

Taking Care Of Your Pregnant Dog

Congratulations! Your dog is about to become a mother. Here are some things to keep in mind while caring for your pregnant dog.

Before delivery

Your dog may require regular deworming, heartworm preventives, and flea control while she is pregnant. Fortunately, many parasite control products can be used during this critical time. Consult your veterinarian about which one is right for your pet.

If your dog is in good physical condition, she will have fewer problems delivering her pups. Pregnant dogs require regular exercise during pregnancy. Weight control is important because more delivery problems are seen in overweight dogs. While weight reduction is probably not advisable during pregnancy, regular exercise will counteract some of the problems associated with obesity. Going for a walk, chasing a ball or Frisbee, or doing any exercise your dog is accustomed to should be safe during pregnancy.

Nutrition is also important during pregnancy. Ask your veterinarian to recommend a high-quality, balanced dog food. Don't give your dog vitamin or mineral supplements, especially calcium supplements, because these could cause a nutritional imbalance. For the first six weeks of the pregnancy, feed your dog her normal amount of food. Gradually increase the amount of food during the final three weeks of the pregnancy so your dog's caloric intake reaches 1.5 times its normal amount. You may need to offer several small meals during the last three weeks because your dog's uterus enlarges in late pregnancy, reducing the amount of food her stomach can hold.

During pregnancy, you may notice vaginal discharges. Occasional mucus discharge is normal. Even if this discharge is pink-tinged, it is considered normal. If the discharge contains blood or pus, see your veterinarian immediately because it could indicate serious pregnancy complications. And be sure to isolate your dog from other dogs three weeks before to three weeks after delivery to reduce the possibility of exposure to disease.

A few weeks before delivery, carefully select a safe and secluded area that is draft-free and away from household traffic patterns. Provide a box that your dog can deliver her puppies in that is easy to clean. Ideally, the box should have a rail around it the puppies can move under to help prevent the mother from accidentally crushing them. Introduce your dog to the box about one week before the expected delivery date to allow your dog to become acclimated. Line the box with washable rugs or blankets to give puppies good footing for nursing and crawling, which helps their legs and feet develop properly.

During delivery

The first stage of labor lasts two to 12 hours. During this stage, the uterus starts to contract regularly and the cervix dilates. Your dog may show signs of nesting, nervousness, panting, shivering, loss of appetite, and vomiting.

When your dog starts experiencing stronger contractions and expels watery fluid, she is in the second stage of labor. The first puppy will enter your dog's pelvic canal, stimulating her to push more aggressively. As each puppy is expelled, your dog will usually break the thin, whitish membrane surrounding the puppy. Puppies may suffocate if these membranes are not removed from their nostrils shortly after birth. The normal interval between the delivery of puppies is 30 to 60 minutes. Rest periods are normal, particularly if your dog is delivering a large litter. During these rest periods, your dog will appear comfortable and care for the puppies already delivered.

You may notice a greenish?black uterine discharge, which is normal. If contractions last longer than one hour or rest periods last longer than four hours, you may need your veterinarian to step in and help. You should also consult your veterinarian if your dog has not delivered a puppy an hour and a half after the watery fluid is expelled. If you see a black, thick discharge and your dog has not shown signs of labor, call your veterinarian immediately.

During the third stage of labor, your dog will expel the placentas. She may eat the placentas and chew the umbilical cords free from the puppies. This placental tissue provides your dog protein and other nutrients, reducing the amount of food she'll need the first few days after delivery. The placentas usually follow each pup, but the passing of a placenta may be interrupted when another pup is delivered. If your dog develops a vaginal discharge that contains pus shortly after delivery, it may indicate retained placentas, so consult your veterinarian.

After delivery

A vaginal discharge is normal after delivery. You should monitor this discharge daily. Watch for a decreasing amount of discharge, a change in color from red to brown, and a change in consistency from watery to mucoid (resembling mucus). It should never have an odor. Your dog will expel most of the discharge in the first two weeks, but you may see small amounts over the following four to six weeks. Blood in the discharge after the first week is abnormal, so if you see any call your veterinarian.

You should also examine your dog's mammary glands every day. These glands provide colostrum and milk for the puppies to ingest. Firm and painful mammary glands may indicate mastitis, an inflammation of the mammary gland. If you catch this early, your veterinarian can show you how to apply hot compresses or perform milk stripping two to four times a day to keep the problem from getting more serious. In most cases, the puppies should still be able to nurse.

As for the puppies, have your veterinarian examine them soon after delivery. The puppies should ingest colostrum within the first 24 hours after birth. Weigh the puppies every day to document weight gain. The Puppies should gain weight daily, although there may be a short lag in the first day or two after delivery. Weight loss or the absence of weight gain may mean serious problems, so consult your veterinarian.

