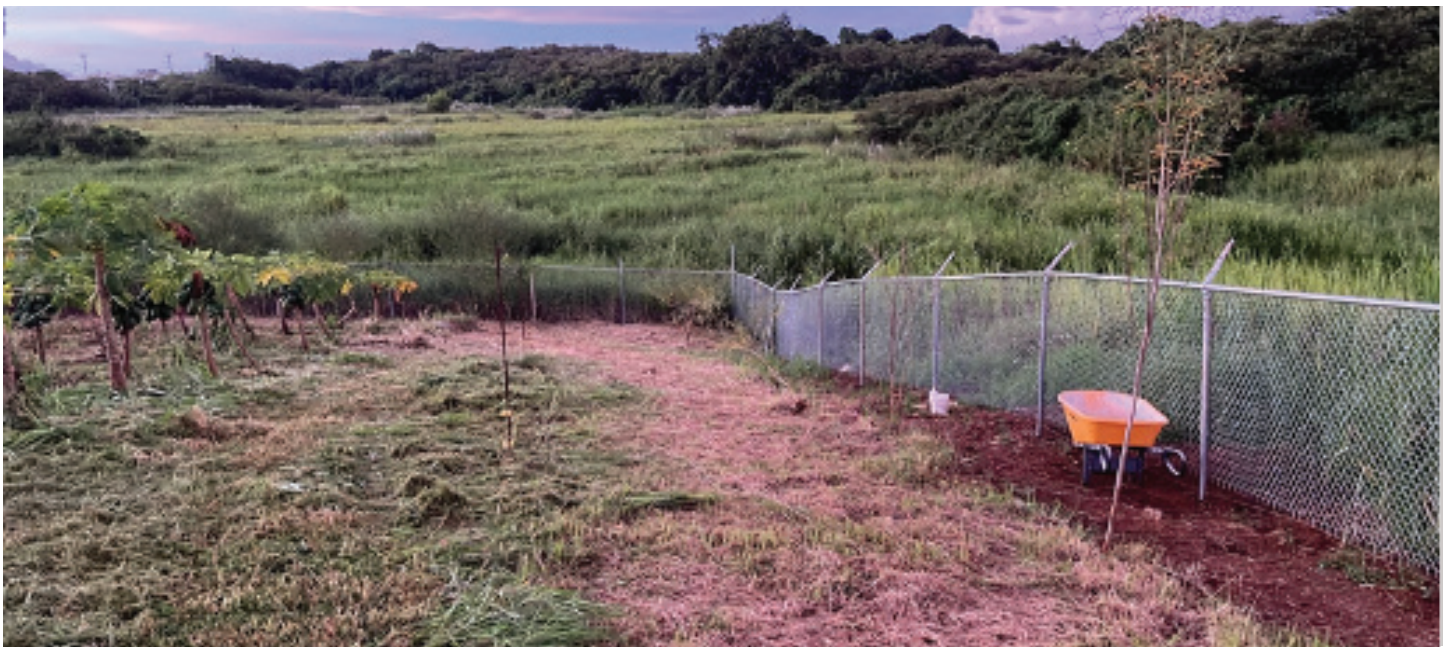
UNIVERSITY OF GUAM
COOPERATIVE EXTENSION
& OUTREACH

Agriculture & Natural Resources Program
Fact Sheet #03-23
July 2023

Non-Electric Exclusion Fence for Farm Systems in Guam

By Chelsea Taitano, Extension Assistant I
Joe Tuquero, Extension Agent III
Mark Acosta, Extension Agent I



A non-electric exclusion fence (chain-link fence) is used to control feral ungulates and dogs from entering an agroforest farm in Talofofo, Guam.

Introduction

Agriculture was once one of the most vital industries in Guam. Today, several large-scale and many small-scale conventional crop farms operate on island. Many small-scale producers practice traditional agroforestry and integrate modern agroforestry practices that promote agricultural and environmental sustainability.

