Article ID: WMC001994 2046-1690

Care of the New Born Domestic Animals

Corresponding Author:
Dr. Govind N Purohit,
Associate Professor, Department of Veterinary Gynecology and Obstetrics, College of Veterinary and Animal Science, Rajast, Department of Veterinary Gynecology and Obstetrics, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Science Bikaner Rajasthan, 334001 - India

Submitting Author:
Mr. Govind N Purohit,
Associate Professor, Vet Obst & Gynec, Raj University of Vet & Anim Sci Bikaner Rajasthan, Deptt of Vet Obst & Gynec Veterinary College Bikaner, 334001 - India

Article ID: WMC001994

Article Type: Review articles

Submitted on:18-Jun-2011, 06:51:50 AM GMT **Published on:** 18-Jun-2011, 07:34:46 PM GMT

Article URL: http://www.webmedcentral.com/article_view/1994

Subject Categories:VETERINARY MEDICINE

Keywords: Calf, Colostrum, New Born, Puppy, Foal

How to cite the article: Purohit G N. Care of the New Born Domestic Animals . WebmedCentral VETERINARY MEDICINE 2011;2(6):WMC001994

Care of the New Born Domestic Animals

Author(s): Purohit G N

Abstract

New borns of various domestic animals need care and attention. They may suffer from many problems and diseases during the neonatal period. This manuscript describes the care of new born calves, buffalo calves, lambs, kids, foals, piglets and puppies. Important aspects described include feeding of colostrum, feeding of orphan animals, shelter and housing, important procedures carried out on young ones like tail docking, vaccination and the common diseases affecting the young ones of common domestic animals.

Introduction

An important aspect of the fruitful animal husbandry is the care of the new born. New born pups and foals usually fetch a high price however, calves, lambs and kids are no less important. The first few days and weeks are important as during this time the new borns are most vulnerable to disease. The highest pig mortality is also seen during the first few days of farrowing. Although the basic care of the newborn involves the proper supply of colostrum, prevention of the new born from extremes of climate and prompt care during illness, there exist some differences between the different domestic species, therefore the care of the new borns of different species is discussed separately.

Review

1. 1. Care of calves, buffalo calves, lambs and kids

The mother usually licks the young one continuously immediately after birth and this removes any mucus adherent to the nostrils and also stimulates the blood circulation in the young ones body. The first thing to notice, therefore following the birth of a calf, buffalo calf, kid or lamb is the normal respiration. If sufficient delay occurred in the delivery of the fetus it should be held by its hind legs and lifted upwards to remove mucus in the air passages by gravitation. Gentle massage of the chest area is suggested during the lifting. Air must be blown in the ear and this stimulates the young one to shake his head. Gentle rubbing of the body with hand or soft towels would also help in increasing the circulation in the calf, lamb or kid. Once the calf is respiring normally it should be kept in front of her mother who starts licking her. Some mothers may not lick their young ones and they must be dried with soft towels and massaged for some time. New borns that have very weak cardiac and respiratory outputs must be provided some artificial respiration using oxygen and appropriate intravenous or intracardiac therapies in emergencies (Weaver and Angel-James, 1986; Nagy, 2009).

The mother usually licks the young one continuously immediately after birth and this removes any mucus adherent to the nostrils and also stimulates the blood circulation in the young ones body. The first thing to notice, therefore following the birth of a calf, buffalo calf, kid or lamb is the normal respiration. If sufficient delay occurred in the delivery of the fetus it should be held by its hind legs and lifted upwards to remove mucus in the air passages by gravitation. Gentle massage of the chest area is suggested during the lifting. Air must be blown in the ear and this stimulates the young one to shake his head. Gentle rubbing of the body with hand or soft towels would also help in increasing the circulation in the calf, lamb or kid. Once the calf is respiring normally it should be kept in front of her mother who starts licking her. Some mothers may not lick their young ones and they must be dried with soft towels and massaged for some time. New borns that have very weak cardiac and respiratory outputs must be provided some artificial respiration using oxygen and appropriate intravenous or intracardiac therapies in emergencies (Weaver and Angel-James, 1986; Nagy, 2009).

