

Swine Health Management for Hawai'i

At A Glance: All swine herds in Hawai'i should have a disease prevention and control plan. This publication provides vaccine recommendations that should be suitable for most Hawai'i swine herds, but it should not replace advice from a veterinarian.



Biosecurity Practices & Other General Recommendations

- Use good hygiene when docking tails, castrating, clipping teeth, and giving injections. Keep a bottle of disinfectant nearby to spray as needed (examples include 1% iodine and scarlet oil).
- Use disinfectant on foot gear, pens, crates, equipment, vehicles, trailers.
- Use well-laundered, clean coveralls or disposable Tyvek® coveralls when working around pigs. Try to avoid wearing barn clothes and shoes off your farm.
- Limit access to your farm. Pathogens and parasites can be carried between farms by humans, animals, vehicles, and contaminated clothing. Do not visit other hog farms unless clothing is changed & boots are disinfected before returning.
- Vermin (rats, mice, mongoose, cats, flies, other insects, etc.) can carry pathogens between farms and can cause structural damage to barns. Creating a vermin control plan can mitigate these risks. Removing debris and clutter around and inside the barn decreases hiding spots, and setting traps can decrease the number of vermin present.
- Food waste must be heated until boiling (100°C/212°F) and kept boiling for at least 30 minutes. Stir occasionally to ensure even cooking.

- continued on p. 4

Introduction

A disease management plan is an essential part of a comprehensive herd health program. All swine herds in Hawai'i should have a disease prevention and control plan. This publication provides vaccine recommendations that should be suitable for most Hawai'i swine herds, but it should not replace advice from a veterinarian. If you are experiencing problems in your herd, your first step should be obtaining a veterinarian's diagnosis, if possible; if not, contact your local CTAHR Extension agent for assistance. Once the problem(s) has/have been identified, vaccination can be used to help control the problem(s).

In general, all breeding animals should be vaccinated against Parvovirus, Leptospirosis, and Erysipelas since these pathogens are extremely common. Mycoplasma and Circovirus are commonly found in nursing piglets and grower/finisher pigs throughout the state. The specific products mentioned in this guide are included only as examples that meet the prevention strategy for the targeted organisms. There may be similar products available that can be substituted with equally beneficial results. Consult with your veterinarian or with an Extension agent to determine the target organisms and select the appropriate products for your farm.

Always follow the label instructions for all veterinary products and their withdrawal times (the amount of time you must wait prior to slaughtering an animal for human consumption after administering a veterinary product). Vaccines generally have a 21-day withdrawal time, and withdrawal times for antibiotics and dewormers vary. Keep in mind that stress and the timing of vaccination can influence the effectiveness of a pig's response to any vaccine.

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THIS INFORMATION HAS BEEN
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Table 1 – The Basic Breeding Herd Program (appropriate for most herds)

Type and Age of Pig	Disease/Condition	Timing	Sample products	Other management recommendations
Sows	Parvovirus, Erysipelas, Leptospirosis	Use as labeled; generally, give one booster 2-4 weeks before breeding	FarrowSure® Gold, FarrowSure® Gold Plus B*, Parvo Shield® L5E	<ul style="list-style-type: none"> Wash & deworm prior to farrowing (see Table 4 for a list of products and withdrawal times). Deworming should take place 14-21 days prior to the anticipated farrowing date Treat for mange
Gilts	Parvovirus, Erysipelas, Leptospirosis	Use as labeled; generally, give two vaccines approximately 3 weeks apart, timing the second dose to be given 2-4 weeks before breeding	FarrowSure® Gold, FarrowSure® Gold Plus B*, Parvo Shield® L5E	<ul style="list-style-type: none"> Clean & disinfect farrowing crates. Use an all in/all out system if possible Ensure adequate fiber in diet prior to farrowing Maintain females at good body condition score (BCS) If difficulty farrowing/low milk production, use oxytocin & Banamine® injections (both require a prescription from a veterinarian).
Boars	Parvovirus, Erysipelas, Leptospirosis	Vaccinate every 6 months. Initial vaccination should consist of 2 doses approximately 3 weeks apart with the second at 2-4 weeks before breeding.	FarrowSure® Gold, FarrowSure® Gold Plus B*, Parvo Shield® L5E	<ul style="list-style-type: none"> Deworm every 6 months (see Table 4 for list of products and withdrawal times); Trim tusks as needed; Treat for mange every 6 months.

