



Whelping and Dystocia

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In this podcast we discuss whelping and dystocia with Dr. Cindy O'Connor of Slade Veterinary Hospital in Framingham, MA. Dr. O'Connor received her DVM from the University of Wisconsin-Madison and completed an internship in small animal medicine and surgery at the Animal Medical Center in New York. After her internship, she pursued specialty training in the area of veterinary medical genetics, pediatrics, and reproduction at the University of Pennsylvania's School of Veterinary Medicine and became a board certified specialist in veterinary reproduction.

What are the reasons that a semen evaluation might be requested?

AKC Canine Health Foundation (CHF): First, can you explain the 3 stages of parturition, or the birth process, in the bitch and how long they last? Let's start with stage 1.

Dr. Cindy O'Connor (O'Connor): Stage 1 of parturition is the preparatory phase for whelping. It averages approximately 6-12 hours but it can be as long as 36 hours. The bitch is usually restless and may show nesting behavior. She is nervous, panting, not interested in eating, and may tremble or shiver. Breeders may see a temperature drop (to 98-99° F) about 12-24 h before stage 2 in approximately 80% of bitches. This temperature drop is related to the abrupt decline in progesterone that occurs just prior to whelping. Uterine contractions become more organized during this stage and the cervix dilates; however, contractions are generally not visible. The signs of stage 1 in the bitch increase in frequency and severity as the uterine contractions become more frequent and intense.

CHF: Can a bitch's environment impact the progression from stage 1 to stage 2?

O'Connor: The beginning of labor is a complex process that involves multiple hormones and body systems in both mom and puppies. Stressors can interfere with the normal progress and can lead to numerous problems with pregnancy including the potential for premature labor and small puppies. It can also interfere with the bitch's ability to relax for the important coordinated and complex body mechanics required for a smooth delivery. Every bitch is unique and the environment should be adjusted for their individual needs. A quiet, warm, draft free area is ideal for most new moms during labor. Ideally, they should have time prior to delivery to adjust to their whelping area. While delivery of puppies can be an exciting event, it should not be the entertainment for the neighborhood as a houseful of strangers creates a tremendous amount of stress during whelping.

CHF: Does she act noticeably different during stage 1? (*are there any warning signs?*)

O'Connor: As mentioned previously, during the first stage of labor uterine contractions begin. These contractions can create some discomfort and confusion which may cause her to appear uncomfortable and restless - pacing, shivering and panting. Many bitches will not eat and some may even vomit. Some also whine persistently while others occupy themselves building a nest, digging and rearranging bedding.

CHF: Now let's discuss stage 2 and stage 3 – what is happening and how long should it last?

O'Connor: Stage 2 is the active propulsive stage when the bitch pushes the puppies out. A puppy is delivered every 30 to 60 minutes on average, although 2 hours can be very normal for some bitches in between pups as they may take some time to rest in between deliveries. As a result of litter size, the length of this stage can be variable 6-12 hours; however this can be as long as 24 hours in very large litters. Abdominal contractions are strong and coordinated, often causing a bitch to stop panting, lift tail, and even grunt during contractions. As a puppy moves toward and enters the birth canal a reflex is initiated, the Ferguson reflex, which creates very strong uterine contractions. When the puppy reaches the vulva, the chorioallantoic sac may be seen first, then the pup with or without the covering of the amniotic sac. The normal birth presentation of the puppies is 60% head first with front legs extended and 40% hind legs first with feet and tail extended. During delivery or shortly thereafter, the bitch should tear away the amniotic sac and lick the neonate vigorously to clear airways and to stimulate respiration.

Stage 3 defines the stage where the placenta is delivered. Placentas usually pass 5 to 15 minutes after each pup is born. Since the bitch has two long uterine horns where the puppies reside, a bitch may deliver a puppy from the left horn and then a puppy from the right horn then the placentas from each horn. So she can deliver puppy then placenta then puppy then placenta or puppy, puppy, placenta, placenta.

CHF: Are there clear signs that stage 2 is progressing well vs. not progressing as it should? What are specific criteria for diagnosing dystocia in the bitch?

O'Connor: As breeders understand what is normal, it is much easier for them to identify when there are difficulties with birth, called a dystocia. Common signs of a dystocia or difficult birth are: black or green vulvar discharge prior to the delivery of the first puppy, 20-30 minutes of strong continuous contractions with no puppy delivered, 2-3 hours of weak and infrequent expulsive efforts failing to produce a pup, 4 or more hours between pups, or an obvious problem such as a puppy stuck in the birth canal.



CHF: At what point should a breeder seek medical intervention from their veterinarian?

O'Connor: At the point that the breeder does not feel that labor is progressing normally, they should seek advice from their veterinarian because dystocia is an emergency that if left untreated could result in loss of puppies as well as a potentially life threatening situation for the bitch. It is important for breeders to be prepared ahead of time with a plan for emergencies since they can develop in the middle of the night. Having a plan in place, with either a veterinarian on call or with an emergency clinic that is familiar with the planned pregnancy is important as time is an important factor when dealing with a dystocia.

