ENHANCING LIVESTOCK WELFARE

Best Practices for Miniature Pigs and Cattle in Shelters

Sydney Brown | VME6934

LIVESTOCK AT A GLANCE

A Glimpse into a Diverse Group

MINIATURE PIGS

Understanding **Labels** and **Misconceptions**

NOT ALL miniature pigs are potbellied pigs, but **ALL** potbellied pigs are considered miniature.

Despite popular claims, there is **NO** such thing as a true "teacup" pig.

KEY FACTS

About Miniature Pigs

Lifespan
15–18 years

Notable Traits
Highly developed senses of smell and hearing

Weight Range
Typically 70–150 pounds

PROPER FEEDING

Life Stage Feeding Guidelines

- **Starter Rations:** For piglets during the weaning process
- **Grower Rations:** For weaned piglets up to approximately 7 weeks of age
- **Maintenance Rations:** For pigs 8 weeks and older

Basic Feeding Chart Ex.

Age Group	Feeding Recommendation
Young Piglet	½ cup per 15- 20 lbs daily
Adult Pig	1 cup per 50- 80 lbs daily

Essential Reminders

Carefully monitor calorie intake and **strictly** ration food portions

Divide daily food volume into several smaller meals

Offer hay to help **curb appetite** between meals

Ensure fresh, clean water is **always** available

Use low, sturdy bowls for food and water to prevent tipping

IDEAL HOUSING

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ISOLATION PROTOCOL

Remove organic matter and thoroughly disinfect toys, furnishings, and equipment between pigs

Minimize foot traffic and limit interactions during the isolation period

Isolate new pigs for a full 30 days before introducing them to others

SURGICAL PROCEDURES AND POPULATION MANAGEMENT

Neuter

- Typically performed between 8 and 12 weeks of age
- Helps reduce destructive behaviors
- Decreases strong bodily odor
- Prevents the development of testicular tumors

Spay

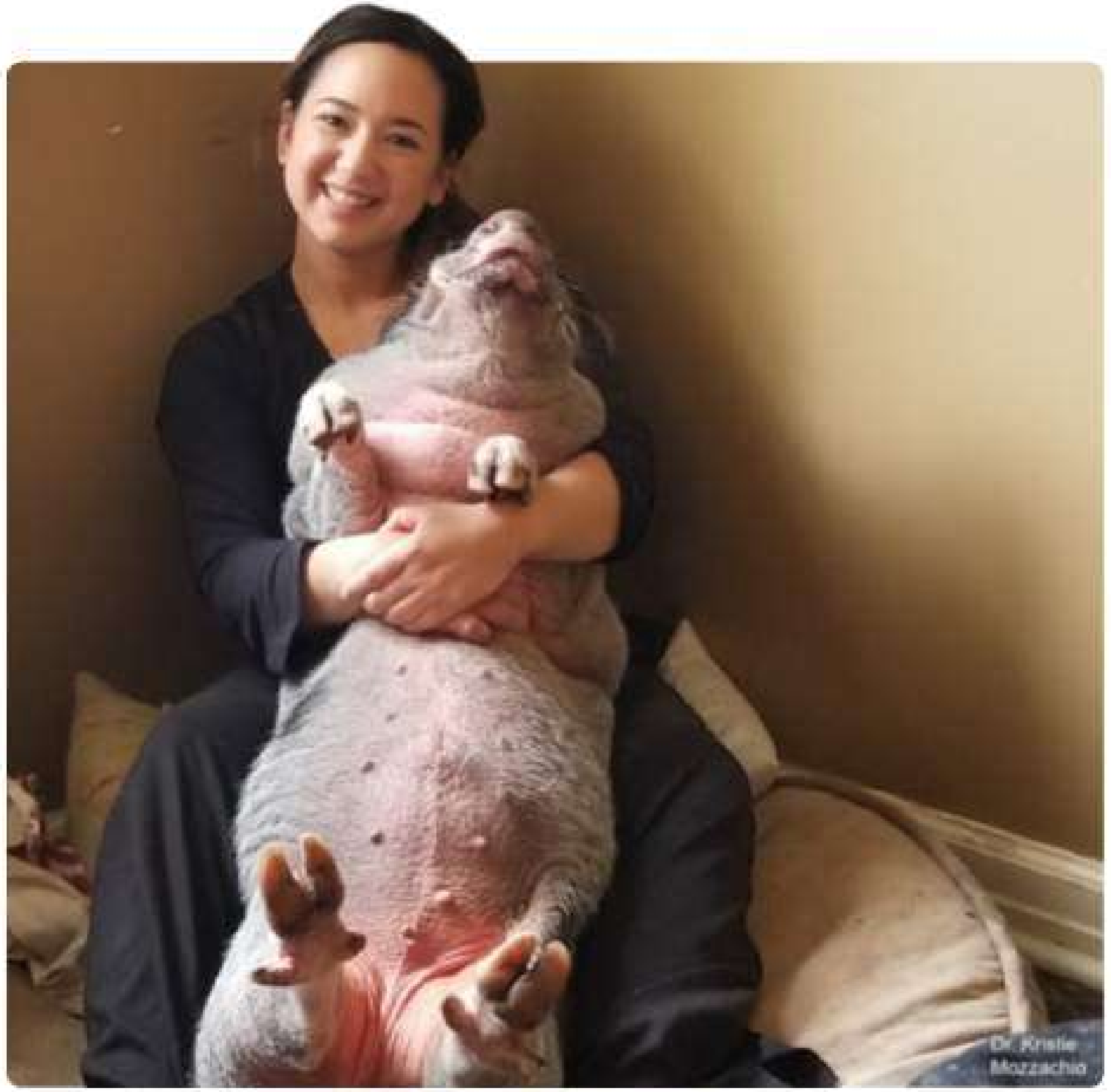
- Typically performed between 3 and 6 months of age
- Helps prevent urinary tract infections
- Reduces the risk of reproductive tumors

IDEAL HANDLING

(Mozzachio, "Restraint of Small to Medium-Sized Miniature Pig")

Small & Medium Pigs

Large Pigs



(Mozzachio, "Pig Flip")

The "Pig Flip"

PREVENTATIVE CARE

Ongoing Health Care

- Begin vaccinations at 8 weeks of age
- Perform annual fecal flotation testing to check for internal parasites
- Schedule tusk trimming as needed for males
- Maintain regular hoof trimming to prevent mobility issues

Recommended Vaccines

- Rabies Virus
- Erysipelas
- Leptospirosis
- Bordetella
- Parvovirus

Tusk Trimming Timeline

- **Intact Males:** Every 6 to 12 months
- **Neutered Males:** Every 1 to 5 years

MEDICAL CONCERNS

Obesity

Commonly caused by free-feeding practices; careful rationing is essential

(Pig Advocates League)