*FarrowSure Gold® Plus B also protects against *Leptospira bratislava*, a common strain of Leptospirosis that is found in Hawai‘i

Table 2 – The Nursing Piglet Program

Type and Age of Pig	Disease/Condition	Timing	Sample products*	Other management recommendations
Nursing Piglet	<i>Mycoplasma hyopneumoniae</i> (enzootic pneumonia)	One or two doses (depending on label directions) with first dose at 1-4 weeks of age or older (as indicated on the label)	Respire-One®, Ingelvac MycoFLEX®, Myco Silencer® ONCE, Merck M+ PAC®	<ul style="list-style-type: none"> Clip “needle” teeth at birth, ensure adequate colostrum intake, avoid drafts, and provide heat lamp if necessary; Cross fostering can be helpful in large litters to ensure adequate nutrition but should be limited to the first 24 hours after farrowing; do not cross foster sick piglets; Inject 200 mg iron dextran IM in neck at 1-3 days of age; Castrate at 3-7 days of age. Wipe area with iodine & use sterile scalpel or side-cutting pliers.
	Circovirus (PCV2)		Ingelvac® CircoFLEX™, Circumvent® PCV, Fostera Gold PCV	

*Dual *Mycoplasma hyopneumoniae* and Circovirus vaccines are available: Circumvent® PCV-M, FlexCombo, Fostera Gold PCV-MH

Table 3 – The Grower/Finisher Program – Check with a Veterinarian or a Cooperative Extension Agent

Type and Age of Pig	Disease/condition	Timing	Sample products	Other management recommendations
Growers and Finishers	<i>Bordetella bronchiseptica</i> , Erysipelas, <i>Glasserella parasuis</i> (formerly <i>Haemophilus parasuis</i>), <i>Pasteurella multocida</i>	Use as labeled; generally, two vaccinations with first dose at 3-4 weeks of age; repeat 2-3 weeks later	Rhini Shield TX4 (no Erysipelas)	<ul style="list-style-type: none"> Deworm one week after weaning & repeat one month after first treatment (see Table 4 for list of products and withdrawal times); Treat for mange at 3 months of age; Do not mix batches. Do not re-mix finishers. Use an all in/all out system if possible; Do not overcrowd pens; solid partitions between pens. <p>*Note: Pigs become vulnerable to infections at about 16 weeks of age when antibodies obtained from the sow’s colostrum become less effective.</p>

Table 4 – Other Vaccines for Problems in Some Herds – Check with a Veterinarian or a Cooperative Extension Agent

Type and Age of Pig	Disease/ Condition	Timing	Sample products	Notes
Pregnant Sows and Gilts	Scours/diarrhea in nursing piglets <i>E. coli</i> , <i>Clostridium perfringens</i> , Rotavirus	Use as labeled; two vaccinations three weeks apart with second vaccine given 2 weeks prior to farrowing	Vaccines available alone or in combination Prosystem® RCE (includes all three) LitterGuard LT-C (includes <i>E. coli</i> & <i>C. perfringens</i>) Herd strain-specific vaccines can also be obtained through a veterinarian.	• Vaccinating sows and gilts will provide antibodies in the colostrum to prevent scours in piglets.
Piglets	Pneumonia, diarrhea & septicemia caused by <i>Salmonella choleraesuis</i>	Three weeks of age	Argus® SC/ST, Enterisol Salmonella T/C	
	PRRS	Consult a veterinarian or a Cooperative Extension agent		
	Swine influenza			

*A brief note on Modified Live Vaccines (MLV): All vaccines listed in tables 1-3 are considered inactivated, killed, or toxoid vaccines that do not contain live bacteria or infectious viruses. Some vaccines listed in table 4 are classified as modified live vaccines, which contain a weakened version of the virus you want to protect your herd against. These modified live vaccines stimulate a stronger immune response and are more effective, but they have a shorter shelf life and aren't appropriate for all ages or production stages. If you are interested in MLV for your herd, contact your veterinarian and the Hawai'i Department of Agriculture for a permit to import.

