

Reproduction in Dogs and Cats

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Estrus in Dogs (Heat Cycles)

General Information

Estrus ("heat") is the mating period of female animals. When estrus occurs, animals are said to be "in heat" or "in season." Dogs generally have their first estrous cycle at 6 to 12 months of age. Some females of the large breeds, however, may not have their first estrus until they are 12 to 24 months of age.

The complete cycle takes about 6 months, resulting in 2 estrous periods each year. Individual variation occurs, but a given female's pattern tends to be repeated regularly.

The estrous cycle can be divided into four stages:

Proestrus: This stage begins with the appearance of vaginal bleeding. It normally lasts from 4 to 9 days. Male dogs become very interested in the female; however, she will not yet mate with them.

Estrus: This is the stage in which the female will accept the male and conception can occur. The vaginal discharge is more yellowish than bloody. Ordinarily, this stage lasts for 4 to 13 days. Your female will stand still and hold her tail to the side when you touch her back or a male dog tries to mount.

Metestrus and *anestrus*: These two stages are periods of ovarian activity, but with no significant outward signs. False pregnancies frequently occur during metestrus.

Important Points Concerning Estrus

- You should consider your pet to be "in season" for 21 days: 7 days coming into heat, 7 days in heat, 7 days going out. Though conception is most likely during the middle 7 days, Mother Nature doesn't always follow the rules. Confine your pet for the entire 3 weeks.
- Remember that the above information is general. Not all females follow these patterns. Consult with the doctor if your pet does not seem typical. Sometimes, cycling problems can be an early warning of more serious problems, and the sooner they are dealt with, the better.

Mating in Dogs

General Information

Female dogs generally have two estrous (heat) cycles each year. This process begins at puberty. Small breeds may start their cycles at 5 to 6 months of age, while some giant breeds may not cycle until 2 years of age. The average age at puberty is 7 to 10 months. After 4 to 9 days of bloody vaginal

discharge, the female will accept the male and stand for breeding. This receptive stage may last a few days or as long as 2 weeks. The most commonly used breeding dates are the 9th, 11th and 13th days after the first vaginal discharge. Repeated breedings, 48 hours apart, as long as the female accepts the male, produce the best conception rate.

Usually no assistance is needed for a successful mating, especially if the dogs have had previous experience. Occasionally, however, some assistance must be given. If trouble is encountered, perhaps the timing is not correct. Double-check the dates and consult with your veterinarian.

Near the conclusion of a normal mating, the dogs will become "tied" together for up to 30 minutes. Occasionally, the male turns around and the dogs stand quietly, tail to tail. This is normal and no cause for alarm. If one of the dogs becomes active during this time, gentle restraint is advisable. Do not attempt to forcefully pull the dogs apart, as this will cause injury.

Female dogs should not be bred during the first heat period. Wait until the second or third heat to breed your female so that full maturity is achieved.

Because pregnancy represents a considerable strain on the mother, females should not be bred at every heat. Acceptable breeding programs include breeding every other heat or breeding during consecutive heats and skipping the third.

If a pregnancy results from the mating, the puppies are born in approximately 63 days. Begin counting from the first breeding.

If you are considering mating your dog, discuss the matter with your veterinarian. A thorough examination is recommended before breeding to help ensure that your pet is in good physical condition.

Gestation in Dogs

General Information

Gestation is the period when the young are developing in the mother's uterus. In dogs, gestation normally lasts 9 weeks (63 days). However, puppies may be delivered between 58 and 68 days.

Diagnosis of Pregnancy

There are currently no accurate blood or urine tests available for early diagnosis of pregnancy in dogs. The earliest time of diagnosis may be 3 to 4 weeks after breeding, when the doctor may be able to detect pregnancy by feeling the abdomen. Abdominal radiographs (x-rays) will usually show evidence of

uterine enlargement around 33 to 35 days and the skeletons of the fetuses are apparent by 45 days. Ultrasound evaluation will usually reveal pregnancy after 30 days.

Physical Changes

During the first 5 weeks of pregnancy, there are few noticeable changes. After the 5th week, you may notice weight gain, especially with large litters. If only 1 or 2 puppies are present, the mother may gain little weight until shortly before birth. Abdominal enlargement is generally obvious in the last 3 weeks. The mammary glands may begin to enlarge as early as the 35th day but usually development is not obvious until 45 days. Milk may be present as early as 7 to 9 days before delivery, but usually it is not produced until 1 to 2 days before delivery.