The next thing to notice and pay attention to in these species immediately following birth is the navel cord (umbilicus). The navel must be either dipped in tincture of iodine or sprayed with iodine sprays. If left unattended the navel may sometimes become infected and result into navel ill with hot painful swelling and sometimes a joint ill within a few days of the birth of calves, kids and lambs. When this develops some antibiotics must be given along with probiotics and iodine spray on the navel.

Another important event during the first day of the young one is the drinking of the first drink from the mother's udder the colostrum. Calves, lambs and kids are all born as monogastric animals which enable them to digest a milk diet. The milk bypasses the rumen by the closing of the oesophageal groove. This closing sends the milk into the abomasum. The rumen is small in newborn ruminants but develops slowly in a

few days with complete rumen development in a few months. The rumen development involves the transfer of useful bacteria from the mother, growth of rumen papillae, and increase in ruminal muscular activity which depends on the intake of dry feed, fodder and water consumed within a few days or weeks by the growing ruminant.

The colostrum feeding of the new born is very important as it provides warmth and energy to the new born and help increase the body temperature. It also provides many antibodies which builds up the newborns immunity (Weaver et al., 2000; Waldner and Rosengren, 2009; Godden et al., 2009). Colostrum needs to be ingested as soon as possible after the young one is born. Within 24 h these special cells become ordinary cells and can no longer absorb colostrum. Also there is a trypsin inhibitor in the colostrum which allows the immune globulins to reach the intestines without destruction. It is presumed that the globulins pass from the intestine by the lymphatic system to the blood stream. The colostrum is also rich in proteins, fat and soluble vitamins and also has a mild laxative effect that helps the infant pass meconium, the black feces the new born first passes. The colostrum from first time mothers is adequate, but the colostrum from older mothers will have more antibodies.

The new born usually tries to stand-up on its own within minutes of its birth and usually within an hour. If it is not able to stand up on its own in four hours something is wrong. An early approach would be to make available a small quantity of colostrum by bringing it manually closer and making it to suckle on the mother's teat. The new born usually suckles the colostrum on its own but at times it may be necessary to train him by putting a finger in the mouth while pouring a few drops of colostrum and then shifting him to the mother's udder. New borns suckle colostrums for many times during the first 2-3 days and this is normal.

The colostrum from mothers that had a premature delivery may not be of optimum quality. Instruments to measure the quality of the colostrum (Clostrometer) are available in some countries and frequently used by many farmers. In case the colostrum is of poor quality or is low in quantity it can be replaced by previously refrigerated colostrum (when collected properly and cleanly refrigerated colostrum keeps well for nearly one year), colostrum borrowed from other mothers, other farms or replacement by using some commercially available colostrums. Each time the new mother is milked the quality of her colostrum decreases. Colostrum is usually thick and off white in color. Thin colostrum, colostrum mixed with blood or colostrum from cows treated for mastitis or that with a high bacterial count should be avoided.

The quantity of colostrum fed depends on the breed and environmental temperatures. In cold temperatures more quantity of colostrum is needed. And the larger breed calves need more of colostrum. It is usual for many dairy farmers over many countries not to consume the milk produced by dairy cows/buffaloes for the first few weeks post-partum and allow ad lib feeding of milk for the calf. At some locations the surplus milk left in the teats after feeding the calf is milked out and fed to stray dogs.