Dippity Pig Syndrome

A condition of unknown origin resulting in painful, temporary skin lesions

(Pig Advocates League, "Erysipelas")

Erysipelas

A zoonotic disease present in 30–50% of healthy pigs; caused by bacteria spread through bodily fluids

ENRICHMENT & BEHAVIOR

Pigs thrive when given opportunities to root and engage in natural behaviors

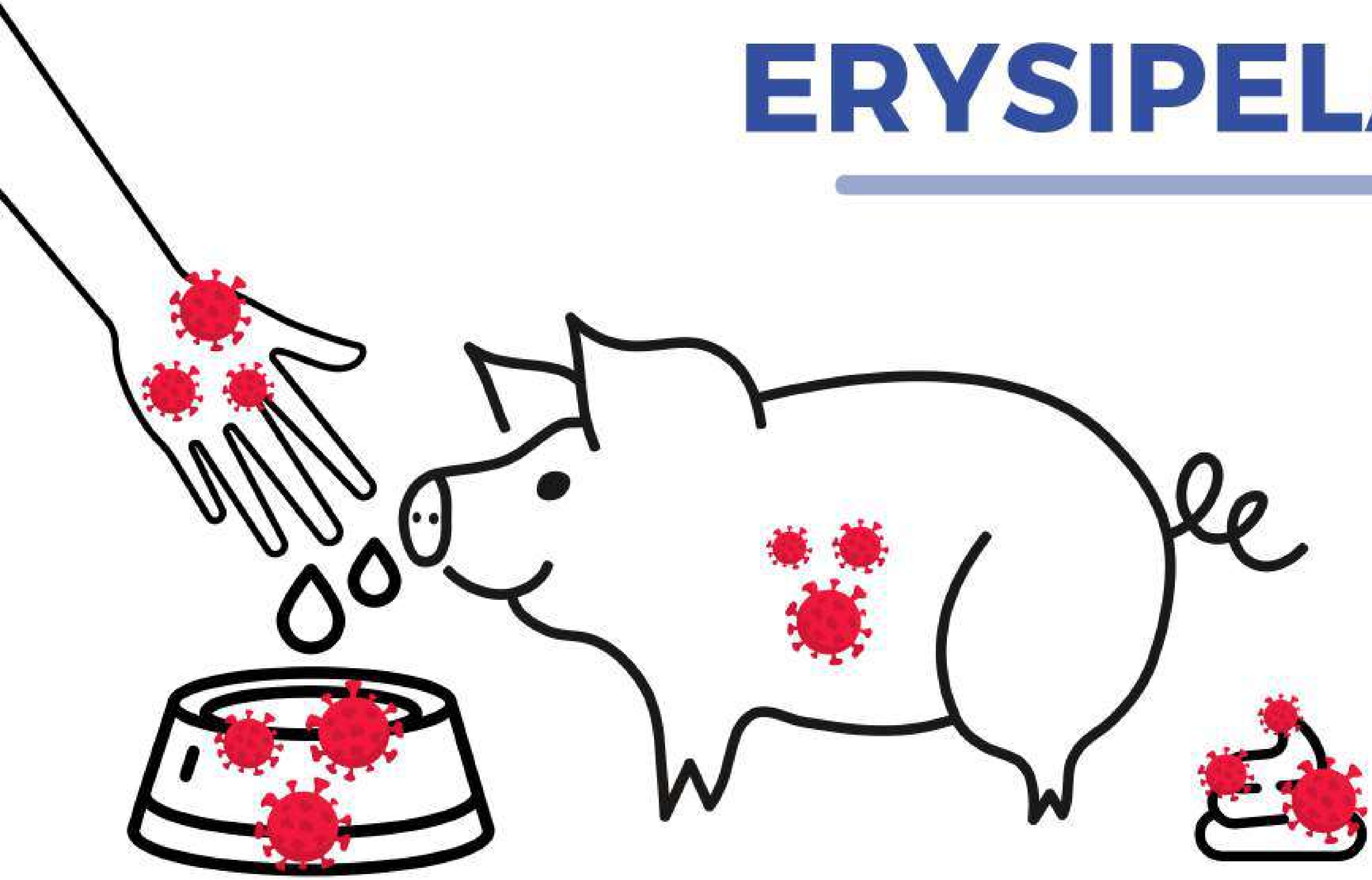
Budget-friendly enrichment options are available with a little creativity and planning

Pigs are social animals, but only sterilized pigs that have completed their isolation period should participate in supervised group interactions

(Den)

(Mini Pig Info)

ERYSIPELAS



Transmission

(Pig Advocates League, “Erysipelas”)

Skin Lesions in Pigs

(Rehmus)

Skin Lesions in Humans

EUTHANASIA CONSIDERATIONS

- Methods such as gunshot and penetrating captive bolt (PCB) may not be **feasible** or **appropriate** in a shelter setting
- Intravenous (IV) administration of barbiturates **closely mirrors standard euthanasia practices** used in companion animals and does not require the additional equipment or specialized training associated with gunshot or PCB methods
- Oral sedatives, such as trazodone and gabapentin, can be administered the night before and again two hours prior to handling to **reduce patient stress** and **facilitate safe handling** by staff

KEY FACTS

About Beef Cattle

Lifespan

10–15 years

Notable Traits

Highly social animals

Weight

Bulls can weigh over 2,000 lbs

PROPER FEEDING

Adult Cattle

- Feed approximately 3% of body weight in dry matter daily
- Use feeders to minimize hay waste
- Provide mineral blocks only with veterinary (DVM) approval

Calves

- Calf Care Guidelines
- Non-nursed calves less than one day old must receive a colostrum replacement
- Calves that have nursed but are under four weeks old require supplemental bottle feeding

PROPER CATTLE HOUSING

Pasture Housing

- Provide at least one acre of grazing space per cow, if possible
- Ensure constant access to water and feeders
- Indoor Enclosures

Indoor Enclosures

- Each cow should have a minimum of 30–40 square feet of space
- Proper ventilation and continuous access to water are essential
- Bedding options may include wood chips for comfort and cleanliness

ISOLATION PROTOCOL

Remove organic matter and thoroughly disinfect toys, furnishings, and equipment between cattle

Minimize foot traffic and limit interactions during the isolation period

Isolate new cattle for a full 30 days before introducing them to others

SURGICAL PROCEDURES AND POPULATION MANAGEMENT

Neuter

- Surgical Methods & Non-Surgical Methods

Spay

- Flank Spay & Vaginal Approach

PROPER HANDLING

- Speak **softly** and **calmly** when interacting
- Minimize unnecessary noise and sudden movements
- Avoid approaching from the animal's blind spots
- Be aware of the **"flight zone"** and **"point of balance"** when moving cattle
- Maintain close physical contact when possible and avoid standing near the hind legs

Figure 6-2. The flight zone.