Aside from numerous types of plant diseases, insects, and mites, feral animals also cause damage to all types of farm systems in Guam. Locally, common feral animals that negatively impact farm systems include swine (pigs), deer, dogs, and chickens. On rare occasions, water buffalos (carabao) have been known to disrupt crop production.

Feral pigs pose the highest threat to crop production on the island (San Nicolas et al., 2017). They are also known to damage all kinds of truck crops, medicinal plants, and orchard-type crops like bananas and papayas, including young fruit tree seedlings and saplings. Because feral pigs reproduce rapidly compared to other wild ungulates (Taylor et al., 1998) and can withstand intensive harvesting when hunted (Giles, 1980), swine are capable of overpopulating areas in a short period of time (Barrett and Birmingham, 1994). One mature female can start reproducing at seven months old and can have one and a half litters per year with up to 12 piglets per litter. Since their introduction to Guam in the 17th Century, domestic pigs have escaped and established large populations throughout the island resulting in a large feral pig population today. Uncontrolled feral swine are so prolific and elusive that elimination is exceptionally difficult (Bach and Connor, 1997).

An exclusion fence system is an effective tool for deterring feral pigs, deer, and dogs from entering farm systems. If a fence system is desired, many types of fence materials and fence systems/designs can meet crop producers' objectives.

Electric Fence Systems

Electrified exclusion fence systems are popular and affordable. Such fence systems are very effective in deterring pigs, deer, and dogs when operated and maintained properly. Basically, a properly installed

electric fence system consists of a high tensile strand(s) of wire or netting that is electrified at a high voltage in pulses. **When a grounded animal or human contacts the fence, they will be electrically shocked for a quick moment.** Although, electric fence systems are not too difficult to install, they require high maintenance and can injure humans and animals through electric shock. Electric fence systems can be installed as permanent or portable systems. Information on electric exclusion fence systems is available at: https://www.uog.edu/_resources/files/extension/publications/Electric_Fencing_Swine_2021.pdf.

Non-Electric Fence Systems

Non-electric exclusion fence systems, which are more permanent systems, are another option for farm system producers to control feral ungulates and dogs in Guam. Though they can be costly and require a more stringent installation process, non-electric fence systems are the most effective exclusion fence systems. They also require much less maintenance than electric fence systems (Wellscroft, n.d.).

This publication offers general information and recommendations on the use of non-electric exclusion fence systems for feral ungulate and feral dog control on farm systems.

Common Types of Non-Electric Exclusion Fence Systems

Determining the type of fence design needed for your farm is based on effectiveness and costs. Topography, quality and availability of materials, soil type, local climate, and budget play an important role in fence design (Conventional Farm Fencing, n.d.). Fence designs for Guam must consider the jumping ability of the Philippine sambar deer and the digging capabilities of pigs and dogs. Fence systems with a minimum height of 6.5 feet above ground is recommended to deter feral deer, and a fence skirt at the base of the fence is recommended to control the digging from pigs and dogs (Figure 1).

Figure 1
A ground skirt (the portion of the fence laying flat on ground) on the outside of an exclusion fence keeps feral pigs and dogs from digging underneath it. *Source: Maui Now*

Multi-Strand Wire Fences

Multi-strand wire fences are comprised of more than one strand of wire that are secured to fence posts that are typically spaced no less than 10 feet apart (Figure 2).

Battens, which are typically strips of squared wood or metal, can be used to maintain spacing between multi-strand wire fence systems between fence posts (Figure 3). Other types of materials, such as stays or wire tensioners, can be used to maintain appropriate spacing between multi-strand wires and tension of wires.