Behavioral Changes

During pregnancy, the female dog may show a change in behavior, especially in the last few weeks. As the uterus enlarges with the developing puppies, your pet may become restless, seek seclusion, and, in the last few days, soil the house. She may shred papers, blankets or bedding in an attempt at "nest building" in the last weeks. During the last 2 weeks, your pet may become irritable and should avoid contact with small children.

Exercise

Moderate exercise is the proper approach. Neither forced rest nor strenuous exercise is a good idea. Short periods of gentle play and short walks are good.

Nutrition

Good nutrition is essential for healthy puppies and mothers. During the first 4 weeks, nutritional needs change little, but feeding a high quality puppy formula is recommended.

During the last 5 weeks, your dog's nutritional needs nearly double. Feed increased amounts of food in several small meals each day. Fresh water should always be available because fluid needs are greatly increased. The doctor may recommend a special diet.

Normal Birth in Dogs (Whelping)

Preparations for Whelping

Begin preparations for delivery of puppies before the female gives birth. A whelping box should be

provided for the mother to begin sleeping in to ensure birth of puppies in the area you have chosen. This box should be only slightly bigger than the mother, with sides 6 to 8 inches high to keep the pups from crawling out of the nest. Place the box in a secluded yet familiar area of the home, away from the family traffic, to allow the mother solitude. Newspapers make excellent bedding because they can be changed easily, are absorbent, and can be shredded by the mother as she makes her "nest." If such materials as old quilts, blankets, rugs or towels are used, they must be washed frequently.

If you want to know precisely when delivery is near, check the rectal temperature of the mother twice daily from the 58th day of pregnancy until labor begins. Normal rectal temperature is between 100.5° and 102° F. Within 24 hours before the onset of labor, the rectal temperature drops nearly 2 degrees.

Labor and Delivery

Labor in the female dog (bitch) can be divided into three stages. The second and third stages are repeated with the birth of each puppy. During the first stage, the mother seems extremely restless and very nervous and often seeks seclusion. She may refuse food even if offered her favorite treats. This stage may last 6 to 24 hours. This is a good time to exercise the mother to allow her to urinate and defecate. In the second stage, uterine contractions and expulsion of the puppies begin. Usually a small greenish sac of fluid protrudes from the vulva, followed by the puppy and its attached placenta. The normal presentation of the puppy is nose first, stomach down ("diving" position). About one third of all puppies, however, are born hindquarters first. This presentation is considered normal in the dog. After delivery, the mother opens the sac, cleans off the pup, and severs the umbilical cord. You may have to perform these functions for the mother (see Obstetric Care). Make sure the sac is removed from the puppy immediately if it is unbroken during delivery. The third stage of labor is the resting stage, which follows delivery of each puppy. Mild contractions and delivery of the afterbirth occur in this phase. This stage usually lasts 10 to 30 minutes, but it may range from a few seconds to an hour.

Obstetric Care

After a pup is delivered, remove all membranes covering the puppy, clean the face, and remove mucus from the mouth and nose. Rub the puppy with a clean towel to dry it and to stimulate respiration and circulation. After a few minutes of rubbing, the puppy should begin to squirm and cry loudly. The umbilical cord should be tied about an inch from the puppy's body with fine thread and then cut on the side of the knot away from the puppy. Apply a drop of iodine or merthiolate to the cord end after it is cut.

Assisting with the Birth

If a puppy seems to be lodged in the birth canal and the mother cannot expel it, rapid assistance is necessary. There may not be time to call your veterinarian and drive to the hospital. Thorough hand washing should be performed before beginning. Having the mother in standing position if possible will increase the chances of success. A generous amount of K-Y jelly or similar lubricant should be used

around the puppy on the lining of the canal. Sometimes gentle rotation of the puppy is all that is necessary. If more help is needed the puppy can be gently grabbed using a small dry towel. Avoid grabbing low on the puppy's limbs as this can cause permanent injury. Use gentle steady pulling in a downward, backward direction to free the puppy. Never pull or jerk suddenly. If you cannot remove the puppy within 5 minutes an emergency C-section is necessary. Be aware that any manipulation within the mother can lead to vaginal injury so appropriate care needs to be taken.