Puppies cannot regulate their body temperatures, so you must keep them warm for the first two weeks of life. Drafts pose the greatest threat for puppies. You can provide supplemental heat sources, such as heating pads or heat lamps on low thermostat settings. Just make sure the puppies can get away from the heat source to avoid becoming too hot. The puppies should remain with their mother during the first several weeks; she will feed them, help keep them warm, stimulate them to urinate and defecate, and teach them appropriate canine interactions.

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INSTRUCTIONS FOR WHELPING

SUGGESTED PREPARATION FOR WHELPING

1. The place where the bitch (mother dog) is to whelp should be prepared a week or so in advance, allowing her to sleep there at night and rest there during the day so that she will be well accustomed to the strange surroundings when the time comes for her to whelp. Many places may be used for whelping. It should be away from activity, noise, and other pets. Think of ease of cleaning (no carpets), and access to the outside for larger breeds.
2. A whelping box should be constructed using either plywood or sturdy cardboard packing cartons. For a medium sized bitch, a whelping box of four feet square is adequate. Make the sides high enough to prevent drafts and line the box with several thicknesses of newspapers. An old mattress pad or quilt in the corner of the box will afford an excellent bed for the puppies to lie on with their dam. The front of the box should be cut away so the bitch can enter and leave the box unaided.
3. Provide a warm place to put the puppies as they are born, such as a basket with a hot water bottle or heating pad. The puppies can later be transferred to the whelping box when the mother dog has completed giving birth. If the puppies get too hot they will "scream" and cry, and if too cold they will whimper. Make sure that you do not take the basket out of mother's sight, since this would upset her and interfere with the remainder of whelping. If the puppies are hungry, they will make "angry" cries.
4. It may be necessary, in the long haired breeds, to comb out or preferably cut the hair around the mammary glands and nipples about a week in advance. Most bitches will start to shed some hair around the nipples about 2 weeks before whelping. The underside of the mother should be gently and thoroughly washed and rinsed clean before the whelping. Any abnormal discharges such as bloody milk, or greenish yellow pus in the milk coming from the nipples and mammary glands should be brought to the attention of your veterinarian.
5. Have iodine or suitable disinfectant on hand for the opened end of the umbilicus on each puppy. Some dental floss will work to tie around the base of the cord if its bleeding. Tie a knot 1/4 to 1/2 inches from the puppy's abdomen. Plenty of clean towels and a human nasal aspirator for nasal mucus removal are also handy to have. An accurate way to weigh the puppies is essential. You may need a gram scale for smaller breeds, dams under 20 pounds. A milk supplement and bottle feeder may be needed.
6. Smaller breeds will definitely need a heat source in the whelping box. Covered heating pads work best. Be careful of heat lamps. Some gradient of heat should be provided, so the pups and dam can move to their own comfort zone.
7. Prior abdominal radiographs of the dam during her 8th week will help at birthing to determine the end point and exactly what to expect. This is especially helpful for first time owners. Ultrasounding is not as accurate especially in large litters.
8. Have emergency phone numbers handy for regular and after hours handy.
9. It is assumed that with the breeding of this pregnancy, consideration of the parents genetic contributions, venereal disease transmissions, and recent deparasitizing and immunizations just prior to insemination took place in the bitch. If these were not taken into account, let your doctor know. Puppies may be at risk of diseases unnecessarily.

II. SIGNS OF ONCOMING LABOR

There may be a pre-labor period 8 to 24 hours in duration. The following signs may be seen during the pre-labor period, indicating the approaching whelping.

1. The bitch becomes restless, getting up, lying down, and changing her position frequently. She may vomit from nervousness.
2. She may paw and scratch at her bedding as if she were preparing a nest. She may tear newspaper up into little pieces in her attempt to make a nest.
3. Lack of interest in even the most tempting food is usually a sure sign that whelping is approaching.
4. Rectal temperature, taken with a rectal thermometer, will fall below 99.0 twelve hours or less prior to whelping. If you start taking the bitch's temperature twice a day after the 59th or 60th day of gestation, her temperature will begin to decrease from a normal of 101.0-102.0 to 99.0-100.0. When it finally goes below 99.0, she will start giving birth within 12 hours.
5. Milk can be expressed from the nipple near or at the time of birth in those bitches having their first litter and about 4 days prior to whelping in those bitches which have had one or more litters previously.

III. THE WHELPING PERIOD (LABOR)

Most bitches will whelp alone and without assistance, needing only supervision by you to see that all is going well. If you bother the bitch too much or interfere you will make her nervous. Be ready to help her or seek help when labor begins if any abnormalities should develop. When in labor, you will see her begin to undergo contractions; she may lie on her side and strain or stand in a "urination stance" (squatting as if to urinate) as she strains. **YOU SHOULD TAKE ACTION IF YOU SEE:**

HEAVY LABOR ATTEMPTS WITH NO PUPPIES ARRIVING FOR 1-2 HOURS OR SOONER

A VAGINAL COMMITMENT TO PLACENTAL OR FETAL STRUCTURE WITH NO ADVANCEMENT

These situations may develop during any phase of the birthing period. Before you panic and call, wash your dominant hand well with good soap and water, and try to determine if and what is present vaginally. Having someone muzzle the dam and holding her will reduce the risk of fear or pain bites. Gently ascend a finger or two vaginally and determine if there is something already committed vaginally. If so delays in the delivery may damage the fetus, so try to help the dam pull it out if you can grasp a puppy body part. Try this before calling, you may just save a pup from brain damage or even death. Packing up and travel to an emergency visit takes precious time.