Table 5 – Swine Dewormers, Drugs for Mange and Lice, and Withdrawal Times

Worm problem*	Compound type	Product name	Route of administration	Withdrawal time
Roundworms (ascarids) & nodular worms	Fenbendazole	Safe-Guard®	In the feed	None
	Ivermectin and Doramectin	Dectomax®	Injection	24 days
		IVOMEC® Premix	In the feed	5 days
		IVOMEC®	Injection	18 days
	Levamisole	LevaMed™	Drinking water	3 days
		Tramisol®	Drinking water	3 days
Pyrantel	Banminth® Premix	In the Feed	1 day	
Other worm problems:				
Migrating worm larvae	Fenbendazole	Safe-Guard®	In the feed	None
	Ivermectins have been found to be effective in treating migrating worm larvae in humans; their effectiveness in treating migrating worm larvae in swine is unknown.			
Whipworms (<i>Trichuris</i>)	Fenbendazole	Safe-Guard®	In the feed	None
<i>Strongyloides</i>	Levamisole	Levasole®	Drinking water	3 days
		Tramisol®	Drinking water	3 days
Kidney worms (<i>Stephanurus edentatus</i>)	Fenbendazole	Safe-Guard®	In the feed	None
	Levamisole ** not a labeled use; need Rx	LevaMed™	Drinking water	3 days
		Tramisol®	Drinking water	3 days
		Ivermectin	IVOMEC® Premix	In the feed
External parasites:				
Mange mites (<i>Sarcoptes scabiei</i>) cause a rapidly spreading scabby dermatitis & will often affect the ears as well as the body; mange will increase stress & make pigs more susceptible to other diseases. Sucking lice (<i>Haematopinus suis</i>) cause itching and fine scabs.	Ivermectin and Doramectin	Dectomax®	Injection	24 days
		IVOMEC® Premix	In the feed	5 days
		IVOMEC®	Injection	18 days
	Permethrin	Atroban® 11% EC	Topical	5 days
		Atroban® 42.5% EC	Topical	5 days
		Permethrin 10%	Topical	5 days
		Prozap® Insectrin®	Topical	5 days
		GardStar® 40% EC	Topical	5 days
	Phosmet	Vet-Kem® Paramite® L.A.	Topical	1 day
	Lice only	Coumaphos	Y-Tex® Co-Ral® Livestock Dust	Topical
Permethrin		Horse Lice Duster™	Topical	5 days
		Screw Worm Aerosol	Topical	5 days

*Other options exist but require a Veterinary Feed Directive (VFD). Talk to a veterinarian to see if any of these options may be appropriate for you

Table 6 -- Recommended Needle Gauge and Length for Intramuscular and Subcutaneous Injections (Adapted from Pork Checkoff, 2022)

	Subcutaneous (SQ)		Intramuscular (IM)	
	Needle Gauge	Needle Length	Needle Gauge	Needle Length
Piglets	18 or 20	$\frac{3}{8}$ " or $\frac{1}{2}$ "	18 or 20	$\frac{3}{8}$ " or $\frac{1}{2}$ "
Growers	16 or 18	$\frac{1}{2}$ "	16 or 18	$\frac{1}{2}$ " - $\frac{3}{4}$ "
Finishers	16	$\frac{3}{4}$ "	16	1"
Breeding Herd	14 or 16	1"	14 or 16	1" or 1 $\frac{1}{2}$ "

