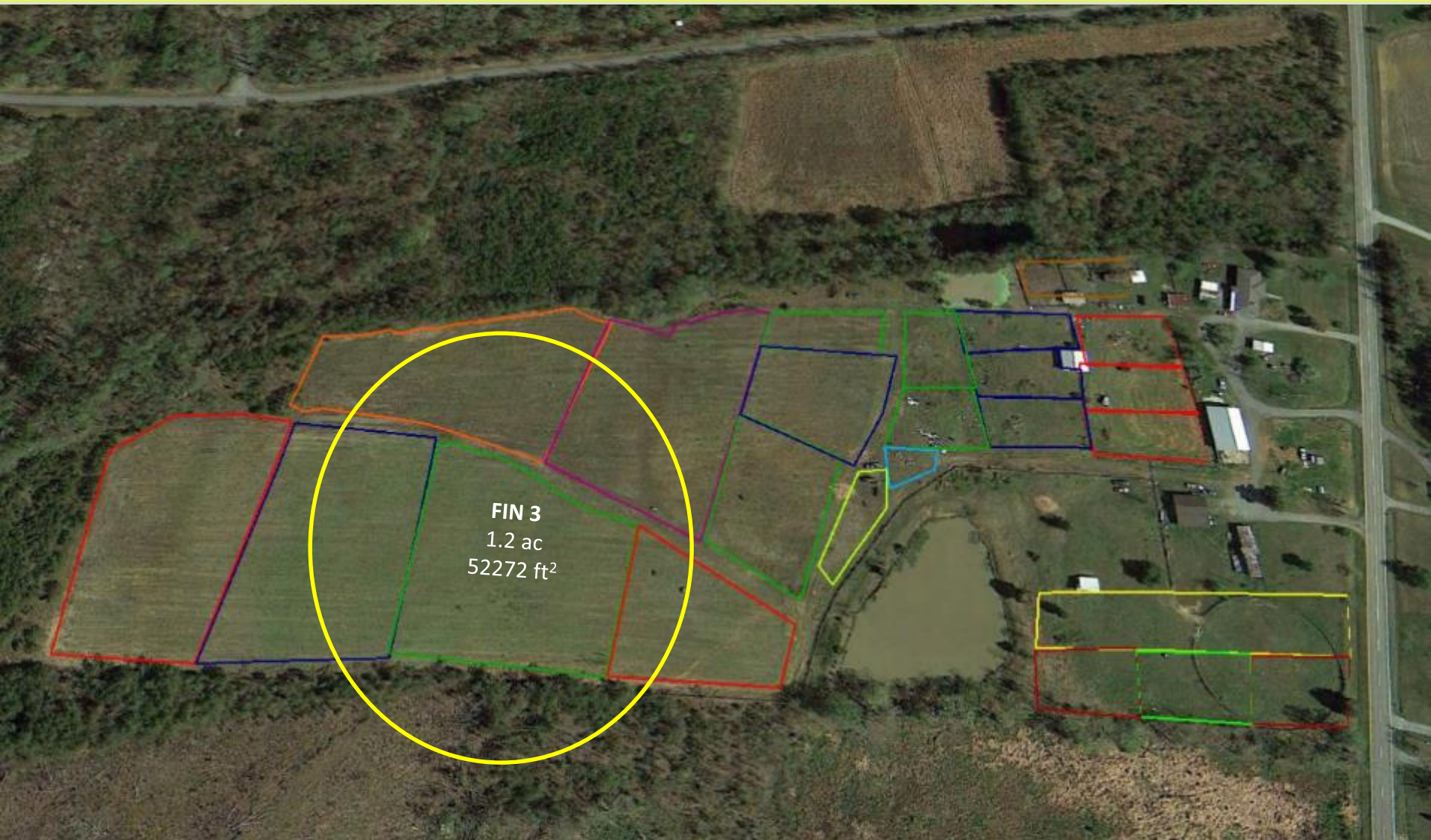


Pasture layout with acreage for each animal production phase

- BRE = BREEDING
- GES = GESTATING
- FAR = FARROWING
- BOAR = BOAR
- REP = REPLACEMENT
- WEA = WEANERS
- FIN = FINISHING
- COR = CORRAL
- QUAR = QUARANTINE