LABOR STEPS IN CHRONOLOGICAL ORDER:

1. Abdominal straining in the urination stance if lying on her side.
2. Appearance of the "water bag" at the vulva. (The bag is part of the placenta).
3. With continued straining the "water bag" should be forced out within 15 minutes. The puppy will be contained within this membranous sac. The mother should chew the membranes from around the newborn puppy and free it from the sac. She should then bite the umbilical cord in half and lick the puppy dry. This will stimulate the puppy to breathe and cry. She may then eat the membranous sac. (placenta) These membranes will not harm her, but don't allow her to eat more than one or two of the placenta since they may cause some indigestion. Some mothers fail to break the sac and free the puppy. If so, you should help her to break the sac and free the puppy and encourage her to lick the puppy. If she fails to lick the newborn pup, you should gently but vigorously rub the puppy with a rough towel until it starts breathing and crying. Then, sever the umbilical cord about 1/2 inches from the puppy's abdomen with a clean scissors. It is better to "crush" the cord in half rather than a clean cut. You should tie clean thread around the end of the cut cord to prevent bleeding. The cord will shrink up as it dries and will fall off in a few days. (Make sure you have left the cord at least 1/2 inches long) Keep a bottle

of alcohol handy for rinsing the scissors before use. A shallow dish of Iodine or bactine solution can be used to dip the end of the umbilical cord after you have tied it.

4. Afterbirth (placenta) should follow each pup within 5 to 15 minutes. Keep a count of the number of afterbirths. Not every puppy is followed by it's placenta, and you may have placentas retained that will be a part of the post delivery discharge. This and breech birthing is *normal* in the bitch. This can last up to 4 weeks and be normal. Don't allow the mother to eat more than one or two afterbirths since she may get indigestion and diarrhea if allowed to do so.

5. Another puppy should follow in 1 to 2 hours. If the mother continues to strain and have contractions for more then 2 hours without giving birth to another puppy, CALL YOUR VETERINARIAN.

After the puppy has been dried, umbilical cord severed, (and tied if you severed the cord) encourage the mother to lick her puppy, but she may be disinterested in her puppies until she is through giving birth to all her puppies. Then, place the puppy in the small box or basket containing the heating pad or hot water bottle that your have prepared before hand. Make sure the heating pad is not too warm and cover it with some towels. It is not necessary that the puppies nurse until the mother dog has completed whelping all her puppies. (unless complications develop during whelping)

6. After the mother has completed whelping she will lie down and rest with no further straining or contractions. Then, take her out of the whelping box and allow her to urinate outside. Return her to the whelping box and give her the puppies to nurse.

7. The mother should be examined within 24 to 48 hours after whelping and given a Posterior pituitary extract (P.O.P.) injection.

8. In breeds that require tail docking and dewclaw removal, 4 or 5 days of age is the recommended time for this procedure.

IV Post Whelping Chores

There are two common killers of new born puppies: Lack of *heat*, and lack of *groceries*! If you find puppies restless, sucking at everything they can for long time periods, crying or fussing all the time, cold to the touch or lethargic, or rejected by the dam you must make sure these two things are fullfilled. Place a thermometer rectally, it should be close to 97 F no cooler. Puppies should be warmed to close to 100F if failing for any reason, and kept there for the first week. Healthy pups at 97F to 100F can be normal the first week and left normally. Once body temperature is taken care of you must be certain that weight gain is occurring. WEIGH THE PUPPIES ACCURATELY and in large litters identify the puppies with a marking system that the bitch can't lick off. Check the mother's nipples and breast for milk. If its not adequate to satisfy complaining puppies or registering a weight gain, you must supplement. There little bellies should be full looking. Supplement and bottles can be purchased in good pet shops.

1. Determine the happiness of each pup hourly. The first eighteen hours are the most critical.
2. Weigh the pups often the first few days especially.
3. Determine slower puppies rectal temperatures often.
4. Leave the dam alone to work. If you interfere too much it's counterproductive.
5. Check the dam's mammary glands daily for signs of mastitis. They should be soft.
6. Puppies need to be stimulated to urinate and defecate. If the mother is not, do so.
7. Check the pups for congenital defects cleft pallets, abnormal extremities, etc.

This information leaflet is provided as a method of communication between veterinarians and clients whose dogs are about to give birth. It is designed to explain the signs of labor, normal birth process and follow-up care of the mother and her puppies. Your role in preparing for and assisting in the birth is discussed along with problems which require special and/or emergency veterinary care. If you have any questions, be sure to ask your veterinarian to answer them for you.