1.1 Feeding of orphan calves/kids/lambs

Newborns whose mothers have died due to some or other reason need to be cared to save their lives. It is usual for farmers to make the orphan young one being adopted by foster mothers. This usually involves the rubbing of placenta and uterine secretions of newly calved mother on the body of the orphan and putting the orphan in front of the new mother. This makes the new mother adopt the orphan new born. The mother is often confused by spraying perfumes near her nostrils. At times when this is not available orphan new borns have to be fed by artificial means. A range of artificial feeding equipments (for eg. Esophageal feeder) are commercially available at many places for young ones of various farm animal species including calves, lambs and kids and have been used under many farm situations. A simplest feeder could be the feeding bottles used for feeding human infants, however, it must be kept in mind that the right quality and quantity of milk must be fed to the newborns for at least 4 weeks subsequent to colostral feeding for the first 2-3 days. A calf starter should be started early in orphan calves (12-14 days of age) so as to wean them early. The ingredients of milk vary between the species. Table 1 shows the milk ingredients in some species and this could be a preliminary guide in formulating milk feeding formula for orphan new borns. An extra energy needs to be provided when new borns are being raised in colder climates. Milk replacers are also available at many countries and can successfully replace whole milk. Feeding should be done at least for twice to thrice a day for the first few days.

1.2 Shelter and housing

The new borns need to be protected from the extremes of the weather including heat, cold and rains yet allowing them ample space, sufficient ventilation and sunlight. Saw dust is a good bedding material for new borns housed in permanently built buildings as it keeps them clean and dry and can be removed easily from time to time. Some commercially made calf homes are also marketed at some places. In situations where dairy cows, buffaloes and goats are kept in

open thatched houses their new borns need care. However, sheep at many places are migratory and the lamb mortality is still low although they are kept in the open during the winter lambing. Probably these lambs have a higher immunity.

1.3 Weaning of new borns

Weaning means removal of new borns from the mother's milk and shifting them to solid feed and fodder. The aim of weaning is many folds; it lowers the cost of rearing, helps in development of the rumen and also triggers the reproductive cyclicity in the mother which was inhibited or prolonged by the suckling calf. Calves can be fed commercially available early starter feeds by the third or fourth week and offered hay as early as the second week. It is also common for the dairy cow/buffalo owners to offer the feed left over by the mother to its calf. Starter feeds are less frequently fed by the sheep and goat owners, but as the lambs/kids have ready access to grass they start nibbling grass and this helps in rumen development. Ideally new born calves/buffalo calves should be weaned at 5-8 weeks of age; however, it is not unusual for a few cow/buffalo owners to feed their young ones on one teat for prolonged periods (up to 6 months age).

1.4 Dehorning/Docking

New born calves and kids are dehorned by destroying the horn bud at about 7-10 days of age by using caustic potash sticks or using an electric horn debudder. Care should be taken not to burn the horn bud excessively and antiseptics must be applied after debudding is completed. Similarly tail docking of lambs can be done during the first week of life using rubber ring or an electric docker. Castration of bucks and lambs using rubber rings should also be done within the first 2 weeks of life.

1.5 Common diseases of new borns

The most frequent problems of the new born calves, lambs and kids are navel ill, septicemia, diarrhea, pneumonia and theleriosis (Bali et al., 1979; Donovan et al., 1998; Reddy and Chaudhari, 2000; Ghosh and Patunda, 1998; Gitau et al., 2001; Khan et al., 2007; Leadley, 2003; Speicher and Hepp, 1973; Panchsara et al., 2009; William and Theodore, 1986; Tiwari et al., 2006; Kumar et al., 2009; Haughey, 1991). Dairy calves can suffer from vitamin A deficiency, ringworm and theleriosis and buffalo calves commonly suffer from thiamine deficiency and mange besides the above mentioned problems.