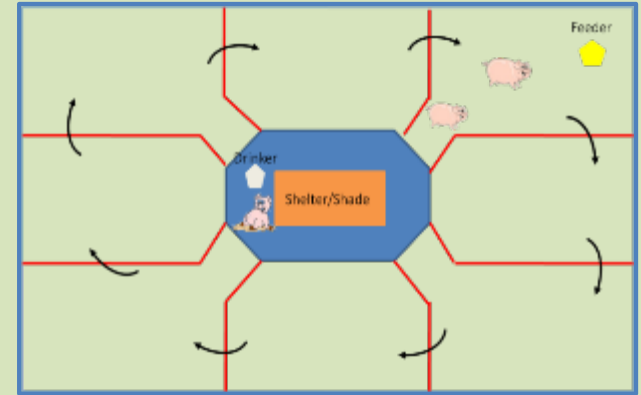
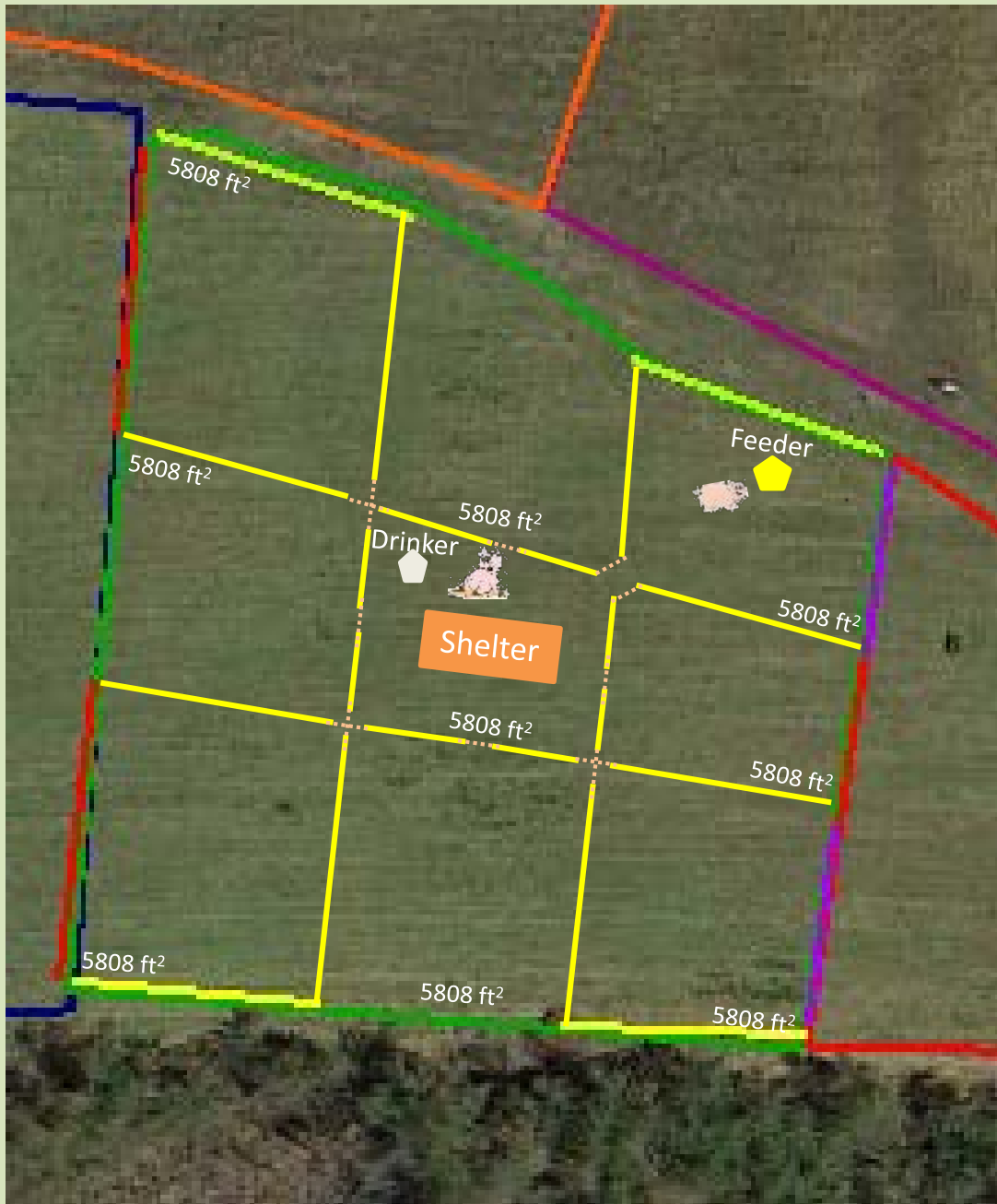