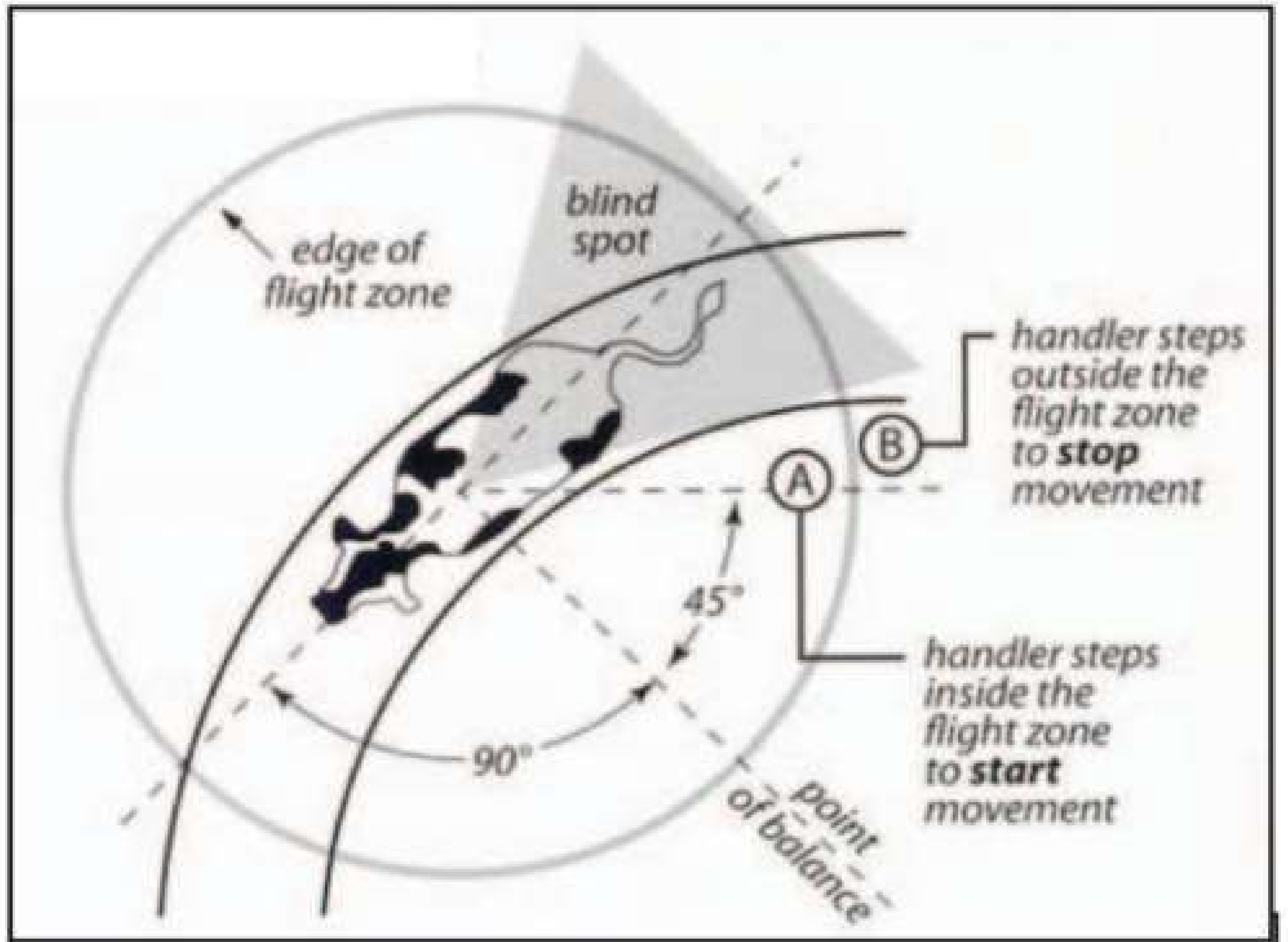


Figure 6-3. This movement pattern can be used to induce an animal to move into a squeeze chute. The handler walks inside the flight zone in the opposite direction of desired movement. The animal moves forward when the handler crosses the point of balance.

(The Ohio State University)

PREVENTATIVE CARE

Core Vaccines

Infectious Bovine Rhinotracheitis (IBR)

A contagious viral disease causing upper respiratory inflammation

Parainfluenza-3 (PI3)

A viral respiratory infection; vaccine is administered as part of a combination vaccine

Bovine Viral Diarrhea (BVD

Leads to immunosuppression and increases the risk of developing bovine respiratory disease complex

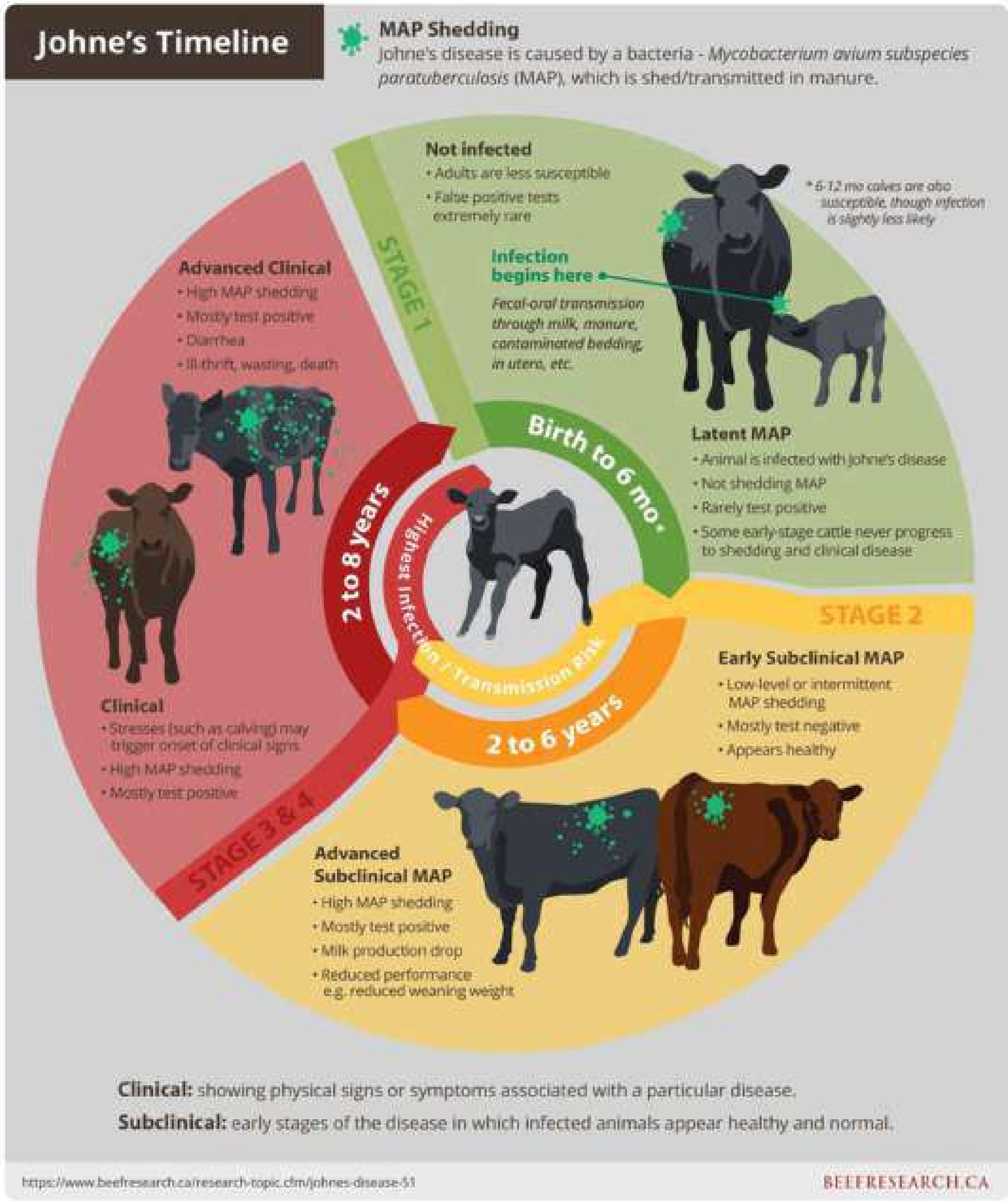
Bovine Respiratory Syncytial Virus (BRSV)