1.5.1 Septicemia

When a new born has septicemia it has disease producing organisms or toxins in its blood. These can spread to multiple organs and can result into meningitis, multiple organ dysfunction, shock and death (Fecteau et al., 2009). Septicemia in calves is usually the result of bacterial infection (E.Coli, Salmonella) that occurs while the calf is in the uterus, during, at, or immediately after birth. The route of infection can be the blood of a sick dam, an infected placenta, the calves umbilical stump, mouth, inhalation or wound. Septicemia is the most severe medical problem that a calf can develop. Septicemia is difficult to treat, and the survival rate is low (Mulei et al., 1995; Aldridge et al., 1993). The affected calves are usually depressed, weak, and reluctant to stand and suckle poorly within 5 days of birth. Swollen joints, diarrhea, pneumonia, meningitis, cloudy eyes and or a large tender navel may develop. Calves may have normal or subnormal temperature.

1.5.2 Diarrhea (Neonatal Calf Scours)

Diarrhea is the most common cause of death in young calves, less frequent in buffalo calves (Dubey et al., 2008; Gundram and More, 1999) and is almost entirely avoidable by good management. The highest risk period for diarrhea is from birth until about 1 month of age (Rao and Nagarcenkar, 1980). Many bacteria, viruses and/or parasites cause diarrhea in calves, kids and lambs. Usually, the calf is infected with more than one agent. The virus, bacteria or parasite is generally identified from a fecal sample or from the intestines of a dead calf. Some agents can also be identified from healthy calves and adult cows. A useful guide to the cause of diarrhea could be the age of onset of diarrhea. E. Coli affects mostly within first 3 days of life and Salmonella affects 5-14 day old calves, bovine virus diarrhea occurs in calves between 4 to 10 weeks of age and coccidia affects calves between 7 days to 6 months age. The symptoms can vary from profuse watery diarrhea to hemorrhagic diarrhea sometimes with colic and nervous signs. Dehydration may develop fast along with hypoglycemia; coma and death appear fast in unattended patients. The treatment depends upon early identification and prompt fluid and electrolyte replacement. The identification of extent of dehydration (percent) can be done by using the below mentioned criterion as the calf usually dies of dehydration:

i) Sunken eyes, skin tenting for 3-5 secs: 6-7 % dehydration

ii) Depression, skin tenting for 8-10 secs, dry mucus membranes: 8-10% dehydration

iii) Recumbent, cool extremities, poor pulse: 11-12% dehydration.

It is many times common for the farmers to withhold milk to calves suffering from diarrhea and feed them whey, but does not seem appropriate. Oral electrolyte replacement with sufficient access to water is essential in calves suffering from diarrhea. The amount of

electrolytes to be given orally depends on the extent of dehydration (Naylor, 1990). In mild diarrhea the amount of oral fluids may be 1.1 kg/day whereas depressed calves may require 3 to 4 kg of oral electrolytes. Seriously ill depressed and recumbent calves may require intravenous fluids and glucose.

The oral fluids may be prepared by adding 1 teaspoonful of salt, 1 teaspoonful of soda bicarbonate, 2 teaspoonfuls of glucose and a pinch of potassium chloride to 1.5 to 2 liters of body temperature water.

Many types of diarrheas do not require any antibiotic therapy specially those of viral origin and those caused by E.Coli. The choice of antibiotic in other forms of diarrhea must depend on the type of organism isolated from the feces. It is usual for many veterinarians to administer sulfadimidine or other antibiotics to diarrhea affected calves. Calves suffering from a hemorrhagic diarrhea must be considered suspicious of coccidiosis. Four products are commonly used in calves suffering from coccidiosis; amprolium, decoquinate, lasalocid and monensin. These products work at different stages of life cycle and stop development or kill the organism. Since, some protozoal organisms can cause diarrhea some commercial companies' market combinations comprising of antibiotics and anti-protozoals. Pectin and kaolin are good agents in controlling diarrhea. Calf mortality due to diarrhea is more prevalent in calves 3 to 6 months of age (Rao and Nagarcenkar, 1980; Gulliksen et al., 2009).