Figure 2
A multi-strand wire fence with wooden posts. *Source: Conventional Farm Fencing, n.d.*

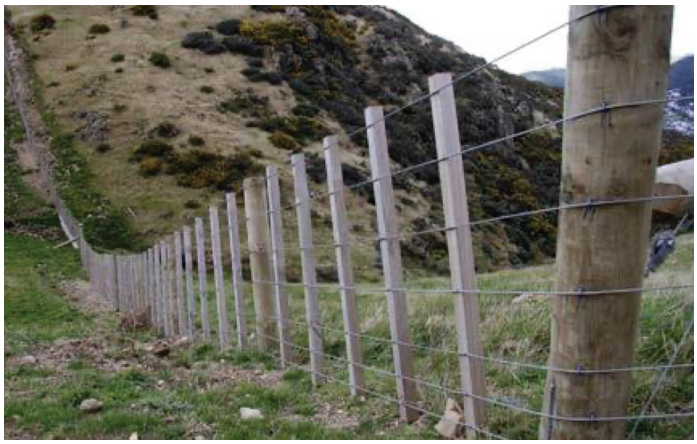


Figure 3
A multi-strand smooth-wire fence with battens installed between fence posts. *Source:* Conventional Farm Fencing, *n.d.*

Figure 4
A multi-strand barbed wire fence system.
Source: Rangemaster Fence (www.rangemasterfence.com)

Commonly used multi-strand wires consist of smooth (Figure 3) or barbed wire (Figure 4). Multi-strand smooth and barbed wire fence systems can provide farmers with sustainable fencing throughout generations. High tensile, higher gauged (thinner) smooth wires are typically used for electric fence systems, but lower gauged (thicker) smooth wire can be used for non-electric fence systems. However, feral animals such as pig, dogs, and possibly deer can squeeze through smooth wire systems with little harm depending on the tension and spacing of the wires and the age/size of the animal.

Barbed wire fence systems provide a strong barrier around agricultural crops and can assist with feral animal control (Worley, 2006). One danger of barbed wire fence systems is that animals can be seriously wounded or die if they become entangled in barbed wire. The spacing of strictly multi-strand wire systems must be planned appropriately to deter feral animals.

Fabricated Net-Like Wire Fences

Many types of fabricated net-like wire fences are available in rolls. Some are available in panels. Common types appropriate for non-electric exclusion fence systems that can be found in Guam include:

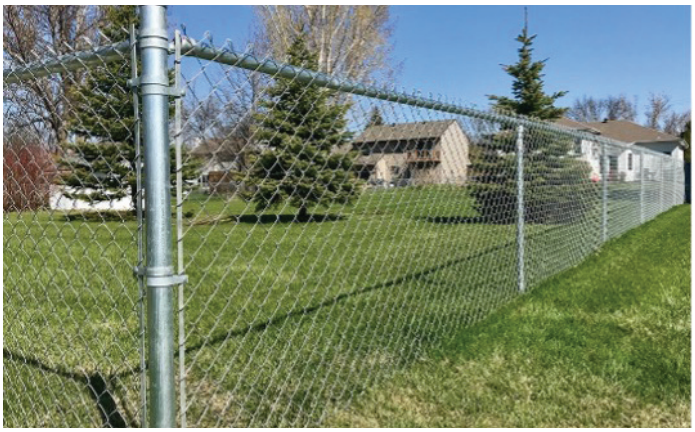


Figure 5
Chain-link fence. *Source: The Doctor Fence*

Figure 6
Woven wire fence.
Source: Cornerstone Fencing Ohio (cornerstonefencingohio.com)

Figure 7
Welded wire fence.
Source: Ultimate One Online (www.ultimate-one.co.uk)

1. Chain link fence (Figure 5)
2. Woven wire (Figure 6)
3. Welded wire (Figure 7)

Other styles of fence systems and materials can be found online. One should consider shipping capabilities of online vendors.

Figure 8
Woven wire with multi-strand barbed wire fence system. *Source:* Alibaba.com

Recommended height, hole size, and design must be considered when using such materials to exclude feral ungulates and dogs. Some designs inter-mix multi-strand wire with net-like fence fabrics (Figure 8).