Notify the Doctor if Any of the Following Occur

- You cannot remove a puppy lodged in the birth canal.
- There is strong, persistent labor for 30 minutes without delivery of a pup.
- There is weak, intermittent labor for 6 hours without delivery of any puppies.
- It has been more than 4 hours since the delivery of the last pup, and it is probable that more puppies are still inside.
- There is a greenish-black vaginal discharge and no labor or puppies within 3 to 4 hours. The greenish-black color is normal, but the discharge should be followed very soon by delivery of the pups.
- The pregnancy lasts more than 65 days.

Whelping in the Bitch from TEXTBOOK OF VETERINARY INTERNAL MEDICINE *Client Information Series*

Margaret V. Root Kustritz and Autumn P. Davidson

Whelping usually occurs with relatively few problems. Dogs can usually deliver their puppies with little help from owners. This sheet is intended to provide information to help you decide when an abnormality is present. Most dogs whelp about 63 days after breeding (normal range, 58 to 71 days). To determine exactly when the dog is due, determine her first day of diestrus (day 1) with vaginal cytology and she will whelp on day 56, 57, or 58; alternatively, start taking your dog's rectal temperature two to four times daily, starting about 55 days after breeding. To take your dog's rectal temperature, you can use a human oral thermometer. Lubricate it with a little petroleum jelly, make sure the thermometer bulb is totally within the anus, and leave it in for at least 1 minute. When the dog's temperature falls to below 100°F (usually below 99°F), she should begin to whelp within 24 hours and will probably begin in 4 to 6 hours. You should have a place set aside for her that is warm and private. She may pick a place for herself and start nesting behavior there as she nears whelping. It is useful to have on hand clean towels, iodine, thread or dental floss, a postal or small food scale, vanilla ice cream, and your veterinarian's phone number.

Labor starts with a long stage in which the uterine contractions begin, the birth canal relaxes, and the cervix opens. The abdominal contractions may not be visible, but your dog may appear nervous or

restless, pant, or vomit. This stage lasts 6 to 12 hours. The second stage is the actual birth of the puppies. You will usually see fetal tissues protruding before you actually see a pup born. Remember, breech deliveries are normal. The puppies are born covered by a membrane that the dog ruptures with her teeth. She also bites through the umbilical cord of each pup. Abdominal contractions are evident at this stage, but it is usually best to leave the bitch alone. Dogs can voluntarily stop giving birth if they are disturbed, so you should make sure she is in a quiet place. When you first see the hard abdominal contractions signaling the second stage of labor, you should give your dog 2 hours to have the first pup. Once you see fetal tissues protruding, she should have a pup within 30 minutes. When she starts delivering, allow 2 hours between pups. Most dogs have a pup every 30 to 60 minutes; some may have several and then rest a while before finishing. If you are unsure about whether whelping is progressing normally, please call your veterinarian. The third and final stage of labor is that of expelling the placenta or afterbirth. The dog usually expels the placenta for each pup after it is born and sometimes expels two placentas after delivering two pups. You should clean these away; there is no good physiologic reason for allowing the bitch to eat them. Trying to count these is notoriously unreliable, but you can try.

You may need to help the pups if the mother does not. If a puppy appears to be stuck, contact your veterinarian immediately. If the mother does not clean the pups, you should dry them with a towel, wipe clear all fluid from the nose and mouth, and rub the puppies vigorously. If the bitch does not sever the umbilical cord, you will have to do it. Wait for 5 to 10 minutes and then tie the umbilical cord in two places with thread or dental floss. The closest tie should be 1 to 2 inches from the pup's body. Cut between the two ties, dipping the end of the cord in iodine. Leave the pups with the bitch; even though she may not let them nurse, they need her warmth and physical contact. Many bitches will eat a special treat such as vanilla ice cream while whelping. Vanilla ice cream is good for bitches during whelping as it provides energy and calcium.