Causes respiratory distress; vaccine is administered as part of a combination vaccine

MEDICAL CONCERNS

Johne's Disease

- A contagious and fatal disease affecting cattle
- Transmitted through ingestion of contaminated colostrum or feces
- Diagnosed using ELISA testing
- No known cure
- Disease progression can be rapid



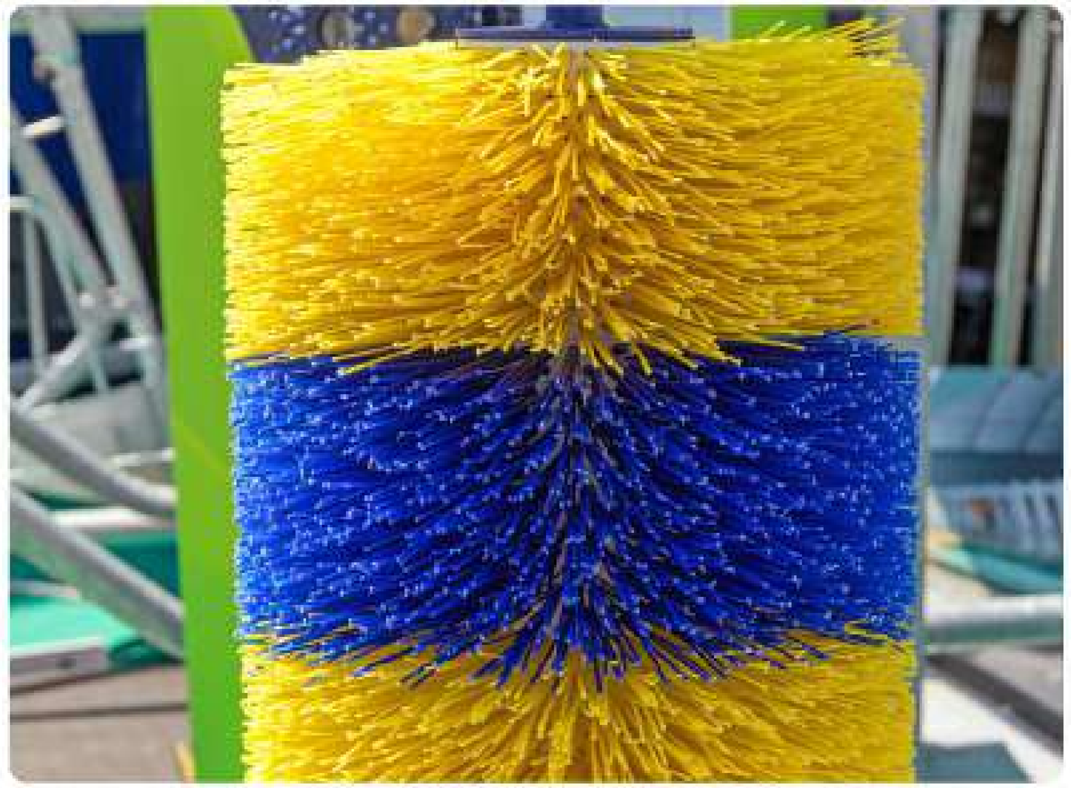
(Beef Cattle Research Council)

ENRICHMENT & BEHAVIOR

Cows are highly social animals and should be housed in herds whenever possible

Provide access to grooming stations to encourage natural behaviors

Introduce novel treats and tactile enrichment activities to stimulate curiosity and engagement



ZOONOTIC DISEASES

- Cows can transmit **Salmonella** and **E. coli** to humans
- **Cryptosporidiosis** can also be spread, causing severe diarrhea in both humans and cattle; transmission occurs through ingestion of contaminated feces, soil, or water
- While supportive treatments are available, proper handwashing and hygiene practices are the most effective prevention methods for shelter staff

EUTHANASIA CONSIDERATIONS

- Humane euthanasia is often best achieved through intravenous (IV) administration of a barbiturate
- Shelter resources and staff training may vary, but it is critical to prioritize staff safety and comfort when determining the appropriate euthanasia method

Table 1: Recommended methods for practical eithanasia

Method	Risk to Human Safety	Skill Required	Potential Public Perception Issues	Adjunctive Method Required
Gunshot	high	moderate*	moderate:	no
Penetrating captive bolt	moderate	moderate*	some blood and motion	yes
Barbiturate overdose	low	moderate*	perceived well	no
*Operator Training Required				

(American Association of Bovine Practitioners)

CAPACITY FOR CARE

- Before accepting livestock, assess whether your shelter can meet the **Five Freedoms** for nontraditional species
- Livestock require **specialized veterinary care**, which may not be accessible at all shelters
- Enrichment needs are species-specific; for example, miniature pigs require **mental stimulation** through activities like puzzles and rooting, which differ from traditional companion animals
- Consider whether there is **community interest** and **adoption potential** for livestock such as miniature pigs or cattle
- Cattle require **extensive grazing space** (acres per animal) and **sturdy shelter** to protect them from environmental conditions

(Mozzachio, "Extracted Tusk, Placed on the Face of a Miniature Pig for Perspective")

LIVESTOCK STANDARD OPERATING PROCEDURE

SOPs should clearly outline facility expectations for staff performing livestock-related tasks

SOPs should be developed for all routine procedures involving livestock

Examples include protocols for administering oral sedation to pigs before veterinary exams or guidelines for setting up a cow's primary enclosure

LIVESTOCK STANDARD OPERATING PROCEDURE

EX.

