Miniature pet pig reproduction
Sherrie G. Clark
Virginia-Maryland Regional College of Veterinary Medicine, Virginia Tech, Blacksburg, VA

Introduction
The introduction of miniature and pot-bellied pigs in the U.S. began in the 1980’s and their popularity remained for a number of years and then subsided until about three years ago. Their popularity in Europe was preceded by their re-introduction to the U.S. – and the first place that they gained popularity was Hollywood. Actresses treated these pets the same as they did miniature dogs – carrying them around in small bags and dressing them in fashion ensembles. Due to their unique personalities and similarities to dogs, the popularity of miniature pigs as pets has continued to climb and the need for veterinarians who are willing to provide health care and understand their reproductive anatomy and physiology has increased. The aim of this paper is to provide a brief overview of the reproductive characteristics of the pot-bellied or miniature pig.

Keywords: Pot belly, pot-bellied, pig, reproduction

Puberty
An intact male can become sexually active as early as 6-8 weeks of age. He will express mounting and dominance behavior over his pen mates, other pets, and household objects. Owners may notice the boar exteriorizing his penis, but more commonly they notice “a swelling on the abdomen or belly near the umbilicus” that is present and then goes away. This swelling is likely accumulation of fluid into the boar’s preputial diverticulum. The fluid usually has a foul odor and is generally composed of urine and semen. Many resources believe that this fluid is used to lubricate the penis during coitus while others consider this fluid to be an attractant for females. While it may appear that this strong odor may attract some females, the major fluid that contains pheromones in the boar is saliva. When excited, the boar will begin to chomp his jaws and increase production of androgens in the saliva – he will appear to be frothing from the mouth.

Both male and female pigs will need to be of adequate size in order to come into puberty and begin breeding. The general rule is that they need to be two-thirds of their mature body weight for their breed. It has been documented that around 12 to 16 weeks of age, a female pig will go into her first estrus and will continue to cycle every 21 days (range 18-24 days). A gilt may begin showing signs of estrus sooner if she is housed in a small group of other pigs or has contact with a boar. Her vulva may begin to swell and become reddened and she will respond with a lordosis response when pressure is applied to her back as would a domestic gilt. Her behavior will be the most noticeable: the gilt may eat less while in estrus, she will have increased locomotor activity, and seek out affection from other pets. Also, she may become increasingly ornery towards owners (increased vocalization in the form of squealing, rooting and biting behavior towards owner’s legs) and many animals until she goes out of estrus, which generally lasts one to three days.

Pre-breeding recommendations
Owners who have obtained miniature pigs with the intent to breed need to consider a variety of reproductive characteristics. The female needs to have at least eight to 12 functional teats in order to raise a litter. Additionally, she needs to be at an appropriate body condition and have shown signs of estrus at least once prior to breeding. Waiting until her second or third estrous cycle will increase the number of ovulations and, therefore, the number of piglets. Another practice that could increase the number of ovulations is that of “flushing”. Flushing involves the increase in feeding rate from 2% to 3% of their body weight 10-14 days prior to breeding.

Other considerations involve administration of pre-breeding vaccinations to reduce chances for infertility or abortion. The primary agents included in this vaccine are: porcine parvovirus, Leptospira (canicola, grippotyphosa, hardjo, icerohaemorrhagiae, pomona +/- bratislava) and Erysipelothrix
*rhusiopathiae*. The vaccine is generally administered three weeks apart with the second dose two to four weeks prior to the animal’s initial breeding and then two weeks prior to subsequent breedings to both males and females. Other health recommendations involve a routine deworming program as well as general health examinations.4-7

**Breeding management**

Pigs generally do not have problems showing signs of estrus or receptivity to mating. Some owners may want to have litters at particular times of the year and want to control the time that the females come into estrus and are subsequently inseminated. This is generally not a common practice in breeding miniature pigs as the owners generally let them breed naturally. If a breeder needs assistance and would like to control the estrous cycle through a pharmacological method, then products that have been approved and used in domestic swine may be used. It has been reported7 that estrus can be induced in prepubertal gilts using a combination of 400 IU pregnant mare serum gonadotropin and 200 IU human chorionic gonadotropin (P.G. 600®, Merck Animal Health, Summit, NJ), but the author does not have experience with this as the females generally come into their first estrus without difficulty. Additionally, if a female comes into estrus and the owner “misses her”, they can either wait for her to come back into estrus in 18-24 days or try administration of prostaglandin after day 12 of her cycle. The pig’s corpora lutea are not responsive to prostaglandin for luteolysis until after this day of the estrous cycle.8 The author does not have any experience with the use of altrenogest to manage estrous cycles of miniature swine.