After whelping is completed, make sure all the pups nurse within 12 to 18 hours. The first milk they receive is important in providing them with immunity to many common diseases. It is also important to make sure the puppies are warm enough; they should be kept in an environment at about 85°F for the first several weeks of life. Be careful in your use of heating pads or heat lamps; it is easy to bum the pups. The mother may have a green to red-brown vulvar discharge for up to 3 weeks after whelping. This is normal and is of no concern as long as it is not foul smelling and she seems fine otherwise. Inspect the mother's mammary glands daily to check for the presence of milk, any abnormal swellings, and pain. Please call you veterinarian if you have any concerns. The puppies should be weighed at birth and daily thereafter. They may lose a small amount of weight the first day but should gain steadily after that, doubling their birth weight by 10 to 14 days of age. Following is a checklist of reasons to call your veterinarian for help:

- The dog has started labor and is not progressing within the time limits just listed.
- The rectal temperature dropped more than 24 hours ago and the dog has not started labor.
- The dog appears ill, depressed, feverish, fatigued.
- You have trouble getting the puppies to breathe early on or to suckle later.
- You are not sure if the dog has finished whelping.
- You have any particular concerns or questions.

Dystocia can occur as a consequence of problems with the dam's uterus or birth canal or with the fetus. The diagnosis of dystocia should be based on the presence of any of the following criteria:

1. Failure of the dam to initiate labor at term. Bitches can be considered over term at more than 70 to 72 days from the first breeding, more than 58 to 60 days of diestrus, or more than 66 days from the luteinizing hormone (LH) surge or initial rise in progesterone during estrus.
2. Failure of the dam to enter stage 1 labor beyond 24 to 36 hours after a detectable drop in rectal temperature to less than 99 to 100°F or to proceed from stage 1 to stage 2 labor within 24 hours.
3. Failure of the dam to complete delivery of all fetuses in a timely fashion. Delivery should occur within 30 minutes to 1 hour of active labor (visible abdominal efforts) or 4 to 6 hours of intermittent labor.
4. Fetal distress (unborn puppies with slow heart rates, stillborns).
5. Maternal distress (excessive pain or systemic illness), green or copious vaginal bleeding.
6. Irreversible history of dystocia (pelvic canal abnormalities, mismatch between fetal and maternal size) or radiographic evidence of fetal malposition.

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Care of the Bitch After Whelping

General Information

Pregnancy and lactation (milk production) constitute a severe strain on the mother's health. Although most mothers handle the task admirably, the wise owner can take certain precautions to protect the health of both mother and puppies.

Important Points in Treatment

Physical examination: Within 48 hours after whelping, the mother and puppies should be examined by a veterinarian.

Diet: Usually no special diet is required, but the mother will require approximately twice as much food as normal.

Fluids: Provide clean, fresh water at all times.

Activity: Ordinarily the mother will spend most of the first 3 weeks with her puppies. Allow her as much exercise as she desires.

Bowel movements: Because of the increased food consumption and the enlarged uterus, your pet may have to relieve herself more frequently. The stools may be soft for the first few days. If diarrhea or straining develop, call the doctor.

Mammary gland care: Check the nipples daily and clean with warm water if dried milk begins to accumulate. Inform the doctor of any discoloration of the skin, swelling, tenderness, or sores. Trim the puppies' nails if they are scratching the mammary glands.

Vaginal discharge: A reddish vaginal discharge, with clotted blood, is normal for the first few days. This may occur intermittently for several weeks.

Behavior: Call the doctor if the nursing mother appears nervous, restless or uncomfortable, or refuses to nurse the puppies.

General effects: Normally the mother experiences heavy coat shedding during the nursing period. Brush her regularly, and call the doctor if any bald spots develop. Slight weight loss is normal, but consult the doctor if the mother appears overly thin.

Estrus (heat period): Pregnancy should have no effect on the next heat period. This period should occur within 6 months after birth of the puppies.

Spaying (ovariohysterectomy): If you desire surgical sterilization for your pet, an appointment should be scheduled after the puppies are weaned and milk production has ceased, but before the next heat period.

Care of Newborn Puppies

General Information

During the first few weeks of the newborn's life, the mother provides the necessities of warmth, nutrition, and stimulation. The owner's responsibilities consist of careful observation to detect problems before they become serious.

Warmth: Room temperature should be at least 85° F. The puppies should be kept off cold floors because chilling can be fatal to young puppies.

Nursing: A well-fed healthy puppy has a round stomach and seems content. Notify the doctor if the puppies seem uneasy or cry frequently.