Preparing for Birth

A couple of weeks before your dog gives birth (whelping), supply the expectant mother with a box for her to have her pups in. The box must be large enough for the mother to stretch out in and allow enough room for a brood of new puppies. The mother dog should be able to enter and leave the box easily. Make sure the sides of the box are several inches high in order to keep the puppies in, box dry, and chilly drafts out. Place the whelping box in a warm area which is free from distractions but familiar to the mother dog. She needs a quiet and secure place to rest.

Newspapers or disposable diapers should layer the floor of the box. They make excellent bedding material because they are easy for the mother to shred for her nest, are absorbent, and can be replaced. Blankets, rugs, and towels are also useful, but they must be cleaned frequently. A heating pad under the box will serve as an additional heat source. Local areas should have a temperature of 80-85°F so the puppies can choose a warmer or cooler area as needed.

Signs of Labor

The normal body temperature of a dog is 101.5° F with variations of one degree above and below normal. About 24 hours before labor begins, the mother dog's temperature may drop by 2 degrees. By taking the expectant mother's temperature twice a day and recording it, dog owners may be able to predict quite accurately when the whelping process will begin. Also about 24 hours before labor, milk is produced, the external genitalia become enlarged and soft, and a thick mucous discharge appears. The dog will refuse food and will become quite restless. Since whelping is imminent, this is a good time to allow the dog some brief exercise, as well as one last chance for urination and bowel movements.

The mucous vaginal discharge turns to a thin greenish discharge a few hours prior to delivery. Primary uterine contractions (labor) begin shortly afterward. A dog may show no pain from these contractions, but she will be nervous and restless.

Whelping

When labor signs are first apparent, the expectant mother should be left alone. If she chooses a bedspread or other area of the house over the whelping box for giving birth, do not move her regardless of the mess that may result. Moving her at this time can take her out of labor and make whelping more difficult.

Prior to giving birth, a dog will assist uterine contractions by straining her abdominal muscles in an effort to force the puppies out of the birth canal. The expulsion of each puppy is preceded by a greenish, fluid-filled sac (placenta). Each puppy is attached to a placenta by an umbilical cord. In larger litters, you may not see one placenta passed immediately after every puppy. Some placentas may be retained and be expelled gradually days after all puppies are born. Most puppies are born head first, but as many as one-third may be born hindquarters first. Either position is considered normal.

An experienced mother will break the sac covering each puppy and lick it to clean it. She will also bite

off the umbilical cord and eat the placenta and afterbirth. An unbroken sac could drown the puppy as it tries to breathe for the first time. Likewise, a puppy wrapped up in the umbilical cord could be strangled, so be prepared to assist the mother, if necessary. If the mother does not take the initiative, remove all covering membranes from the puppy, clean its face and remove any mucus from its mouth and nose. The umbilical cord should then be tied off with thread 1 inch from the pup's body and cut off beyond the tie. Apply a drop of iodine or Betadine to the end of the cord to prevent infection. The remaining part of the cord will shrivel, dry up, and drop off at 2-3 days of life. Letting the mother eat most of the placentas is likely to cause loose stools, and is no medical advantage.

When each puppy begins to squirm and cry on its own, place it close to its mother so it can receive warmth and mothering and begin nursing. Once this is done, the puppy should not be disturbed.

Most puppies are born at 30 to 60-minute intervals, but many variations are possible. For instance, two may be born in close succession, followed by 2-4 hours of rest. A resting stage follows each birth. At this time, milder contractions help expel remaining afterbirth in preparation for the next delivery.

After the last puppy has been delivered, the mother will appear more relaxed with no straining and will attend to her puppies. Allow her an opportunity to urinate and defecate and get some brief exercise. She may have diarrhea for a couple of days as a result of eating the placentas and afterbirth. Her vaginal discharge may appear bloody or a greenish-black color for a few days to 2 weeks, but this does not indicate a problem unless it persists beyond 4 weeks of whelping.

Whelping Problems

If a puppy becomes lodged in the birth canal, immediate assistance is required. Try removing the pup before calling for help. A delay could lead to puppy injury. Wrap a clean towel or disposable diaper around the part of the puppy you can grasp and pull gently but steadily in an outward and downward direction. If the puppy cannot be removed within 5 minutes, call your veterinarian immediately.

If a pup is born weak or is ignored by its mother, your assistance can save its life. For instance, if a newborn puppy appears cold and weak with irregular or no breathing, hold it firmly and swing it up and down between your legs with its head down. This will help drain fluid from the mouth and lungs. To stimulate breathing, rub the puppy briskly with a warm towel. By blowing gently into its nose and softly pressing its chest with your fingers you can also help induce breathing. When the puppy starts breathing on its own, return it to its mother.