Finisher paddocks will be managed rotationally



FIN 3
1.2 ac
52272 ft²

Finisher paddock will be subdivided in nine plots.

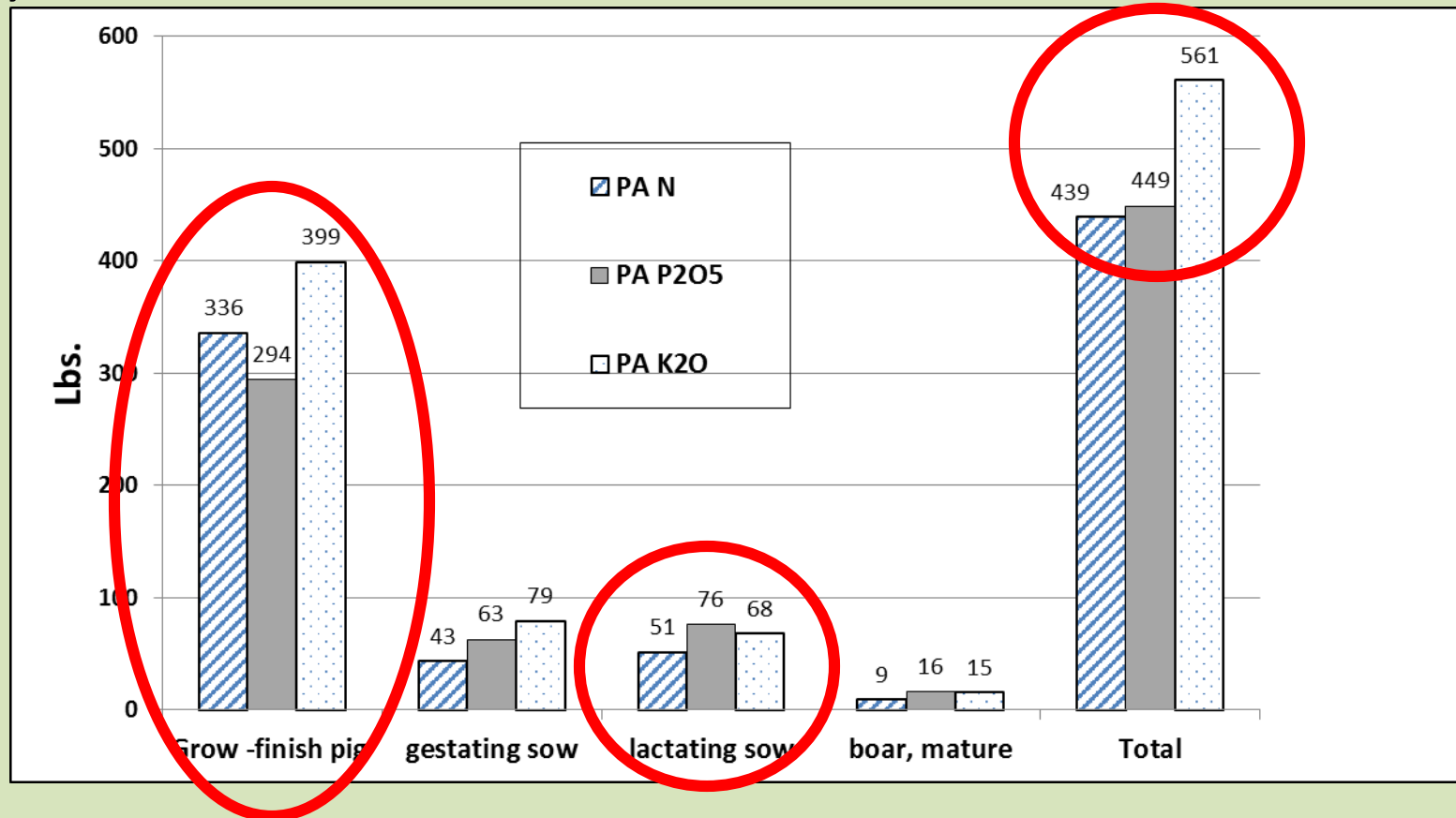


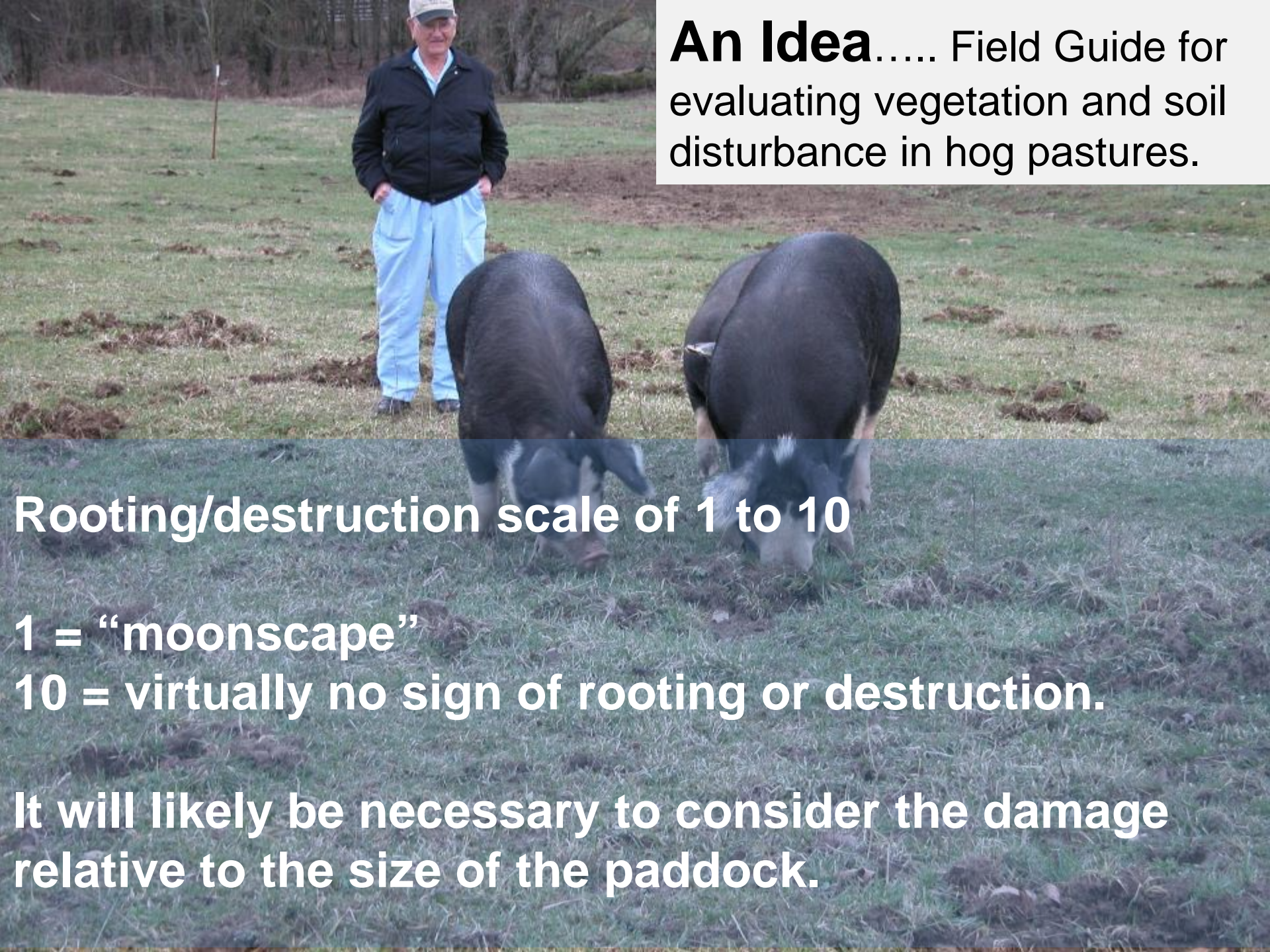
Rotational Grazing

Potential pasture crops to provide soil cover for the finishing phase of outdoor hog production

1st year		
Months on pasture	No hogs	Base Crops in each pasture (choose grasses with rhizomes, stolons)
Jan-Apr	May - Dec	Mostly Fescue mixed with some Bermuda
Feb-May	Jun-Jan	
Mar-Jun	July - Feb.	
Apr-Jly	Aug-Mar	Mostly Bermuda with some Fescue
May-Aug	Sep-Apr	
Jun-Sep	Oct-May	Mostly Bermuda; Perhaps fall overseeded with Smallgrain
Jly-Oct	Nov.- Jun	
Aug-Nov	Dec-Jly	
Sep-Dec	Jan-Aug	
Oct-Jan	Feb-Sep	Mostly Bermuda with some Fescue
Nov-Feb	Mar-Oct	Mostly Fescue mixed with some Bermuda
Dec-Mar	Apr-Nov	

Annual nutrient production from a farrow to finishing operation with the following animal numbers. Two farrowings/yr of 6 sows, 14 pigs, 1 boar.