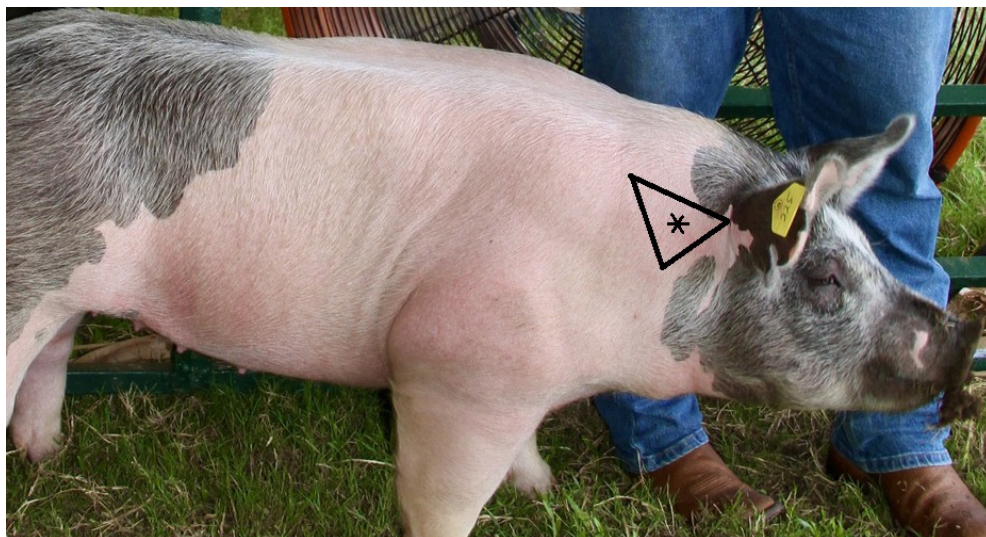


Figure 1. Intramuscular injections should be given in the neck. Do not give injections in the ham. The best injection site is behind and below the ear but in front of the shoulder blade. *Photo Credit: Becky Settlage*

- Use an appropriate needle gauge and length for the size of pig when vaccinating (Table 6).
- Inject medications, vaccinations, and de-wormers into the neck muscle (Figure 2).
- Never use a bent or broken needle when injecting animals. A bent needle can break off inside the animal, which poses a risk to human health. Adequate restraint is important for safety. If a needle breaks off inside the animal, ensure that the animal has an identification tag and that this information (needle location, animal ID) is recorded and provided to the buyer or slaughterhouse.
- Observe all withdrawal times for antibiotics, vaccines, and dewormers.

Calculating Withdrawal Times

Most vaccines and dewormers have a withdrawal time listed on the label. This is the time that the product stays in the animal's body after administration. During the withdrawal period, animals cannot be slaughtered and consumed. When administering any product to your animals, write down the following: 1) product name, 2) date

and time it was administered, 3) the withdrawal length (sometimes found on the label as "do not treat swine within ## days of slaughter"), and 4) which animals received the product. Writing this information on a physical or electronic calendar can help you keep track of information and make it easy to note when the animals are safe for selling and slaughter. If a product was administered over multiple hours or days, the last treatment time is the starting time for the withdrawal period.

Withdrawal times can be calculated either (1) manually or (2) using an online calculator.

Manual calculation: Find the withdrawal time of the product. Starting at the time the product was administered, count that many days from the administration date. If a pig is treated with a product that has a 5-day withdrawal period that was administered on January 1st at noon, the withdrawal time is up on January 6th at noon.

Online calculator: There are many free withdrawal time calculators available online. Before using one of these calculators, make sure you have all the important information listed

above. Some calculators have pre-filled information for some drugs; be sure to double-check this against the withdrawal time on the product's label since the times are occasionally updated. Enter the information into the calculator, and it will determine when the withdrawal time is complete.

Body Condition Scores

An important aspect of herd health is the herd's body condition (Figure 3). A quick way to evaluate the animals' body condition is to assign a body condition score of 1 to 5 by looking at the following points: the ribs, the back-bone, the hip bones (the points of the pelvis), and the tail head. As the amount of body fat increases on the animal, their score will increase. Animals with a BCS of one are emaciated, while animals with a BCS of 5 are overweight. The ideal BCS is 2.5 or 3 (Figure 4). Overconditioned sows (BCS 4 and higher) are more likely to have difficulty farrowing, are more susceptible to heat stress, and have a harder time getting pregnant. Underconditioned sows (BCS 2 or lower) are more likely to produce inadequate amounts of milk, are more susceptible to chilling, and have a harder time getting pregnant.