Standard Operating Procedure for Miniature Pig Enclosure Set-Up

Identification Number

P-01

Effective Date

05/30/2025

Purpose

This document is designed to outline the process Critter Adoption & Rescue Effort Inc. staff and volunteers are expected to follow when arranging a primary enclosure for a miniature pig.

Revision History

- 04/28/2025. Edited.
- 04/01/2025. Created.

Persons Affected

- Kennel Attendants

Policy

Critter Adoption & Rescue Effort, Inc. (C.A.R.E) strives to provide high quality housing conditions to ensure all animals can exhibit natural behaviors during their time in the faculty. To ensure that the humane housing is done consistently, accurately, and efficiently, C.A.R.E follows the ASV Guidelines for Standards of Care in Animal Shelters. Miniature pigs within the facility will be treated with compassion and dignity throughout their stay, from intake to adoption.

Definitions

- Primary Enclosure: An indoor enclosure at least 6 sq ft in size that shields the pig form outside elements. The floor is covered in bedding or hay and water is always available. The temperature is maintained between 60 to 775 degrees Fahrenheit
- Outdoor Enclosure: A pen no smaller than 8 by 15 feet in size with a shaded area for sun protection. The perimeter is enclosed with chain link fencing and mesh fencing 1 foot underground to prevent burrowing. Miniature pigs must be allowed in their outdoor enclosure for several hours a day.
- Rooting: A natural behavior where pigs use their snouts to sift through dirt to locate food and cool off.

Responsibilities

- *Kennel Attendants*- Prior to a new pig being admitted into the facility, both the primary and outdoor enclosure must be prepared. This includes ensuring that sufficient hay and bedding is provided, as well as enrichment toys, and food and water bowls.

Procedures

- Inspect the enclosures for any organic matter, such as feces.
- Using gloves, paper towels, and a trash bag collect the waste and dispose of it in the outdoor trash bin.
- Collect the REScue power washer and apply solution to the walls and floor of the primary enclosure.
- Allow REScue to sit for 5 minutes.
- Rinse rescue off with power washer
- Collect two bales of hay from the garage bay and disperse them across the ground of the outdoor enclosure.
- Collect a clean kiddie pool from the garage bay and place in the corner of the outdoor enclosure.
- Using the outdoor hallway hose, fill the kiddie pool halfway with water.
- Turn off the hose before recoiling back to the wall.
- Go the garage bay and collect one of the clean large yoga balls and place in the outdoor pen.
- Return to the indoor enclosure and ensure walls and floor are dry.
- Collect a clean large bed and 3 blankets from the laundry room and place inside the primary enclosure.
- Return to the garage bay and collect an additional clean kiddie pool and a bag of plastic balls from the box labeled "clean"
- Place the kiddie pool in the enclosure
- Empty the bag of plastic balls into the enclosure
- Obtain a large and low lipped water bowl from the box in the dish room labeled "pig"
- Place water bowl in the primary enclosure
- Fill water bowl with water from the hallway hose.
- Flip the kennel card to "Ready"

LIVESTOCK TRANSPORTATION

- Ensure proper ventilation is available in the transport vehicle
- Confirm that the facility vehicle can support the anticipated load weight and has compatible electric connections
- Place clear identifiers on all transported animals
- Ensure the vehicle allows animals to move naturally and comfortably during transport
- Consult the facility veterinarian (DVM) regarding the use of oral sedatives for pigs to minimize stress

(Farm Compare)

THANK YOU

ENHANCING LIVESTOCK WELFARE

Best Practices for Miniature Pigs and Cattle in Shelters

Sydney Brown | VME6934

Final Project VME6934 Outline

Good evening, everyone; it is a pleasure to be here with you all after an exciting semester. My name is Sydney, and today, I will be speaking about sheltering livestock species. First, I would like to clarify what livestock species I will speak about, including miniature pigs and cattle. You will notice the absence of horses in this presentation, as I felt the content related to this species alone warranted its own presentation. The two species we will focus on this evening share similarities through their dual associations by providing goods such as meat and companionship. While horses can and have been used for their meat, in the United States, it has not been found historically socially acceptable, further creating a divide between them and the groups highlighted tonight. I would also like to point out that while goats and sheep are part of the livestock group, we will not discuss them directly this evening in the interest of time.

With that in mind, I would like to start with Miniature Pigs and work our way through the livestock groups.

The United States first became acquainted with Miniature Pigs in the 1980s (Mozzachio and Pollock). While this label was first used to describe Vietnamese potbellied pigs, "Miniature" now describes approximately 14 small breeds (Mozzachio and Pollock). Under this umbrella term, you will find breeds that include "potbellied" in their namesake. While the terms miniature and potbellied are used interchangeably in popular culture, it is important to know the distinction as potbellied pigs are a type of miniature pig breed, and not all miniature pigs are considered potbellied. On this note, it is also important to clarify that marketing terms such as "micro mini" and "teacup" do not represent recognized breeds and are false advertising, contributing to these animals' presence in our shelters.

On average, miniature pigs live between 15 and 18 years and weigh 70-150 lbs (Mozzachio and Pollock). As soon as they are 6 weeks old, piglets begin to wean from their mother, and they continue to grow until they are 4 years old (Mozzachio and Pollock). Pigs are known to have poor eyesight but compensate for this with an elevated sense of smell and hearing (Mozzachio and Pollock).

When assessing the basic husbandry needs of our miniature pigs, let us begin with their diets. While wild pigs are opportunistic omnivores, domesticated miniature pigs require formulated feed to satisfy their nutrition needs. When deciding what type of feed to utilize for a miniature pig in your shelter, you can start by assessing the animal's age. Pig feed is grouped into age categories that consist of a starter ration for piglets being weaned, a grower ration, which can be used until the pig reaches adolescence, and maintenance rations, which are used once the animals reach 8 weeks old (Mozzachio and Pollock). As you may have guessed, Pigs are extremely food-motivated, which requires shelter staff to be mindful of their food intake to prevent obesity. A general rule of thumb for calorie intake is shown here. To further prevent pigs in your care from becoming overweight, you can offer them grass hay, which is full of fiber and can help curb feelings of hunger (Mozzachio and Pollock). Unlike food, which must be closely rationed and offered on a strict feeding schedule, water should always be available to the pig. To encourage drinking, you may offer your pig room temperature water, as this also may prevent the pig from choking on their pellets (Mozzachio and Pollock). Both food and water bowls should be low to the ground to accommodate their low stature while being heavy enough that they cannot be tipped over (Mozzachio and Pollock).