Most mother dogs have all of the necessary tools for normal whelping. Too much intervention on your part may be a disservice to both the mother and her puppies; however, veterinary assistance may be necessary if specific problems arise. For example, emergency care is required when, 2-4 hours of intermittent straining and contractions, the dog enters a resting phase without a successful birth.

Follow-up Care of the Mother

It is a good idea to have the mother examined by a veterinarian within 24 hours after whelping concludes to ensure that no puppies or placentas remain in the uterus. An injection to reduce the size of the uterus help prevent infections and other complications.

The mother will need more food once her appetite returns, and it should be divided into at least three daily feedings. Dietary supplements can assist milk production. Ask your veterinarian for specific formulations best suited to your dog. Fresh water should be available at all times. If dried milk accumulates, clean the mother's nipples carefully with warm water.

Disease Considerations for the Mother

Uterine infections, mammary gland infections, and eclampsia (milk fever) can occur after whelping.

Dark-colored material will be expelled from the uterus for several days following whelping. Under normal conditions, this discharge should cease within 4 weeks. If the uterus becomes infected, however, this discharge may increase and become red and foul-smelling. Other signs and symptoms of an infected uterus include an elevated temperature, and a loss of appetite. The dog will also act depressed. If the mother shows signs of an infected uterus, seek immediate veterinary care and keep the puppies warm and nursing.

An infection of the mammary glands will also cause depression and an elevated rectal temperature. One or more breasts will become hard, swollen, reddish-purple and extremely painful. This condition also requires immediate veterinary care.

Milk production and the nutritional demands of puppies can be a severe strain on the mother. She may suffer from a loss of calcium during the first month after whelping because her supply is utilized to produce milk for the puppies. This calcium reduction can create a disease known as eclampsia or milk fever. Emergency veterinary care is essential if the nursing mother shows any of the following signs:

muscular incoordination and excessive trembling,

muscle twitchings or convulsions,

excessive drooling, or

extreme nervousness and panting.

Calcium injections can reverse these signs, but treatment must be immediate to prevent death. Although both the puppies and the mother will try to nurse, in the case of untreated eclampsia, nursing will further drain calcium from the mother's body.

Care of Newborn Puppies

A good mother will do most of the work in caring for her puppies prior to weaning; therefore, a lot of human intervention usually is not needed. Nursing from the mother not only fulfills the puppies' nutritional needs, but it also provides them with antibodies to help prevent infections. In addition, the puppies have an opportunity to learn from their mother.

The two leading causes of puppy death after live birth are chilling, and a lack of fluids and energy. Puppies that are not nursing with enthusiasm, cold to the touch, or constantly complaining need your help. Warm them to 98-100° F rectally, and provide the necessary food. Ask your veterinarian for advice, but be prepared for these things weeks in advance. Soon after birth, the puppies should be examined by a veterinarian. If tail docking and/or dewclaw removal is desired, this should be done before the pups are about 3-5 days old.

The room temperature where puppies are housed should be no less than 70° F and cold floors should be avoided to prevent chilling. Clip the puppies' nails as they become sharp to prevent them from hurting the mother during nursing. A puppy's eyes should open 10-14 days after birth. As the puppies begin to explore their new environment, a mixture of dog food intended for puppy growth and water or milk can be given to assist weaning. Cow's milk can be used unless it makes the puppies sick.

Behavioral adaptation is as important as physical health in puppies. It is best to handle the puppies as little as possible during their first 3-4 weeks of life. After about 4 weeks, you can assist each pup's positive socialization toward people by cradling each puppy in your arms for about a minute twice a day. Do not handle them too much or permit rough handling by anyone, especially children.

Establish regular feeding schedules and take the pups outside or to a specific toilet area when they wake up and after each feeding - this will help facilitate house-training later on. Do not scold them for mistakes but praise and pet the puppies when they urinate or defecate in the correct place.

At 6-8 weeks of age, a stool sample should be checked by a veterinarian for internal parasites. At the same time, the puppies should be vaccinated for canine distemper, hepatitis, leptospirosis, and parvovirus. These vaccinations should be considered at an earlier age if the puppies are not able to nurse from their mother. A rabies vaccination can be given at 3 months of age and older.

Weaning

Under normal conditions, weaning will occur naturally around 5-6 weeks after birth. The puppies will become more independent, and the mother will react negatively to the sharp teeth and nails of her puppies.

To help the puppies make a smooth transition at this time to life without their mother, separate the mother and pups for an increasing length of time each day until they are together only at night. The mother's food intake should be reduced to help her produce less milk.

Gradually replace the puppies' liquid food with a well-balanced commercial puppy food that is intended for feeding during growth. Feed the puppies 3-5 times a day. The whole weaning process should take about 1 week.

If the mother dog continues to produce milk after weaning, her breasts could become engorged and painful. Hot towels and a gentle massage can help reduce the congestion. Complete withdrawal of all food and water for 24 hours often works well. Consult your veterinarian if milk production continues after weaning has been completed.