Crying: Extended crying is usually a sign of trouble and should be reported to the doctor immediately.

Tail docking/dewclaw removal: Puppies of breeds in which these procedures are done should be presented at 2 to 5 days of age. Please call for an appointment.

Eyes: The puppies' eyes should open at 10 to 14 days of age.

Weaning: Weaning can begin at approximately 3 to 4 weeks. Dry puppy food softened with warm water may be used.

Worms: Puppies should be dewormed at 2, 4, 6, and 9 weeks of age. A stool specimen should be brought to the office for laboratory examination when the puppies are 12 weeks old.

Vaccinations: A series of immunizations should begin at 6 weeks of age. The doctor will recommend a schedule for the appropriate vaccinations.

Cesarean Section

General Information

A cesarean section is a procedure to surgically remove puppies or kittens from the uterus when natural (unassisted) delivery of the young is impossible or potentially harmful to the mother or babies.

The reasons for a cesarean section are numerous and varied. The female may be too sick to deliver the young. Mechanical obstructions in the birth canal, caused by such things as old fractures, tumors, or abdominal masses, may prevent normal passage of babies. Or, the babies may be unusually large.

Sometimes this surgery is planned well in advance because of known problems. At other times, difficulties develop at the time of birth and the decision to perform surgery must be made immediately.

After full recovery from a cesarean section, the mother usually assumes her normal maternal duties. The incision and sutures from surgery rarely interfere with nursing. If problems arise, the doctor will advise you regarding proper action.

Important Points in Treatment

1. The mother may be treated as usual, but her activity should be moderately restricted. The abdomen and mammary glands may be cleaned with a warm, damp cloth as needed. The nest should be kept dry and clean.
2. If the mother is still showing signs of sedation from surgery, she should not be left alone with her puppies until she regains her normal attitude and behavior. Some dogs may kill their puppies while under the influence of sedatives.

Notify the Doctor if Any of the Following Occur

- Your pet is weak or depressed.
- Your pet vomits, has diarrhea, or refuses to eat.
- The babies cry frequently.
- Your pet refuses to care for the babies.
- Fluid or pus drains from the incision or the vagina.

Estrus in Cats (Heat Cycles)

General Information

Estrus ("heat") is the mating period of female animals. When estrus occurs, animals are said to be "in heat" or "in season." Cats normally have their first estrous cycle between 5 and 10 months of age, with the average age around 6 months. The female cat has 2 to 4 estrous periods every year, each lasting 15 to 22 days. If she is bred, estrus seldom lasts more than 4 days. If successful mating does not occur, estrus may last for 7 to 10 days and recur at 15- to 21-day intervals. It is possible for an unmated female to cycle every 3 to 4 weeks indefinitely. Cats also have an estrous period 1 to 6 weeks after giving birth, so a female may be nursing one litter while pregnant with another.

Behavior

Because there is usually no obvious vaginal discharge or swelling of the genitals during estrus in cats, as is seen in dogs, behavior changes are the only obvious sign that your cat is in estrus. A cat in estrus carries her tail to one side, keeps her hindquarters elevated, exhibits "treading" movements of the hind legs, and seems unusually affectionate. She spends a good deal of time rolling on the floor and seems much more restless than usual. The cat's voice seems more piercing, and she may "call" for 1 to 2 days before she accepts the male.

Gestation in Cats

General Information

The term gestation means the period when the young are developing in the mother's uterus. In cats, gestation normally lasts 63 to 65 days. Siamese cats may carry their kittens for 67 days.

Diagnosis of Pregnancy

There are currently no accurate blood or urine tests available for early diagnosis of pregnancy in cats. The earliest time of diagnosis may be at 3 to 4 weeks after breeding, when the doctor may be able to detect pregnancy by feeling the abdomen. Abdominal radiographs (x-rays) will usually show evidence of uterine enlargement around 33 to 35 days and the skeletons of the fetuses are apparent by 45 days. Ultrasound evaluations will usually reveal pregnancy after 30 days.

Physical Changes

During the first 4 to 5 weeks of pregnancy, there are few noticeable changes. Weight gain and enlargement of the abdomen generally become noticeable after the fifth week. The increase, of course, varies with the size of the litter.

The mammary glands may begin to enlarge during the fifth week, but typically no increase in size is noticed until the seventh week. Milk is normally present 1 to 2 days before delivery.