CALCULATING WITHDRAWAL TIMES

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 Ivomec® Premix fed at 12 pm	2	3	4	5	6 Withdrawal time is complete at 12 pm	7
8	9	10	11	12	13	14
15 Safe-Guard® fed at 12 pm Pigs can be sold immediately	16 Withdrawal time: none	17	18	19	20	21 Tramisol® added in water from 12 pm- 1 pm
22	23	24 Withdrawal time is complete at 1 pm	25 Withdrawal time: 72 hours (3 days)	26	27	28
29	30	31				

Figure 2. Sample withdrawal times calculations.

Cleaning and Disinfection

Cleaning - refers to the physical removal of organic debris (e.g., feces, mud, dried food waste, etc.). For disinfectants to be effective the surface or object to be disinfected must be clean; organic material reduces the effectiveness of disinfectants. Thorough washing will remove 95% of all microbes. Soap products are commonly used for cleaning, as they help penetrate and break up stubborn materials. Liquid dish detergent diluted in warm water is an example of a good cleaning agent. However, soap residues can inactivate some disinfectants. Don't forget to wash your hands.

Disinfection – refers to the use of a chemical or physical agent to kill vegetative forms (not spores) of bacteria, fungi, and viruses. Disinfectants will not sterilize a surface but will reduce pathogen numbers more dramatically than cleaners. Regardless of the product used, for adequate disinfecting to occur most manufacturers recommend a contact time of 10 - 20 minutes. For detailed information on disinfectant types and the pathogens they work on, visit The Center for Food Security and Public Health.

When choosing a disinfectant, there are several factors to consider.

- **Target pathogens:** Broad spectrum disinfectants work well in most situations, but some pathogens (e.g., rotaviruses) are more resistant to disinfection.
- **Shelf life:** Disinfectants vary in their storage requirements and stability. For example, diluted bleach will quickly lose its ability to disinfect surfaces if left in sunlight.
- **Contact time:** The time a disinfectant needs to work after being applied varies between disinfectant types. The minimum contact time will be listed on the product label.
- **Safety:** Most disinfectants can irritate human and animal eyes, skin, and respiratory tract. Some disinfectants should not be used in closed spaces with poor ventilation.
- **Application method:** the most common way to apply a disinfectant is by spraying, but for small scale-use, wiping or dipping might be easier.
- **Cost:** Cost should be calculated based on the solution that is applied to the farm. Concentrated disinfectants will cost more than diluted, ready-to-use disinfectants, but they may be cheaper on a per gallon of use basis.
- **Environment:** Some disinfectants are harmful to plant and aquatic life (e.g., phenolics), so care should be taken if there is a chance of run-off from your farm.

Disinfectants

Alcohols

- generally limited to use as a hand sanitizer;
- effective on bacteria and many viruses;

Household bleach

(generally used in a dilution of 1 part bleach to 32 parts water - about ½ cup per gallon of water)

- short contact time;
- effective on bacteria and all viruses;
- inexpensive;
- harsh on clothing and skin;
- corrosive to metal surfaces, especially at higher concentrations;
- dangerous when used in closed spaces due to the toxic fumes;
- do not mix with ammonia – can create highly toxic chlorine gas; be aware that some household dish-washing soaps and other cleaners contain ammonia; if soap is used for cleaning, be sure to rinse thoroughly before disinfecting with bleach;
- bleach solutions lose strength over time, so fresh solutions should be made up regularly;
- quickly inactivated by light and organic material (e.g., feces).

Oxidizing agents

(e.g., Potassium peroxymonosulfate-Virkon S/DuPont) – 1% strength is recommended for use around swine

- safe;
- effective on bacteria and viruses;
- damaging to some metals;
- effective for 1 week after mixing.