When housing a miniature pig in your facility, considerations must be made for its enclosure. These are social and intelligent animals that require secure and stimulating environments. Miniature pigs must spend at least several hours outdoors daily to facilitate natural behaviors such as rooting (Mozzachio and Pollock). An outdoor pen should be no smaller than eight by 15 feet in size with a shaded area to protect the pig from sun damage (Mozzachio and Pollock). The perimeter of the enclosure requires fencing, such as hog panels or chain link fencing, with the inclusion of mesh fencing that is 1 foot underground to contain pigs who may attempt to dig underneath the fence (Mozzachio and Pollock). Mixed media should be available to the pigs in this enclosure to meet their needs, such as concrete in select areas to aid in wearing down their hooves (Mozzachio and Pollock). In addition to an outdoor area, miniature pigs require an insulated house for sleeping and nesting behaviors. This enclosure should be at least six sq ft in size and be stocked with bedding material (Mozzachio and Pollock). Fleece blankets, straw, or aspen wood shavings are all appropriate materials that can be layered deep enough so that pigs may bury themselves comfortably (Mozzachio and Pollock). To maintain their ideal environmental temperature of 60-75 degrees Fahrenheit, fans or space heaters, out of reach of the pig, can be used (Mozzachio and Pollock). A child's wading pool can be included in their outdoor pen to encourage water intake and allow pigs to cool themselves off in warmer weather.

Biosecurity is important when a new pig is brought into your shelter.
The USDA recommends quarantining new pigs for 30 days to prevent the spread of zoonotic diseases to other animals within the facility (United States Department of Agriculture). During either intake quarantine or an illness isolation period, unnecessary interactions should be minimized, and materials for a footbath outside the enclosure should be provided. As with any enclosure in the shelter, it is important to promptly remove any fecal matter and disinfect any furnishing used in the pen between animals. Pig pens should be physically separated to prevent pigs from physically interacting with each other while in isolation.

Similarly to cats and dogs in a shelter setting, pigs are good candidates for surgical sterilization. With female pigs going into heat every 3 weeks and with a litter size reaching as much as 15 piglets, sterilization is vital to prevent pig overpopulation (Mozzachio and Pollock). In addition to preventing unwanted litter, sterilization has many other benefits, including reducing odor and destructive behaviors in male pigs and preventing urinary infections and tumors in female pigs (Mozzachio and Pollock). Castrations are typically performed between 8 to 12 weeks but have been reported as early as 1 week (Mozzachio and Pollock). Ovariohysterectomies typically occur between 3 to 6 months but have been conducted as early as 6 weeks (Mozzachio and Pollock). Surgical procedures in pigs in a shelter setting will likely be limited to sterilization surgeries. Intubation for surgical procedures is difficult due to the anatomy of the larynx and mouth. Using a long laryngoscope blade and stylet, it is best to intubate a pig in sternal recumbency for optimum efficacy (Mozzachio and Pollock). Surgical procedures that may arise include the removal of uterine tumors, which are typically found in solder intact female patients (Mozzachio and Pollock).

Pigs are notoriously difficult to handle and are not shy about verbally expressing their dissatisfaction. It is important to remember that being handled or restrained is not naturally comforting as a prey species. Hearing protection is recommended for staff and volunteers' safety, as squealing can be painful in close proximity. Handling should be minimized, and pharmaceutical intervention can alleviate stress for both staff and the pig. Pairing oral gabapentin and oral trazodone together before a scheduled procedure or hands-on experience is beneficial and should be given the night before an event and again two hours prior (Mozzachio and Pollock). If your shelter has a behaviorist who is comfortable harness training and crate training a miniature pig, this can be beneficial in the long term despite being an involved process. This tactic can assist with desensitizing pigs to medical handling as examinations can be conducted through open parts of a carrier, and harness walking is less stressful than being picked up and relocated.

When your shelter's veterinary team is assessing a pig, it is best to keep it on the ground and with non-slip material, such as a yoga mat (Mozzachio and Pollock). Small and medium-sized pigs can be restrained by putting one hand under the rear and the other in front of the forelimbs and under the neck (Mozzachio and Pollock).

Large pigs can be handled using narrow chutes or moved using sorting panels (Mozzachio and Pollock). This minimizes direct contact and allows veterinary staff to move the pig as needed for medical treatments.

Finally, the pig flip restraint method requires a staff member to be comfortable and trained to hold the pig in their lap with its stomach exposed (Mozzachio and Pollock). This position is ideal for hoof trimming and provides excellent venipuncture access.

While oral sedation was previously mentioned, it is important to note that both deep sedation and light general anesthesia are utilized often when diagnostic and therapeutic procedures are required on especially anxious pigs.

Miniature pigs require routine preventive treatments just as traditional species do. As previously discussed, handling these patients is difficult for the pig and shelter staff, so it is best to fast pigs for at least 6 hours before their physical examination if sedation becomes necessary (Mozzachio and Pollock). Discussing with the shelter veterinarian about oral sedation, such as gabapentin and trazodone, is also ideal for reducing anxiety for the patient. Once the veterinarian has completed the physical examination, vaccines can be administered. Vaccinations may be first administered to pigs between 8 and 12 weeks old (Mozzachio and Pollock). While regional impacts may change your vaccine protocol, the following are suggested for all miniature pigs.

A fecal flotation should be performed during annual wellness examinations to ensure the absence of gastrointestinal parasites. These veterinary examinations also allow veterinary shelter staff to perform a tusk trim to prevent dental abscesses and associated pain. This procedure is done under general anesthesia, and the tusks are trimmed using an obstetric saw with a Dremel to smooth out the edges (Mozzachio and Pollock). Shelters should be aware that scheduling tusk trims should follow this timeline

After one year of age, pigs typically require a hoof trim once a year. Rough surfaces can help wear down hooves, impacting the frequency of trims. Additional factors such as age, hoof deformities, and arthritis also affect how often trims must occur (Mozzachio and Pollock).

Besides preventive treatments, shelters must also be aware of medical conditions commonly seen in miniature pigs. This includes obesity, which is the result of free feeding paired with their insatiable appetite. Musculoskeletal concerns include Erysipelas *(air uh sip o luhs)* and osteoarthritis. The former being spread through soil bacteria and resolved with penicillin with the latter being managed through routine hoof trimming, anti-inflammatories, and pain medications (Mozzachio and Pollock). Dippity Pig is a disorder with an unknown cause but results in acute presentation of lumbar pain. This extremely painful condition also results in the appearance of irritating lesions on the skin. It has been noted that Dippity Pig occurs after a stressful event and it is often thought that the stress of a veterinary exam may only exacerbate feelings of stress (Mozzachio and Pollock). Luckily, this condition resolves on its own within 2 days. During a flare-up, shelter staff should ensure the pig's house is warm and quiet to facilitate a non-stressful environment (Mozzachio and Pollock).