Orphaned Puppies

One of the primary killers of newborn puppies is the lack of adequate warmth. The mother's natural body heat must be replaced in her absence. Incubators, 60-watt infrared heat bulbs, heating pads or hot water bottles can be used as a heat source. It is estimated that puppies need a constant temperature of 85-90°F the first week of life, 80°F the second week, 75°F the third and fourth weeks, and 70°F thereafter. Incubators with thermostats are most efficient but expensive. The other heat alternatives should warm only half of the available space so the puppies can choose the temperature best suited to their needs. Be sure to cover any heating pad or hot water bottle with towels, newspapers, or disposable diapers to prevent burning the puppies' delicate skin.

A substitute for the mother dog's milk must be found if the natural mother dies or is unable to care for her puppies. Cow's milk alone is not a good alternative because it can irritate a puppy's stomach and intestine. A temporary replacement can be made by combining two egg yolks with 1 cup of homogenized milk or goat's milk. Milk substitutes for puppies can be purchased from veterinarians and certain pet, drug and grocery stores.

When preparing the milk substitute, always follow the manufacturer's directions on the label for its proper preparation and keep all feeding equipment scrupulously clean. A good way of handling prepared formula is to prepare only a 48-hour supply of formula at a time.

The easiest and safest way of feeding milk substitute formula to puppies is by nipple bottle feeding or by tube feeding. Nipple bottles made especially for feeding orphan puppies or bottles equipped with premie infant nipples are best. When feeding with a nipple bottle, hold the bottle so that the puppy does not ingest air. The hole in the nipple should be such that when the bottle is inverted, milk slowly oozes from the nipple. Never squeeze milk out of the bottle while the nipple is in the mouth; doing so may result in aspiration of the milk into the lungs.

Newborn puppies may have a small plug in their anus which prevents normal waste elimination. A mother normally licks each puppy, stimulating urination and defecation. In the absence of the mother, take a piece of cotton, soak it in warm water and wash each puppy's abdomen, anus and rear legs to

stimulate the elimination of waste. It will take about 3 weeks before a puppy can function on its own.

A healthy puppy sleeps a great deal during its first few weeks of life, and it should gain weight every day. Consult a veterinarian if a puppy does not sleep well, loses or fails to gain weight or shows signs of illness.

Glossary

Eclampsia - Disease which is also referred to as milk fever caused by calcium reduction in nursing mothers

Placenta - Fluid-filled sac which is the organ of metabolic interchange between the fetus and mother

Weaning - To take from the breast, depriving permanently of breast milk, and nourishing with other food

Whelping - The act of giving birth to puppies

DVMs can help clients understand behaviors during, after delivery

Preparation time

As natural delivery of the puppies approaches, bitches may change their eating habits. Some bitches will eat more than a normal amount of food and constantly beg for more, others will reduce the amount they eat or eat very little. At least 24 hours before natural delivery of the puppies, it is a good idea to clip short the long hairs surrounding the nipples and the vulva to prevent interference with delivery and nursing. Approximately 18 to 24 hours before natural delivery, the bitch's rectal temperature should drop 1 °F to 2°F below the normal rectal temperature. The normal rectal temperature for adult dogs at home is 100°F to 101.8°F. Rectal temperature can be taken twice a day. When the rectal temperature drops, it is important to stay close because delivery is near.

Natural delivery

Natural delivery has three stages. Stage 1 begins with contractions of the uterus and ends when the cervix is fully dilated. It takes about six to 12 hours. Bitches may appear restless and nervous and may shiver, pant, vomit or pace. Most bitches seek a place to "nest" near the end of this stage. Stage 2 begins with full dilation of the cervix, entry of the first puppy into the birth canal, and rupture of the membranes that surround the puppy. Stage 2 ends with delivery of the last puppy. The bitch shows obvious intense abdominal contractions in her attempt to deliver the puppies. The time between initiation of stage 2 and delivery of the first puppy varies (it is usually less than four hours). The time between deliveries of subsequent puppies also varies (usually 20 to 60 minutes), but can be as long as two to three hours. Stage 3 begins after delivery of the puppies and ends with passage of all membranes. If the bitch has multiple puppies, she may alternate between stage 2 and stage 3.

Difficulty in natural delivery

The natural delivery problems of puppies usually involve a small or deformed birth canal, an oversized puppy or weakness of the uterus (that is, insufficient force of the uterus to propel a puppy through the birth canal). Natural delivery problems are present if the bitch has had 30 minutes of persistent, strong, abdominal contractions without expulsion of a puppy. Other problems include:

- If more than four hours have passed since the onset of stage 2 to delivery of the first puppy;
- If more than 2 hours have passed between delivery of puppies;
- If the bitch fails to deliver a puppy within 24 hours after rectal temperature falls below 99°F or within 36 hours of serum progesterone being <2 ng/ml.