Chlorhexidine

- safe;
- effective on bacteria and some viruses;
- recommended contact time is about 5 minutes;
- not corrosive to metal surfaces.

Quaternary ammonium compounds

(e.g., Roccal-D/Pfizer)

- effective on most bacteria and viruses;
- can be used as a one-step cleaning and disinfection product - thus you do not need to clean the surface prior to disinfecting; thoroughly rinse after use since this product can be toxic;
- some residual effect.

Quaternary ammonium + glutaraldehyde mixture

(e.g., Synergize/Preserve International) – ½ oz per gallon water

- cleaner and disinfectant combination;
- effective on bacteria and viruses;
- non-irritating, non-corrosive;
- specifically formulated for use in animal housing facilities and equipment in the facilities (waterers, feeders, hauling equipment, loading equipment, farrowing

crates, nurseries, foot baths, etc.).

Inorganic iodine products

(e.g., povidone-iodine/many brands and manufacturers)

- effective on bacteria and most viruses;
- low toxicity;
- low cost;
- may penetrate some plastics.

Stabilized & Accelerated hydrogen peroxide

products (e.g., Intervention or Rescue/Virox)

- short contact time;
- non-irritating, non-corrosive;
- environmentally friendly (hydrogen peroxide breaks down into water and oxygen);
- effective on bacteria and viruses;
- specifically formulated for use in animal housing facilities and equipment (waterers, feeders, hauling equipment, loading equipment, farrowing crates, foot baths, etc.);
- will continue to work if there are small amounts of organic matter present.

Phenolic products

(many brands, manufacturers exist; e.g., 1-Stroke Environ/Steris)

- effective on bacteria and most viruses;
- cleans and disinfects with one application;
- can be toxic; thoroughly rinse after use; use with good ventilation;
- highly corrosive.

Ammonia

(many brands)

- irritating to the skin and respiratory tract.

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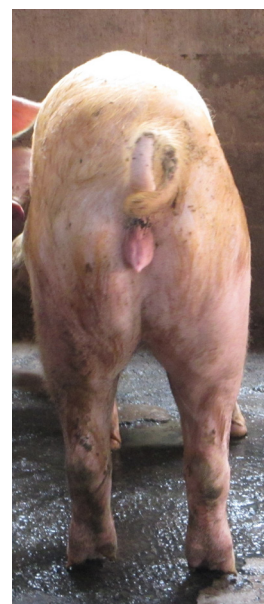
BCSSCORE	BY VISUAL		BY TOUCH WITH FLAT PALM	Approx. LEVEL of BACK FAT (inches / cm)
1	Emaciated		Backbone, shoulders, hips and ribs highly visible and defined. Careful when touching these sows as it may hurt.	<0.6 inches <1.5 cm
2	Thin		Backbone, shoulders, hips and ribs are noticeable and easily felt with no palm pressure.	0.6 – 0.7 1.5 – 1.8
2.5	Moderately thin		Backbone, shoulders, hips and ribs can be felt without palm pressure.	
3	Perfect		Backbone, shoulders, ribs and hips felt with gentle palm pressure.	0.7 – 0.8 1.8 – 2.0
3.5	Slightly overweight		Backbone, shoulders, ribs and hip bones can be felt with moderate palm pressure.	
4	Overweight		Backbone, shoulders, ribs and hips cannot be felt with moderate palm pressure.	0.8 – 0.9 2.0 – 2.3
5	Obese		Backbone, shoulders, ribs and hip bones cannot be felt with heavy palm pressure.	>0.9 / >2.3

Figure 3. How to body condition score pigs .

© The Commuter Pig Keeper, Michaela Giles

**Figure 4.** Pig A (top) is underconditioned and has a BCS of 2. She has narrow hips and the spine is slightly visible, but the hip bones are not prominent.

Pig B (middle) is an ideal condition with a BCS of 2.5 or 3.0. This boar is trim and muscular without excess fat.

Pig C (bottom) is overconditioned and has a BCS of 4 or 4.5. She is smooth all over with significant fat coverage and her hip bones are not easily felt.

Picture credit: Brittany Castle