Miniature pigs thrive in environments where they can participate in natural behaviors. This includes rooting and grazing, which can be facilitated by hiding food in grass or hay (Mozzachio and Pollock). If your shelter has limited space, a slow feeder used for large dogs can also satisfy this desire. Feeding puzzles can also be crafted in-house to meet financial restraints. Pigs are social animals and typically do well in groups. Your shelter can consider introducing sterilized pigs that have passed through intake quarantine to help satisfy their social needs. However, monitoring pigs for aggressive behaviors is important, as territorial disagreements can occur. Shelter staff should never leave two unacquainted pigs alone unsupervised.

Miniature pigs do possess zoonotic potential that poses a danger to public health. As mentioned previously, one of the primary concerns is Swine Erysipelas *(air uh sip o luhs),* which is considered to be present in 30-50% of healthy pigs (Wang and Riley). The bacteria responsible for the disease is present in an infected pig's feces, urine, saliva, and nasal secretions, which can further contaminate surrounding bedding, soil, food, and water (Wang and Riley). Individuals who work closely with pigs, such as shelter staff, are at the greatest risk of infection due to their close proximity to the bacteria (Wang and Riley). Clinical symptoms are similar between pigs and humans, as acute presentation manifests in localized lesions on the skin. These lesions are often painful and itchy but often resolve on their own without medical intervention (Wang and Riley). Chronic onset symptoms include arthritis, which results in discomfort for both species. In the event of recurring symptoms, both humans and pigs are often given antibiotics (Wang and Riley). Vaccinating pigs for Erysipelas *(air uh sip o luhs)* helps prevent the spread of the disease to other pigs in your facility and your staff. Staff members routinely interacting with pigs should maintain proper handwashing techniques and routinely disinfect equipment involved in pig husbandry.

Guidelines for the euthanasia of pigs are not as straightforward as with traditional species, such as dogs and cats. Pigs exist in a gray area between product and companion, with the former being more common. This results in available literature and methods for farmers that may not seem appropriate in a shelter setting. Acceptable methods from the AVMA for adult pigs over 70 lbs do include physical methods, such as a gunshot to the head or PCB (Leary and Johnson). However, limitations within the shelter, such as staff training, improper equipment, and staff comfort, can make this method impractical. In contrast, the administration of barbiturates via IV catheter may be a more realistic option as pigs can be given oral sedatives prior to the procedure, making handling easier. IV access is available in both the cephalic and saphenous veins, making this procedure more closely mimic euthanasia methods on dogs and cats. This method is also acceptable for pigs under 70 lbs, including juvenile or suckling pigs (Leary and Johnson. As with any euthanasia method that utilizes barbiturates, the remains must be disposed of properly, ideally via cremation, to prevent inflicting harm on native scavengers who may attempt to eat contaminated remains.

Now, I want to redirect our discussion toward cattle in a shelter setting. While some topics, such as transportation and SOPs, are similar, I want to highlight the unique aspects of sheltering cattle first.

Cattle include both cows, steers, and bulls within the domesticated bovine group. These ruminants are often seen in agricultural facilities as different species have been bred to fulfill dairy and beef needs. As a result of this deviation, husbandry practices may vary between breeds and, again, on life stage and sex. However, because beef cattle are far more prominent in the United States than dairy cattle, we will focus on their needs in a shelter setting (Britannica). Common breeds include Angus variations and the Simmental.

Literature pertaining to cattle nutrition is often centered around maximizing products such as meat and dairy. As grazers, cows can obtain their nutrients from vegetation on the ground. However, this may need to be supplemented with hay during cold seasons or in areas with sparse plant life. Companion cows, such as those likely surrendered to an animal shelter, should eat about 3% of their body weight in dry matter daily (Hess, “Daily Diet, Treats, & Supplements for Cows”). This refers to the amount of plant material consumed once the moisture has been eliminated (Hess, “Daily Diet, Treats, & Supplements for Cows”). To prevent wasting excess hay, it is advised to use a feeder, especially if your facility has multiple cows on site. It is also important to be mindful of where your facility stores its hay, as it should not be exposed to excess sunlight or moisture or placed on the ground (Hess, “Daily Diet, Treats, & Supplements for Cows”). Offering cattle mineral blocks, such as selenium, may also be beneficial if your shelter is located in deficient areas (Hess, “Daily Diet, Treats, & Supplements for Cows”).

Cattle should always have access to water. Non-nursing cows, for example, can drink up to 2 gallons per 100 lbs of body weight, so ample water stations are necessary in your pasture (Hess, “Daily Diet, Treats, & Supplements for Cows”).

Calves have their own dietary considerations, especially if they did not nurse from their mother after birth. While a rare event, a colostrum replacement should be given to surrender cows that are less than a day old (Hess, “Care Recommendations for Calves”). Calves that do not receive colostrum soon after birth struggle to survive. Calves that did nurse from their mother after birth but are surrendered alone to your facility must be bottle-fed for at least four weeks after birth (Hess, “Care Recommendations for Calves”). Store-bought whole cow's milk can be warmed up and is less likely to cause GI upset in comparison to a milk replacer. During this time, your staff should be feeding the calf between 10 and 12% of its body weight in milk (Hess, “Care Recommendations for Calves”).

To best meet the five freedoms for cows in a shelter setting, they will need both an indoor and outdoor living space. When assessing indoor space, having at least 30 to 40 sq ft of space per cow is ideal (Hess, “Creating a Good Home for Cows”). This amount of room allows for natural behaviors and paired with proper ventilation, can create a safe structure that can be used to protect cattle in adverse weather conditions. Laying down bedding material, such as wood chips, can provide a comfortable place for cattle to rest, especially those with chronic joint pain (Hess, “Creating a Good Home for Cows”). Considerations for cold and warm weather should be taken, such as providing extra hay and bedding for the former and cold water indoors for the latter.

1 acre of pasture space per cow should be allocated to allow grazing behaviors (Hess, “Creating a Good Home for Cows”). To contain cattle, a sturdy fence should run the length of the pasture.

Once your shelter has welcomed a cow to the facility, quarantining them from the general population is important to protect the rest of the residents. Establishing this area is not only initially beneficial but can be used for cows showing signs of illness in the general population. Prior to joining a larger herd within the facility, new cows should be quarantined for 30 days (Hess, “Biosecurity”). This time will allow staff to monitor newly admitted cattle for signs of illness. If cattle who have been established in the communal pasture show signs of illness, they should be moved to an isolation pen to protect the rest of the herd. The period of isolation may be an additional 30 days, but this may depend on alignment and advice from your facility's DVM (Hess, “Biosecurity”). To further protect the rest of the shelter's animals and staff, disinfecting any fomites, such as equipment and tools, is important. Additionally, staff should limit who has access to sick cattle and their enclosures. As always, maintaining proper hand-cleaning protocols is necessary.