Behavioral Changes

During the last weeks of pregnancy, your cat may have difficulty finding a comfortable position and may seem restless. Many queens (female cats) seek seclusion. Occasionally the cat may soil the house because the heavy uterus is pressing the bladder or colon.

Exercise

Normally no restriction of exercise is required during the first 6 to 7 weeks. Your cat should be kept indoors during the last 2 weeks because she may attempt to have her kittens in an unsafe outside location.

Nutrition

Good nutrition is essential to the health of both mother and kittens. It is nearly impossible to overfeed a pregnant cat because she requires 2 to 4 times as much food as normal.

Harmful feeding practices include feeding raw egg whites, raw fish, and exclusive meat or fish diets. The doctor may prescribe a special diet or supplementation.

Normal Birth in Cats (Kindling, Queening)

Preparation for Delivery

You should begin to prepare for birth of the kittens before the queen (mother cat) gives birth. A box should be provided so that the mother becomes accustomed to sleeping in it and will deliver the kittens there. Most cats prefer a covered delivery box. Food and water can be kept nearby. Place the box in a secluded yet familiar area of the home, away from family traffic, to allow mother and kittens solitude and rest. Newspapers make excellent bedding because they can be changed easily, are absorbent, and can be shredded by the mother as she makes her "nest." If such materials as old quilts, rugs, blankets or mattress pads are used, they should be laundered frequently.

If you want to know more precisely when delivery is near, check the rectal temperature twice daily, starting on the 60th day. Rectal temperature drops below 100° F within 24 hours before the onset of labor. Normal rectal temperature ranges from 100.5° to 102° F.

Labor and Delivery

During the first stage of labor, the queen seems uneasy and restless. She may refuse food or water. The cat's rectal temperature drops, and she seeks dark, secluded places. Considerable howling may occur. This last stage lasts 12 to 24 hours. In the second stage, uterine contractions and expulsion of the kittens begin. Delivery starts with a small, greenish sac protruding from the vaginal opening. This is followed by a kitten and the attached placenta. The normal presentation of the kitten is nose first, lying on its stomach ("diving" position). Some kittens, however, are born hindquarters first. After the delivery, the mother normally opens the sac by licking and biting, cleans off the kitten, and severs the umbilical cord. You may have to perform these functions for the mother if she refuses to do it herself (see Obstetric Care). Make sure the sac is removed from the kitten immediately if the mother doesn't do so. The third stage of labor is a resting stage, which follows delivery of each kitten. This stage may last from a few

minutes to 1 hour. Occasionally, two kittens are delivered within a few minutes, followed by resting.

Obstetric Care

After each kitten is born, remove all membranes covering the kitten, clean off its face, and remove mucus from its nose and mouth. Rub the kitten with a clean, dry towel to dry it and stimulate breathing and circulation. After a few minutes of rubbing, the kitten should begin to squirm and cry. The umbilical cord should be tied about 1 inch from the body with fine thread and cut on the side of the knot away from the kitten. Apply a drop of iodine or merthiolate to the cord end after it is cut.

Assisting with the Birth

If a kitten seems to be lodged in the birth canal and the mother cannot expel it, assistance is necessary. There may not be time to call your veterinarian and drive it to the hospital if you wish to save the kitten. Thorough hand washing should be performed before beginning. A generous amount of K-Y jelly or similar lubricant should be used around the kitten on the lining of the canal. Sometimes gentle rotation of the kitten is all that is necessary. If more help is needed the kitten can be gently grabbed using a small dry towel. Avoid grabbing low on the kitten's limbs as this can cause permanent injury. Use gentle steady pulling to free the kitten. Never pull or jerk suddenly. If you cannot remove the kitten within 5 minutes an emergency C-section is necessary. Given the small size of the mother, it is impossible to manually free any kitten unless it is partly outside the birth canal without damaging the mother.

Notify the Doctor if Any of the Following Occur

- You cannot remove a kitten lodged in the birth canal.
- Labor is strong and persistent for 30 minutes without delivery of a kitten.
- Labor is weak and intermittent for 5 hours without any results.
- There is a dark vaginal discharge, and no labor or births have occurred within 3 to 4 hours.
- The pregnancy lasts more than 67 days.