A natural delivery problem also exists if the bitch cries and displays signs of pain and constantly licks her genitals when trying to deliver. The normal length of pregnancy is 63 days from the last breeding. Natural delivery problems exist if the pregnancy is prolonged (that is, more than 70 days from day of first mating, more than

59 days from the first day of diestrus (the time when the bitch will not allow the breeding act to occur), or more than 66 days from the peak in the serum luteinizing hormone (LH).

Assisted natural delivery

Assisted natural delivery is used when a puppy is lodged in the birth canal during delivery. Preferably, a veterinarian should be used for assisted natural delivery. The veterinarian will apply lubrication liberally on a gloved hand and place the bitch in standing position. Use of gloved fingers is the safest and most reliable approach to manually pulling a puppy through the birth canal. If the birth canal is too small for fingers to move and lubrication is adequate, the veterinarian can use instruments. Breeders should never use instruments in attempting assisted natural delivery of live puppies. These instruments can do great harm to the puppy and to the bitch. The veterinarian will place a gloved finger in the birth canal to direct the instrument. A spay hook or a non-ratcheted forceps is used, and traction should be applied to deliver the puppy in a posterior and ventral direction. Traction on a single leg is definitely contraindicated. The veterinarian will perform a cesarean section if the puppy cannot be delivered within 25 to 30 minutes.

Cesarean section

Two types of cesarean sections are generally performed in dogs: unplanned and planned. An unplanned c-section is necessary in the bitch with the following: weak contractions of the uterus, unresponsiveness to the hormone injection oxytocin to stimulate contractions of the uterus, pelvic or vaginal obstruction, a puppy in an uncorrectable position, oversized puppies, puppy stress or a dead puppy still in the uterus. Planned c-section is necessary for breeds highly prone to failure of natural delivery and bitches with a history of failures in natural delivery.

Establishing immediate maternal behavior

Establishing maternal behavior of a birthing bitch involves a variety of hormones, experience as a birthing bitch, hereditary tendencies and the stimulus provided by the newborn puppies. Vaginal-cervical stimulation, which is caused by the passage of the puppy through the birth canal, causes oxytocin release by way of spinal afferents with neural connections to the hypothalamus. The cells that produce oxytocin are located in the hypothalamus. These cells have axons that carry the hormone either to the posterior pituitary gland, where it is released into the peripheral blood stream, or to other parts of the brain, including the olfactory bulb. In the olfactory bulb, oxytocin stimulates the release of monoamines and opiates, which then initiates a sensitive period during which the bitch will identify the smell of the puppies as her own. The period during which a bitch will form a bond with a specific puppy is probably less than 24 hours. Apparently, a decline in circulating estrogen and prolactin, an increase in oxytocin (and possibly prolactin), cervical stimulation and the presence of a small puppy with a foreshortened

face and wet with amniotic fluid are all factors involved in establishing the bitch's maternal behavior.

Puppy rejection

Problem: Puppy rejection is an immediate problem with some birthing bitches. Immediate puppy rejection usually occurs in primiparous bitches. Experience with being a nursing mother once seems to be very important. Multiple rejection episodes are uncommon, possibly because owners do not breed the bitch again after she refused to nurse her puppies the first time.

Solution: Sometimes characteristics of a newborn puppy can be used to induce a new mother to accept her puppy if she is not naturally maternal or to motivate a bitch to accept a puppy that is not her own. These characteristics are that it is small, uncoordinated, and wet. Wetting with amniotic fluid is the best way, but amniotic fluid is usually not available. Wetting the puppy with warm water can be effective. Be sure that the puppy does not become chilled as a result. The bitch will lick the puppy, thus drying it and possibly triggering the natural maternal acceptance.

Problem: c-section is frequently associated with immediate rejection of newborn puppies. Case example: Immediately following surgery the puppies are introduced to the bitch in her cage in the hospital's observation and recovery area. She immediately kills a puppy. The owners then take the puppies and handle them before representing them to the bitch in their van. Apparently, the combination of a more familiar place as in their van and the owner's scent on the puppies was enough to inhibit aggression and allow the bitch to recognize the puppies as her own.

Solution: It is important when introducing the bitch that has had a recent cesarean section performed to her holding cage in the hospital's observation and recovery area that the holding cage be warm and as free of noise as possible. The newborn puppies should already be in the holding cage and making sounds that indicate hunger. It is also extremely important to allow sufficient time to pass for the bitch to establish her maternal behavior before she is transported to the home or a new location. Birthing in familiar environments always helps to reduce aggression toward newborn puppies.

Problem: Occasionally, puppy rejection can lead to cannibalism. In some cases, the bitch eats the placenta and chews the umbilical cord and she may keep on chewing up the umbilical cord and begin consuming the puppy.

Solution: There is nothing one can do to stop cannibalism of a litter of puppies once it starts other than to raise the newborn puppies as orphans.