There are several causes for dystocia and intervention relies on proper identification of the cause. Maternal causes include a physical obstruction such as a vaginal stricture that does not allow passage of the puppies, abnormalities of uterine function, or abnormalities of pregnancy such as a twist in the uterus. Fetal factors could also be involved such as large puppies that cannot pass through the birth canal, a deformity in the puppy such as one with retained fluid or "walrus puppy", or an abnormality in the presentation of the puppy (a puppy that is folded like a pretzel).

The evaluation by the veterinarian will involve assessing the overall health and stability of the bitch for any complications of dystocia to her health. This may include blood work to evaluate for metabolic complications that can result in difficulties with birth such as low blood calcium, low blood sugar, or a negative energy balance (pregnancy ketosis). A vaginal exam will help evaluate for the potential of a puppy that may be lodged in the birth canal. X-rays assist veterinarians evaluating the number of puppies retained in the uterus and the potential for fetal or maternal causes of dystocia such as fetal oversize or malposition resulting in a problem with delivery. Ultrasound is also often utilized to assess fetal well-being, in particular fetal heart rate evaluations for evidence of distress. This is particularly important with considering the method of intervention in an effort to have the best outcome possible for a healthy bitch and puppies.

CHF: Is surgery the only option during dystocia?

O'Connor: No. There are several options for intervention based on the cause of the dystocia and the well-being of both the bitch and the puppies. One important consideration that may seem obvious but should not be disregarded is to ensure that the due date is correct (ovulation timing performed?) and that the puppies are full term. Canine pregnancy is only 63 +/- 1 day and so every day counts for fetal survivability.

If the bitch is in obvious labor and the result of the difficult delivery is a malpositioned puppy, some skilled obstetricians can resolve some positioning problems during the vaginal exam. In other cases of dystocia, medical therapies may be used to augment labor successfully. For example, some bitches may have ineffective uterine contractions and may respond to oxytocin and/or calcium therapy. It is

important that an obstruction has been ruled out prior to their use as causing contractions against a blockage can not only result in fetal death and discomfort for the bitch, but risks serious uterine damage such as uterine rupture. However, other cases of dystocia may require surgical interventions such as an episiotomy or a C-section.

CHF: Can you briefly describe a canine C-section?

O'Connor: A C-section is performed by a highly skilled veterinary team. It is important that pre-anesthetic evaluations including a physical exam and blood work are performed to assist in the plan for anesthesia. An intravenous (IV) catheter is placed to deliver medications, such as anesthetic drugs and pain medications, as well as to administer fluids during surgery. As much of the preparation is performed prior to anesthesia as possible such as clipping hair on the abdomen to minimize the anesthesia time. There are various successful methods to perform anesthesia including epidural anesthesia or general anesthesia. Once appropriately anesthetized and a sterile scrub performed, the veterinary surgeon makes an incision in the mid to lower abdomen in order to exteriorize the uterus. A small incision is then made into the uterus in order to remove the puppies. In the bitch, the uterus has a short uterine body and two long uterine horns where the puppies reside. As a result, in larger litters more than one incision into the uterus may be needed in order to deliver all the puppies. Once a puppy is removed from the uterus, it is passed on to a highly skilled team of technicians who clear the puppy's airways, stimulate breathing, clamp, tie, and disinfect the umbilical cord, warm and dry the puppy, and place the puppy in a warm and humidified incubator until the bitch is recovered from anesthesia and ready to nurse them. As part of the team is caring for the puppies, the rest of the team, anesthetist and veterinary surgeon, are completing the surgery. Most commonly, the placentas are removed from the uterus with the puppies, although if they are difficult to remove or if bleeding is excessive with removal, the veterinarian may elect to leave them in place to be passed vaginally in the discharge (called lochia) that is seen after delivery as the uterus involutes or repairs. The uterine incision is sutured closed and the uterus is placed back into the abdomen where it is inspected to ensure that all the puppies were successfully delivered, evaluate for any abnormalities, and to make sure there is no bleeding. The abdominal incision is then sutured in several layers. As she is recovering from anesthesia, the veterinary team is making sure mom is comfortable and nursing puppies soon after surgery is complete.

CHF: Now let's finally discuss neonatal care, if a bitch is progressed well through stage 2 how should the puppies look and act immediately postpartum?

O'Connor: Once warm and dry, the puppies should be vigorous and searching out (rooting) for a nipple to actively nurse. Their mucus membranes (gums) should look bright red as that is normal based on the differences in the hemoglobin in their blood for the first few days after birth. They should have tone to their body (not feel limp) and they often vocalize when handled.

CHF: If a puppy is non-responsive does the bitch usually manage resuscitation or should a breeder immediately intervene?