1.5.3 Pneumonia

Pneumonia is an inflammation of the lungs and is usually caused because of lack of colostrum feeding, cold weather, diurnal temperature variations and a wet housing. Clinical signs of pneumonia include a nasal discharge, dry cough, body temperature of greater than 41 degree C, respiratory distress and decreased appetite. Sometimes head tilt and an inability to rise may be seen. Herds often experience outbreaks of pneumonia occurring in a number of calves at the same time. Frequently more than one agent are involved in an outbreak and include Pasteurella haemolytica, Pasteurella multocida, Mycoplasma bovis, Haemophilus somnus, Actinomyces pyogenes, IBR and Salmonella dublin. Problems that occur within 5 days of birth usually have their source as the dam or the calving environment. After 7 days of age, problems develop from a source in the calf environment.

Antibiotic therapy is necessary along with non-steroidal anti-inflammatory drugs like aspirin, banamine or ketoprofen. Supplementation of probiotics and improvement of the environment and keeping the calves in a clean and dry place is helpful in improving the calves' health. Rubbing the chest of the calf with liniments is helpful. When the calf is seriously ill it must be monitored more closely and appropriate therapy instituted at an early time. Calf mortality because of respiratory disease is high in young calves below 1 month of age (Rao and Nagarcenkar, 1980; Gulliksen et al., 2009; Donovan et al., 1998) and also in sheep (Rook et al., 1990; Binns et al., 2002).

2 Care of New born foals

2.1 Immediate Post-Partum Examination

The immediate post-partum examination is very important. Foals are sometimes seriously compromised. Early detection of problems and prompt veterinary care are critical in the overall outcome of the compromised foal. Resuscitation of the compromised foals is important and this includes the care of both the respiration and the circulation (Palmer, 2007). Because the first examination is usually performed by a lay person, farm manager, or night watchman, farm personnel should be knowledgeable about foal delivery and should be able to recognize post-foaling abnormalities. Farms should be equipped with an emergency kit, and personnel should have a basic knowledge of pulmonary resuscitation of the newborn foal. Many times, a brief administration of nasal oxygen will make a great difference in the immediate health of compromised foals (Corley and Axon, 2005). The basic procedure of compromised foal care has been described recently (Pierce, 2003). Briefly, the airways must be cleaned and any fluid in the nostrils should be aspirated with a catheter tipped syringe. If this does not induce respiration ventilation must be attempted by mouth to nostril breaths (20-30 breaths per minute) or a oxygen mask should be applied and oxygen given (Kahn et al., 1992). Positive pressure ventilation is best accomplished via an endotracheal tube (Kahn et al., 1992). In case of circulatory compromise chest compression should be done (100-120 compressions per minute). If no pulse is still present after 2 minutes 1 mL of epinephrine (1:1000) should be given IV (Palmer, 2007).

Immediately after delivery of the foal, respiration should be assessed. Respiratory movements usually begin within 30 sec of birth. Initially, the respiratory rate is 60 - 70 breaths/min. The mucous membranes should become pink within the first minute after delivery, and the capillary refill time should be 2 sec or less, which indicates adequate peripheral circulation. Infrequent or shallow respiration is usually followed by pale or cyanotic mucous membranes and hypoxemia. In this instance, 3 - 5 min of nasally administered oxygen will assist oxygenation. The normal foal responds to external stimuli, and a suckle reflex begins within 5 min of birth. The newborn foal will also

respond to noise and may whinny. Heart rate and strength can be evaluated by watching the palpations of the heart or by watching for the heart beat through the thoracic wall. Normal heart rate for the newborn foal is 60 - 120 beats/min. Foals with heart rates of

It is usual for many clinicians to perform a complete blood count (CBC) and immunoglobulin G (IgG) concentration when the foal is 6-8 h post first suckles. The required minimum IgG concentration is 400 mg/dl. Foals at risk for illness because of pregnancy or farm history of disease need to have an IgG concentration of 800 mg/dl. (Pierce, 2003).