Females that are exhibiting signs of estrus will seek out the male. Upon introduction of the male, she will show interest towards him. There will be a period of courtship that occurs where both parties will grunt and growl at each other and then the female will stand to be mounted by the boar. The boar may be initially cautious and make nose-to-nose contact before moving to the vulvar area. He may root at the abdomen prior to mounting to ensure that the female is properly stimulated and willing to stand. Depending on the experience of the boar, it may take a few attempts to mount the female. He will generally begin thrusting prior to achieving intromission. The act of coitus may take up to 10-15 minutes as the boar locks into the cervix and ejaculates. After a mating has occurred, the male and female may spend time together in the same area. Multiple matings may occur during the time she is in estrus.

Females ovulate approximately two-thirds of the way through estrus (which is about 1-3 days in length). To increase litter size, the female should be bred at least twice daily until she does not stand for the male.5 Many owners will likely leave the male and female together during the time that the female is exhibiting signs of estrus to ensure that multiple matings occur. If a male is not able to breed the female for various reasons, hand assisted mating may be attempted or the breeder will have to make another plan for breeding.

Artificial insemination can be performed in miniature swine, but the size of the pipettes used for breeding domestic pigs may be too large. Boars can be trained for semen collection from phantoms, using feed sacks, or other objects that mimic a female in standing estrus. Many boars have high libido and an innate mounting instinct so they can be easily trained to mount and semen collected similar to that of a domestic boar.9 Evaluation of the semen should consist of gross evaluation for color and opacity, microscopic evaluation for motility and sperm cell morphology, and concentration of sperm cells in the ejaculate. The semen could be extended with commercial swine extender if the ejaculate is to be used for breeding of multiple females.

**Pregnancy and gestation**

The gestation length for a miniature pig is the same as a domestic pig: three months, three weeks, three days or ~114-115 days. Litter sizes will vary from four to 12 piglets with an average litter size of 5.1 piglets. The majority of losses during pregnancy occurs during the first trimester and can be affected by heat stress, nutrition, and other stresses that affect the general health of the pig. In general, piglets will be viable when delivered after 110-112 days of gestation.5,7
During gestation, sows need to be fed a diet specific for her energy, protein, and mineral needs. There are commercial diets for miniature swine that can be used to meet these needs – the feeding of a combination of adult and youth diets should meet these needs for the gestating or lactating female. The sow or gilt should gain up to 20% of her body weight during gestation, with the majority of this being during the last trimester due to piglet growth.

**Pregnancy diagnosis**

Many breeders will assume that their gilt or sow is pregnant when she is not receptive to breeding by the male on her next estrus after mating. They may or may not have a relationship with a veterinarian who could perform pregnancy diagnosis via transabdominal ultrasonography. This can be performed beginning as early as 19-20 days post-mating, but most examinations will occur around 28-30 days after mating. The gilt or sow can remain standing for the examination. A 3.5-5 mHz transducer can be used on the abdomen and placed medial to the flank fold and pointed towards the bladder. A positive pregnancy diagnosis will consist of identifying hyperechoic fetuses within the hypoechoic amniotic vesicles in the uterus (Figure). With an accurate breeding date, the farrowing date can be determined. After 30 days, the growing piglets can be monitored via ultrasonography or radiographs to ensure that they are developing normally.

![B mode ultrasonographic image of a pregnant sow ~ 25 days of gestation.](image)

**Parturition and neonatal care**

It is generally recommended to limit the amount of exposure of the gilt or sow to other pigs or many visitors to the house for two weeks prior to farrowing to limit the exposure to pathogens. It is also a good idea to limit this exposure during the first few weeks after farrowing. Breeders should prepare a farrowing box in preparation for the birth of the piglets. This box should be kept as clean as possible and could contain some small soft bedding. It should be a warm and dry place that is free of drafts and out of the way from the rest of the household and pets. A heat lamp or pad is recommended to keep the piglets warm after they are born as it can be difficult for them to maintain their own body temperature. Be sure to keep electrical cords out of the reach of the sow and piglets as they may accidentally chew on the cords and become electrocuted. Be sure that the sow can find a place to remain cool as her environmental temperature requirements (60-70°F) are much cooler than that of the piglets (92-95°F).