A man wearing a black jacket, light blue pants, and a cap stands in a grassy field. Two large black pigs are in the foreground, one slightly to the left of the other, both facing away from the camera and looking down at the ground. The field shows signs of being rooted, with patches of bare earth and sparse grass.

An Idea..... Field Guide for evaluating vegetation and soil disturbance in hog pastures.

Rooting/destruction scale of 1 to 10

1 = “moonscape”

10 = virtually no sign of rooting or destruction.

It will likely be necessary to consider the damage relative to the size of the paddock.

Score = 9



These sites pose little potential environmental or resource damage at this point.

1. Ground cover is good.
2. Landscape position is good.





These sites would result in excessively high nutrient loading and high probability for contaminating ground and surface water....so the score would be 1 or 2.



Feb

20 year-old stand of fescue & bermuda .
Affected area is less than 15% of the total paddock.

July

Note landscape position and recovery during the spring and early summer following winter damage.

Feb

Score on this end = 1-2 but paddock as whole = 5-6



Score = 7-8

...because disturbance makes up less than 15% of land area in the paddock.

Score = 2-3

... because disturbance makes up 60% of the land area in the paddock.





Score = 7-8..because of damage around fence line. However, if the fence is placed on the contour this rooting behavior can be used to create a “mini-terrace” that shortens the length of slope within a pasture and can minimize the amount of runoff that reaches water channels.

Additional information

<http://www.cefs.ncsu.edu/index.htm>

<http://www.cefs.ncsu.edu/whatwedo/researchunits.html>

http://www.cefs.ncsu.edu/publications/conservation_practices_2012.pdf

<http://www.cefs.ncsu.edu/resources/nutrient-and-vegetation-management-in-outdoor-hog-production-systems.pdf>

http://www.cefs.ncsu.edu/publications/10_ideas_for_improving_resource_mgt_in_outdoor_hogs.pdf

http://www.cefs.ncsu.edu/publications/IMPORTANCE_OF_GROUN_%20COVER_MAINTENANCE.pdf

http://www.cefs.ncsu.edu/publications/Nutrient_management_in_pastured_swine_operations.pdf