O'Connor: As a breeder myself, it is hard for me to sit back and watch, so I tend to be involved during the delivery and assist the bitch with removal of the sac and fetal membranes, clearing of the airways, stimulation of breathing, drying and warming the newborn, and clamping, tying, and disinfecting the umbilical cord. However, it is also completely normal to allow a bitch to handle the delivery and stimulation of the puppy herself. Natural instinct is amazing, however, not all bitches are great moms and some need more assistance than others.

CHF: Do you recommend that breeders learn how to safely aspirate fluid from the nose and mouth of a newborn?

O'Connor: Yes. It is important to learn how to do this properly and gently so that injuries to the puppy do not occur. This should never be performed with a high power suction vacuum. Bulb syringes or a favorite of mine, the Delee mucus trap, can be used to gently suction the airway and remove and mucus plugs that may be obstructing air flow.

CHF: Is cardiopulmonary Resuscitation, or CPR, ever performed on newborn puppies?

O'Connor: Yes. Neonatal resuscitation is performed most commonly on puppies that are not thriving immediately after birth. Clearing the airway and in some cases giving breaths to a puppy have been used to establish breathing. Neonatal puppies are very susceptible to low oxygen (hypoxia) from poor ventilation and they have immature control mechanisms for respiration. Their respiratory pattern is normally lower and more irregular than adult dogs. Fortunately, newborns have reflexes in the umbilical area and genital area (where mom would lick) that stimulate breathing. There is also a pressure point under the nose that is often used by veterinary professionals to stimulate breathing. One big difference in the physiology of neonates is that a low heart rate is most commonly a result of poor breathing (hypoxia) or a low body temperature, so these need to be addressed prior to reaching for drugs or considering chest compressions. Puppies are also amazingly adapted to survive the stressors of birth and so it is important not to give up on resuscitation techniques too early (giving resuscitative efforts at least 30-45 minutes before discontinuing).

CHF: How long is the neonatal period in the dog and are there different needs during this early period of life?

O'Connor: Generally speaking, a neonate is less than 6 weeks of age at which point the puppy would generally be referred to as pediatric. However, more specifically the following definitions have been suggested to better define neonatal puppies developmental stages: perinatal period (less than one day), neonatal period (one to 21 days), maturation period (21-28 days) and pre-weaning period (28-42 days).

One important factor is that newborn puppies are less mature than newborns of other species, keeping in mind that the most critical period in neonates is the first three weeks.

As mentioned previously, a normal neonate is active, squirms & vocalizes when examined, has a strong suckle reflex, nurses, & gains weight (5-10 % of their birth weight per day). Neonates are very active in their sleep often twitching. They have a well-developed rooting reflex which allows them to make their way to the milk bar. Birth weight is an important predictor of neonatal survival as higher mortality is seen with low birth weights, specifically more than 15% lower than the average litter birth weight. Monitoring weight gain is an important indicator of health status and weight loss or poor weight gain can be one of the early signs of a potential problem. As a result, it is recommended to weigh neonates twice daily for the first week of life.

A neonate's body temperature is lower than adults, normally 97° to 98 F. Below 96°F, their intestinal tract does not have proper motility and so feeding should not be attempted until a normal temperature has been achieved due to the risk of regurgitation and aspiration pneumonia. Neonates are highly susceptible to environmental stress, in particular temperature stress, as they are not able to regulate their body temperature until 3 weeks of age when reflexes such as the ability to shiver develop. As a result, they rely completely on the warmth of their mother as well as the environment to prevent hypothermia. Hyperthermia (>100°F) can also be just as damaging to a neonate as hypothermia, so it is important for breeders to not over supplement heat. Neonatal temperatures should be monitored and should be evaluated if a problem is suspected.

After three weeks of age, their eyelids and ear canals are open, body temperature regulation is established, and the puppy is capable of eating solid food and urinating/defecating without stimulation.

CHF: What are your thoughts on appropriate weaning time for puppies?

O'Connor: As a breeder, I tend to allow the bitch to tell me when she is ready for the puppies to be fully weaned. As mentioned previously, during the first three weeks of life, the puppies rely completely on their mother. After three weeks of age, they continue to mature and one important consideration is that they start to erupt their puppy teeth. At this age, they are also becoming increasingly mobile and it is a great time to start to offer gruel to supplement mom's milk. The intensity of the weaning transition, in my experience, includes several factors, such as the desire of the bitch to continue nursing, her health, and the nutritional needs of the puppies. Some bitches will continue to nurse puppies for 6-8 weeks with a gradual weaning process while others are content to wean them rapidly at 4 weeks and who can blame them as their puppy teeth are erupting at this age. Some bitches will have significant irritation from rough nursing and some will even develop mastitis. In addition, as the puppies grow, their nutritional demands increase which creates a large strain on the bitch. All of these factors are considered in developing a plan for weaning which in most cases begins at 3 ½ - 4 weeks of age and is generally complete by 6-8 weeks of age, sometimes sooner.