Near the time of farrowing, gilts and sows will begin nesting and becoming increasingly restless. This behavior may occur 12-24 hours prior to farrowing. The mammary glands will increase in size a few days prior to farrowing and form a sticky secretion at the end of the teats. The ligaments around the perineal area (tail head) will begin to soften and the vulva will become enlarged and elongate.
During the first stage of labor, the female becomes restless and withdrawn and her breathing may become rapid. She will go to her nest/farrowing box and will not be responsive to food or treats. When she is in the second stage of labor, the rupture of the chorioallantois has occurred and strong abdominal contractions will ensue. Piglets can be delivered in anterior or posterior position and will generally occur every 15-10 minutes. It can take up to four hours for a normal litter to be born – expect that this will be longer for gilts as they will likely rest longer between piglets. The placentas of the piglets can either be passed with each piglet or group of piglets or can all be passed at the end of farrowing.

When monitoring a sow that is farrowing, keep the area clean, warm and as dry as possible. A sow that becomes alarmed or disturbed during farrowing may halt the process and this could lead to a dystocia. Dystocia is not common in pigs (less than 1% of farrowings),5 but could be more of a concern in the pot belly pig as genetic selection allows smaller females to be bred early and piglets may not pass through a small pelvic diameter. First litter females and older sows are the most likely ones to experience uterine inertia and subsequent dystocia. The uterus may not contract and move piglets through the uterine horns. Females should be examined for any obstruction within the birth canal if a piglet is not delivered after at least three hours of abdominal contractions or it is longer than one hour between piglets. This should always be performed prior to administration of oxytocin. The additional administration of calcium gluconate (SQ) will assist with uterine contractions and delivery of any retained. Causes of dystocia will be discussed in more detail in the “Reproductive disorders” section of this article.

During the postpartum period, the sow should be monitored closely. If this is her first litter, she will likely be nervous and anxious with respect to her piglets and could savage them. These sows may need to be sedated with a phenothiazine tranquilizer such as acepromazine for her to accept the piglets and allow them to nurse. An additional concern regarding the sow is whether she is producing enough milk for the piglets. The sow should lie quietly while the piglets nurse. She will generally grunt to her piglets at the time of feeding to let the piglets know that she is letting down her milk. If she is agalactic, she may move away from the piglets or lie on her mammary glands so that piglets cannot nurse. The mammary glands should be monitored for signs of mastitis and agalactia and treated appropriately with antibiotics, anti-inflammatories, and oxytocin. Additionally, the sow’s appetite, general attitude, and rectal temperature should be monitored closely during the first week postpartum. If the piglets need to be fed, they can be fed using a syringe or a pet nursing bottle. They should be fed 10% of their body weight (25-40 ml) at each feeding every four to six hours during the first 12 hours of life. This will ensure adequate immunoglobulin transfer to the piglets. If the sow does not have adequate colostrum, then cow colostrum can be used as a substitute.2,11

It is imperative that piglets be fed frequently (every three to four hours) as they do not have adequate fat stores and can die of starvation. Additionally, they need to be kept warm so that they will be able to adequately absorb the nutrients from their gastrointestinal tract. If the piglets are not able to nurse, they can be fed via a stomach tube or supplemented with oral glucose.2,4,11 Once they are nursing well and gaining weight, they can be transitioned to pan feeding by four to five days of age. Overfeeding can result in the piglets developing diarrhea, which can lead to dehydration. Their feeding should be adjusted as to how they are gaining weight and tolerating feedings if they are not nursing the sow.

Common reproductive disorders

Dystocia

As discussed previously, dystocia is not very common in swine. The clinical signs associated with dystocia and indications for intervention include: gestation over 115 days, prolonged stage one of labor and no progression to stage two, straining and contractions associated with stage two, but no piglets are delivered, delivery of one or two piglets and signs of labor cease, longer than one hour between piglets, and a foul discharge coming from the vulva. There are a variety of causes of dystocia and manual removal of piglets can be difficult in these animals due to size constrictions. If an obstruction is not determined (either by palpation of the vaginal canal or via ultrasonography/radiography), then oxytocin (10-20 IU) can be administered in the muscle to stimulate uterine contraction and expelling of piglets. If
two doses 30-60 minutes apart does not result in delivery of the piglets, then a cesarean section is recommended. \(^5,7,11\)

The procedure for cesarean section in the pig has been described in various sources.\(^4,12\) Once the pig is appropriately anesthetized (±/- epidural anesthesia), a paramedian approach (dorsal to the mammary gland) has been described as to reduce the chance of dehiscence from vigorous nursing from the piglets. Piglets are introduced to the gilt or sow once she has recovered from anesthesia and will lie quietly for the piglets to nurse. Even with a normal birth, piglets are still at a risk of being crushed by being laid on – this may be more of a concern with a female that did not give birth to them via the vaginal route. Gilts or sows should be administered non-steroidal anti-inflammatories and analgesics post-operatively and monitored closely in anticipation that she will be calmer with the piglets if pain is controlled.