Considerations for Fence Designs and Installation

When constructing a non-electric fence, quality and durability are two key factors that should determine the type and design of fence installed (U.S. Department of Agriculture NRCS, 2018). Quality and durability, along with fence design and installation, should determine the fence's life expectancy. Constructing a non-electric fence design is influenced by topography, soil type, localized geological features, location, and budget. On small islands like Guam, one should consider seeking materials that can withstand high salt-spray. Most importantly, designing a fence should adhere to federal, state, and local laws, and regulations. To properly install fence systems, one should seek advice and technical guidance from professional fence designers and installers.

Non-Electric Fence Maintenance

Proper maintenance of non-electric fences is important to ensure the fence has longevity and requires less labor (Honophy, 2021). Below are suggested practices to adopt for proper fence maintenance:

- Repair, replace, or tighten any weakened wires.
- Repair or replace any weakened post assemblies.
- Inspect the maintain the tension of the fence system.
- Prevent overgrowth of weeds and bushes along the fence line.
- Follow a regular inspection routine.

Local Resources

For technical assistance on fence designs and materials:

USDA Natural Resources Conservation Service - Guam Field Office
(671) 300-8591
https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/pacific-islands-area/guam-service-center

For more information on proper fence standards and alternative fence designs/materials, the following local businesses are known to provide fence system materials:

1. **Tsang Brother Corp.** (Dededo, Guam)
   (671) 638-1113
2. **Benson Guam Ent.** (Mongmong-Toto-Maite, Guam)
   (671) 477-7562
3. **Home Depot** (Tamuning, Guam)
   (671) 648-0440
4. **Jack Peters & Co.** (Tamuning, Guam)
   (671) 646-1241

Numerous online resources can also help to better comprehend and decide on a desired non-electric fence system (depending on local availability of materials or shipping capabilities of fence vendors).

For More Information

Contact University of Guam Cooperative Extension & Outreach at (671) 735-2080 for help or more information.

References

Bach, J.P., and J.R. Connor. (1993). Economics and human dimensions of the wild hog in Texas. Pages 88–100 in C.W. Hanselka and J.F. Cadenhead, technical editors. Proceedings of feral swine: a compendium for resource managers. Texas Agricultural Extension Service.

Conventional Farm Fencing. (n.d.). https://cdn-flightdec.userfirst.co.nz/uploads/sites/pauatahanui/files/PDFs/A-Z%20Information/Types_of_Fencing.pdf.

Giles, J.R. (1980). *Ecology of feral pigs in New South Wales*. [Dissertation, University of New South Wales]. National Library of Australia.

Hanophy, W. (2021). *Fencing with wildlife in mind*. Colorado Parks & Wildlife. https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf.

San Nicolas, P.J., Bamba, J., & Dresbach, S.H. (2021). *Electric fence for feral swine: Materials, installation guidelines, and maintenance.* University of Guam Cooperative Extension & Outreach. https://www.uog.edu/_resources/files/extension/publications/Electric_Fencing_Swine_2021.pdf.

Taylor, R.B., E.C. Hellgren, T.M. Gabor, and L.M. Ilse. (1998). Reproduction of feral pigs in southern Texas. *Journal of Mammalogy*, 79: 1325–1331. https://www.jstor.org/stable/1383024.

U.S. Department of Agriculture, Natural Resources Conservation Service. (2018). Conservation Practice Standard: Fence. NRCS, PI.

Wellscroft. (n.d.). *Non-electric fence options - wellscroft*. Wellscroft Fence Systems LLC. https://www.wellscroft.com/media/resources/Non-Electric-Fence-Options_Wellscroft.pdf.

Worley, J.W. (2006). *Fences for horses.* University of Georgia Extension. https://extension.uga.edu/publications/detail.html?number=C774&title=Fences+for+the+Farm.

Published: July 7, 2023

This publication was funded by Western SARE grant number RGR20-003.