Due to their large size, bovine surgery can be challenging. Standing surgery is common and is done in castrations and GI corrective surgeries (Veterian Key).

Surgical sterilization is an effective method of managing the shelter population if your facilities anticipate letting males and females in the same pasture. Juvenile males are castrated young to reduce discomfort. Once secured in a chute, the castration can either be performed surgically via the removal of the testicles or nonsurgically through banding (McCarville et al.). After either method is performed, the patient can be given oral NSAID to reduce pain further. Female cows can be spayed through two methods, the Flank spay and the vaginal approach (Veterian Key).

To best handle cattle, it is important to understand how they see the world. Cattle have wide-angle vision, and as prey animals, seeing movement in their peripheral vision can induce fear. Additionally, loud sounds, often associated with transport vehicles and inexperienced staff members, can be startling. When interacting with cattle, speaking softly and using solid visual blocks to manipulate cattle into a pen is best. It is also important for staff to understand a cow's "flight zone" or personal space (The Ohio State University). This imaginary boundary encircles the cow and can help us visualize where their blind spots are. The point of balance is another imaginary landmark at the shoulders of the cow, which staff can use to visualize where to safely approach the cow (The Ohio State University). For example, if you need the cow to move forward, staff can move behind the point of balance (The Ohio State University). This understanding of their natural response can help staff members move cattle without stress. With this in mind, it is essential to remember that cows have a powerful kick. To prevent this, remain very close to the animal's side and out of range of its hind legs.

Cattle have routine wellness requirements as well as species-specific health conditions. While your shelter should consult with its veterinarian about vaccination recommendations, there is a set of core vaccines to consider (Hess, "Creating a Vaccination Program for Cow Residents at Your Animal Sanctuary"). Cattle are prone to a myriad of health conditions unique to their species. For example, Johne's disease, a contagious and fatal disease infecting cattle through ingestion of feces or colostrum, currently has no cure but can be diagnosed through ELISA testing (Hess, "Advanced Topics in Resident Health: Johne's Disease (*Paratuberculosis*)"). While the disease can be dormant for a year, it can also progress within just 3 weeks, causing death (Hess, "Advanced Topics in Resident Health: Johne's Disease (*Paratuberculosis*)").

As social animals, cattle should have access to other cows after completing intake quarantine. To prevent unwanted calves, only sterilized individuals should be allowed in communal pastures. Including grooming stations and providing changing vegetable treats can make a pasture more dynamic for cattle (Hess, "Creating a Good Home for Cows"). Providing unique tactile experiences, such as piles of novel dirt or sand, may also be a fun and exciting way to change their routine (Hess, "Creating a Good Home for Cows").

Cattle can transmit zoonotic diseases to humans, which would cause concern for public health. Salmonella and E. coli are familiar diseases; however, cattle are also hosts to the parasite responsible for cryptosporidiosis *(crip to spor id i osis)*. Both cattle and humans experience severe loose stool after becoming infected (Waechter). Humans working with cattle often become infected due to ingestion of contaminated soil, feces, or water (Waechter).. While there is no treatment for humans, fluid therapy is an option for severe cases. As mentioned previously, the best form of prevention is maintaining hygiene after interacting with cattle and routine enclosure cleaning.

Euthanasia methods for cattle are outlined in the AVMA guidelines, with non-inhaled barbiturates being the primary acceptable method (Leary and Johnson). While this method requires animal restraint, no adjunctive method is required, and the risk to human safety is low. This method is also quiet in comparison to physical methods such as a gunshot, which may be beneficial if multiple individuals need to be euthanized. While gunshots are acceptable with conditions, the risk to staff safety is high, and some community members may be upset by this methodology. If a cow is euthanized using barbiturates, the remains must be disposed of either via cremation or in an appropriately deep burial site.

If your shelter is considering accepting livestock into your facility, it's important first to assess your capacity for care, as pigs and cows have several unique requirements. This includes ensuring your facility has access to a large animal veterinarian, as pigs may require procedures such as tusk trimming or require medical intervention for conditions such as Diamond skin disease or tusk abscesses. Cows may require treatment for wooden tongue or bovine viral diarrhea, to name a few. In addition to considerations for veterinary care, husbandry staff must be equipped to handle, house, and enrich pigs, which presents unique challenges of its own. Pigs do not find fulfillment in playing as dogs or cats do and benefit instead from exploring and rooting. Understanding this is imperative as bored pigs often become destructive pigs, which can cause further strain on staff. In addition, cattle require physical space to graze out in pasture and room for an enclosed structure. Ensuring your facility can accommodate these space requirements is vital before agreeing to bring cattle into the facility. It is also imperative to consider if the area your shelter is servicing is interested in adopting miniature pigs or cattle. If there is no demand for these animals, you are putting your facility at risk for the cost associated with long-term care and the animals at risk for the psychological impacts of a long stay.

Having Standard Operating Procedures created to address the specific needs of miniature pigs, and cattle goes hand in hand with ensuring your facility has the appropriate capacity for care. Standard Operating Procedures should outline the expectations for procedures such as pig and cow intake examinations, feeding schedules, and clerical events such as how staff should chart morning rounds. As with any SOP, the staffing and volunteer groups impacted should be noted to prevent role confusion, and procedures should be outlined step by step to ensure compliance. An Example SOP can be found on the slide

If your shelter finds itself in a scenario where you are transporting miniature pigs or cattle, it is important to ensure your vehicle is appropriate. A well-ventilated vehicle is vital, as this removes heat and moisture created by the animal during transit. For example, a 100lb pig can produce 200 watts of heat, and without proper ventilation, the transit vehicle can quickly become an environment that is deadly to livestock (Department for Environment Food and Rural Affairs). Manipulating air movement within the transport vehicle can be done by putting fans at the front of the vehicle and inlet apertures at the end of the vehicle to maximize airflow in a forward-moving vehicle (Department for Environment Food and Rural Affairs). As with dogs and cats, pigs or cattle transported from the shelter should be approved for transport by a DVM to prevent the spread of zoonotic diseases (DeTar et al.). Visual identification is also necessary, especially if multiple animals are being transported (DeTar et al.). This can include marking the inner ear with their name or shelter ID number (DeTar et al.). Due to the variable size of miniature pigs, preplanning is required to ensure the transport vehicle's primary enclosure allows the animal to stand, sit, turn around normally, and lie comfortably without restraint (DeTar et al.). It is also ideal to provide transport vehicles with bedding material to facilitate natural behavior and comfort during this stressful transition (DeTar et al.). As discussed during handling, premedication of the pigs prior to travel is recommended to reduce stress and auditory strain on transport staff.

That concludes my presentation on sheltering miniature pigs and cattle. I appreciate everyone's time and attention.

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