Inguinal hernias and cryptorchidism

Both of these conditions occur primarily in male piglets and can be recognized prior to weaning at around six weeks of age. Breeders will generally not attempt to castrate these males. Both of these conditions have been considered to be congenital defects in the domestic pig and should not be used for breeding. Repair of the hernia is recommended at castration. Abdominal exploratory surgery is generally recommended for removal of retained testes. Descriptions of these surgical procedures are available in many of the large animal surgery text books.

Uterine and ovarian masses

It is common for geriatric sows to develop masses on the reproductive tract. The procedure for ovariohysterectomy (OHE) has been the recommended treatment. Various approaches have been described: ventral midline, paralumbar (flank), ventrolateral, and paramedian. For a routine oophorectomy, a paralumbar approach may reduce many of the complications observed post-operatively in pigs. The most common complication has been hemorrhage or development of adhesions which lead to potential gastrointestinal disorders. The author prefers the ventral midline approach as an OHE is the most common surgical procedure that will remove all parts of the reproductive tract that could develop into benign or malignant masses. One should note that the broad ligament of the pig can be quite thick and vascular – this is one of the primary reasons that the author prefers the visualization provided by the ventral midline approach.

Miscellaneous anomalies

There are a variety of other anomalies and disorders that can affect the reproductive tract of miniature swine that also affect domestic pigs. Some of these include: persistent penile frenulum, prolapsed penis and prepuce, preputial diverticulitis, vaginal prolapse, uterine prolapse, and urethral obstruction.\(^12,13\) All of these anomalies are diagnosed and treated according to the severity of the condition and decisions are then made on the potential to affect the individual’s breeding capacity.

Conclusion

The author hopes that the information provided will assist reproductive specialists in increasing their knowledge regarding pot-bellied and other miniature pigs. Additionally, this information should provide a little more confidence in providing reproductive services to this species in their practices.

References

Appendix

Miniature Vietnamese Pot-bellied Pigs: These miniature pigs represent probably the most popular breed owned today. They have a docile disposition, in general. The author has worked with a number of these pigs that will bite and “attack” the legs of people that they do not know or trust. Their exaggerated pot bellies and swayed backs are completely normal and healthy. Their average height is about 16 - 20 in. and their average weight can be over 100 lbs.

Juliani (Painted Miniature) Pig: These little guys are truly miniature, averaging about 12-16 inches and weighing 15-60 pounds. Like the pot-bellied pig, they have a gentle disposition and are quite playful. The mini Juliana has a longer nose, lighter boned body and longer legs than a pot-bellied pig. They have more of a straight back with less of a belly. The mini Juliana is usually spotted.

African Pygmy or Guinea Hog: These miniature pigs weigh in at an average of 20-40 pounds and reach an average height of 14 to 22 inches. They are active, alert and highly intelligent. In contrast to the pot-bellied pigs, African Pygmies have straight backs.

Kunekune: A small breed of pig from New Zealand. The Kunekune pig is relatively hairy with a pudgy build and may bear wattles hanging from their lower jaw. Color ranges include black and white, ginger, cream, gold-tip, black, brown and tri-colored.

The miniature pig sizes:
"Potbelly Pig": 18 - 26" weigh up to 200 lbs
"Miniature Potbelly Pig": 16 - 20" weigh up to 100 lbs
"Toy Pig": 14 - 16" (Can be a combination of two breeds). These pigs will be many different colors as well to include chocolate, spotted, pink, and red.
"Micro Pig": 12 - 16" This is a new breed in itself, you will notice a different body type than the pot-bellied pig and “a longer, squared off nose, straight back, smaller tummy and longer leg.”
"Mini Micro Pig or Teacup": 15" and under, same as the micro in looks but smaller. The true ones that stay this small are very rare.
"Mini Juliana Pig": 10 - 16" This is a breed in itself. Unlike the pot-bellied pig, the Juliana is very delicate boned and has a long nose and has spots. Also known as the painted pig or spotted Juliana. This is the smallest of all of the mini breeds.