Whelping and Managing Healthy Puppies

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Whelping

Even though exact mechanism of initiating parturition in the bitch is not well understood. But it is believed that both the fetal and maternal factors contribute in initiating whelping. The hormonal changes, including decrease in progesterone, and increase in prostaglandin F_{2a}, prolactin and corticosteroids play an important role in whelping.

Onset of whelping can be predicted by drop in serum progesterone and rectal temperature¹ (hypothermia), etc.

Stages of whelping

Stage I

It lasts about 6-12hrs. Synchronous uterine contractions and dilation of the cervix occurs during this stage but these contractions are not visible from outside. Bitch is usually restless, may not eat well, pant and shiver. First timer young bitches may get nervous and this stage of whelping may last longer.

Stage II

Puppy delivery occurs during this stage. The puppies are usually delivered every 30 minutes to 1-hour interval, with some exceptions of longer interval. On average it takes about 3-6 hours to complete the whelping. Up to 24 hour to complete the delivery has been reported without any complications.

During this stage, the cervix is wide open and with the help of uterine contractions and the mother's push, the puppy is delivered. In uterus, the puppy is enclosed in two placental membranes - allantochorion (outer) and allantoamnion (inner). At delivery, the outer membrane breaks and the fluid are discharged from the vulva. Most of the puppies are delivered enclosed in the inner membrane, which is usually removed by licking by the bitch. If the puppy is covered with the membrane, a person in attendance may remove it to facilitate puppy's breathing. The bitch's vigorous licking stimulates breathing and cardiovascular system of the puppy. The bitch also sever the umbilical cord during the licking. If the umbilical cord is intact, it can be ligated with a thread about an inch from the puppy, and cut with scissors. Dipping in 2% iodine solution should disinfect the cut end.

The puppy delivery by head or tail coming first is considered normal. Lochia or postpartum discharge in the bitch is dark green color compared to red color in other domestic animals. The green color comes from biliverdin, a pigment in the placental band, attached to the uterus. As the placenta detaches from the uterus, the pigment is released. Lochia may be discharge for 2-3 weeks post whelping.

Stage III

Placental delivery is completed during this stage. As discussed before, the placenta usually follows the delivery of each puppy, which may take 5-15 minutes during 2nd stage of whelping. Retention of fetal membrane is uncommon.

Managing Healthy Puppies

About one-third of all pups born alive die by weaning age; most die within the first 2 weeks of life. Causes of puppy mortality are poorly understood, and fetal maturity is difficult to assess. Maternal age, however, does appear to influence puppy survival, performance decline after the fifth year of life or after the sixth litter.

a. Hypothermia

The most critical need of a new puppy is warmth. Usually, the newborn is protected against hypothermia by its closeness to the dam and littermates. Neonatal puppies cannot regulate their body temperature until 12-14 days after birth. Neonate can maintain its body temperature only 8 to 12°F above the environmental temperature. The owners must ensure that the pup's environmental temperature be approximately 85°F. The physiologic reasons for the lack of adequate thermoregulation include decreased body fat, poor peripheral vasoconstrictive reflexes, a large surface area to body weight ratio, and lack of a shivering reflex. The shivering reflex begins at about six to eight days of age. The absence of an adequate cardiovascular response to hypothermia seemingly makes hypothermia an irreversible event in the newborn, especially if accompanied by anorexia.

Hypothermia is recognized when the core body temperature drops below 94°F. Ineffective nursing may manifest it. The bitch may push the ill puppy away from the others. Initially, the pup may become more active, but this activity stops as the core body temperature begins to fall. As hypothermia worsens, the pup will become motionless, with very slow respiration.

One method of treatment is to slowly re-warm the puppy by holding the pup next to one's body - inside a loose garment or pocket - and by gently massaging the pup. Rapid re-warming should be avoided as this will result in an increase in metabolic rate with the possibility of increasing tissue hypoxia. Other heating devices that have been used include heating pads, lamps, and hot water bottles. Regardless which heating device is utilized, care should be taken to prevent burns, as the neonate may not show pain, and the peripheral circulation may be inadequate to effectively distribute the heat. Another alternative is to use of an incubator, which should be kept 85-90°F. Care should be taken not to exceed 90°F, because this can lead to respiratory distress. For both the normal and hypothermic neonate, the relative humidity within the incubator should be maintained at 55% to 60%, and the oxygen concentration should be between 30% and 40%.

b. Colostrum Deficiency

Colostrum is the second critical need of the newborn. Even though carnivore placentas are relatively thin compared to other domestic species, the neonate acquires relatively small amounts of immunoglobulins prior to birth; ingestion of colostrum is almost essential to normal growth. Colostral antibodies are absorbed within the first 24 hours.

Although puppies deprived of colostrum may survive if fed bitch milk replacer, they will have been deprived of 80-90% of the passive immunity nursing puppies acquire. If the pup is slightly chilled or weak, it should be warmed and then a saturated glucose solution (sugar water, honey water, karo syrup, etc.) is preferred to administration of either mother's milk or milk replacer.

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