<http://www.cefs.ncsu.edu/publications/outdoorswineproduction.pdf>

<http://www.acrcd.org/ForFarmersRanchers/OutdoorHogProductionBestManagementPractices.aspx>

<http://www.acrcd.org/Portals/0/NRCS%20Practices%20Chart.pdf>

Outdoor Hog Production:

Best Practices for Conservation in the San Francisco Bay Area





Conservation Practices for Outdoor Hog Systems

By Susan Ellsworth and Sheila Barry

The Natural Resources Conservation Service (NRCS) is an agency of the USDA tasked with promoting conservation on working lands through financial and technical assistance. Farm or ranch conservation planning is one of the many services provided by the NRCS for interested producers. The NRCS' Environmental Quality Incentives Program (EQIP) can then be utilized to help share the cost of specific conservation improvements identified within the conservation plan.

What follows is a description of various practices developed by NRCS that directly support outdoor hog management best practices in California and how they might be utilized. The chart also includes an explanation of how these practices would address potential natural resource concerns. To learn more about the NRCS and its programs, contact your local office by visiting <http://offices.sc.egov.usda.gov/locator/app?state=CA>.

Resource Conservation Practice	Practice Description	Application in Outdoor Hog System
Compost Facility 	A structure to contain and facilitate the aerobic transition of animal manure and/or plant waste into stable organic matter suitable for use as soil amendment.	Use to manage hog manure and bedding for animals in confined or deep-bedded systems. <ul style="list-style-type: none">Will address potential nutrient loading in soil, runoff or leaching associated with accumulated hog manure
Cover Crop 	Crops including grasses, legumes and forbs planted seasonally to reduce erosion, increase soil organic matter, suppress weeds, manage soil moisture, minimize compaction and support other goals.	Use as part of integrated cropping/hog production system – where cover crop can be grazed after achieving its resource goal. Can also be used between forage crops in pasture systems to build soil or replenish nutrients for enhanced forage production. Cover crops provide the following benefits: <ul style="list-style-type: none">Promote nutrient recycling or redistribution within soilReduce compaction in soil after use by hogsSuppress weeds resulting from disturbed soilProvide soil cover in rotationally used paddocks after hogs are removed

Funding provided by the Natural Resources Conservation Service Conservation Innovation Grant # 86-9104-3-179

Outdoor Hog Production: Conservation Practices 1

Summary

- Maintaining ground cover with live vegetation or residue is challenging, but possible
- Nutritional value is of minor importance with the exception of gestating sows and boars
 - Very little nutrient removal from site unless crop is harvested.
- Rotational stocking is possible and provides some control over vegetation survival and soil disturbance
- Managing watering facilities, housing, and feeding is different than for ruminants and horses
- Crop rotations following with hogs provides nutrient management, soil surface smoothing, and minimizes disease buildup.

Questions



Silvana Pietrosevoli
919 515 0814
Silvana.Pietrosevoli.09@gmail.com
NCSU Animal Science Department

James T Green, Jr.
Jamestgreenjr@gmail.com
Retired from NCSU

Water requirements

Gallons/head/day	
Nursery Pigs (up to 60 lbs)	0.7
Grower Pigs (60 to 100 lbs)	2-3
Finishing Pigs (100 to 250 lbs)	3-5
Non pregnant gilts	3
Pregnant sows	3-6
Lactating sows	2.5-7
Boars	5



Space allowance for huts, ark, shelter and shade

	Minimum space allowance (sq feet/head)		
	AWA*	Others	
Breeding pigs	Boars	16	16
	Gilts and dry sows	16	16
	Gestating gilts and sows		46
	Farrowing and Lactating sows	42	46
Fattening pigs	Up to 66 lb	3	6.5
	Up to 110 lb	4.5	9.7
	Up to 187 lb	7	14
	Up to 242 lbs	8.5	14

*Animal welfare approved standard



Feeders

Feeders

N of pigs/hole

Weaned (33-66 lb)	4
Growers (66-110 lb)	3
Fatteners (110 lb-Market)	2
Gestating sow	1