Foals with an IgG concentrationin uterofetal infections such as Leptospirosis, (Bernard and Williams, 1993) trauma during birthing process, or delayed pulmonary clearing of fetal fluids. Occasionally, WBC counts

Most normal mares and foals are turned out into a small paddock the first day after birth. Turn out is restricted to 30 min - 1 h the first day, and the time is gradually increased over the next few days. Mares and foals should be kept in their own paddock until the tenth to twelfth day. They must then be turned out into a larger paddock with one or two other mares and foals. If foals require restricted turn out or when frequent treatments are indicated, a round pen or a portable pen about the size of a stall is used.

2.2 Signs of health in a new born foal

A healthy newborn foal is strong, responsive and very active. A number of things should be noted when observing the newborn from a distance including the foal's attitude, willingness to nurse, awareness of the surroundings, the relationship with the mare, the ability to move around and the respiratory pattern.

Mares encourage their newborn foals to get up and nurse within the first hour after birth. This is often referred to as the "1-2-3 RULE" of the newborn foal:

A healthy foal should stand within 1 hour

Should start nursing within 2 hours

Should pass the meconium (first feces) within 3 hours after birth

It is important for the foal to ingest the colostrum as soon as possible after standing. The suckle reflex begins at approximately 20 minutes after birth, and becomes stronger and stronger with time. Moreover, normal foals nurse every 30 minutes, and failure to suckle is the first sign of a neonatal problem. Normally, foals suckle approximately 30 times per day, ingesting 12 to 20 percent of their body weight in milk, and gaining an average of two to three pounds per day. It is advisable to have a routine evaluation of newborn foal by the veterinarian within 12 to 24 hours of birth. This should include careful observation and physical examination, and assessment of maturity and passive transfer of maternal immunity.

If the newborn foal does not stand and nurse by two hours after birth, it should be considered abnormal.

The first feces of the newborn (meconium) are dark brown and either pasty or firm little fecal balls. It is important for the foal to pass the meconium within 3 hours after birth and the best way to stimulate gut movement and passage of the meconium is nursing them properly.

2.3 Signs of Abnormalities

Signs of problems include not nursing often (make sure to check the udder), salivating excessively, grinding teeth, or showing signs of abdominal distension and pain (such as getting up and down, rolling on his back). Other signs include straining to defecate and urinate, limb abnormalities such as angular or flexural limb deformities and lameness (Rossdale and Ricketts, 1980).

2.4 Common Abnormalities of Foals from birth to 30 Days of Age

A new born foal can suffer from many abnormalities however, some of the most common ones detailed previously (Rossdale and Ricketts, 1980; Pierce, 2003) are described. The prognostic factors in the neonatal sick foal have also been detailed recently (Castagnetti and Veronesi, 2008).

2.4.1 Fractured Ribs

Fractured ribs are a very serious problem in the neonate, because death can result from a fractured rib penetrating the heart or lungs. No foal should be turned out into a paddock until its ribs have been palpated. Fractured ribs are most common after a dystocia or in very large foals. If the foal has been determined to have fractured ribs, it should be restricted to a stall for approximately 3 weeks. Usually, this length of time will allow for stabilization of the fracture site, and an adequate fibrous callous over the fracture will form. Foals with less severe fractures are often difficult to detect on the initial examination. These foals may present as a mild colic after initiation of exercise, or one will observe an increased heart rate or rapid respiratory rate. A careful examination will reveal the presence of a fractured rib and mild edema over the affected ribs. In questionable cases, an ultrasound examination will confirm the presence of a fracture.

2.4.2 Entropion

Entropion is the most common ophthalmic abnormality. Uveal inflammation has been recorded in septic new born foals (Leiva et al., 2009). This abnormality is best treated with a SC injection of 3 ml of procaine penicillin G (PPG) in the affected eyelid. This injection inflates excess tissues and decreases tissue laxity, causing the lid to stay in its normal position. The mild inflammatory reaction within the SC tissues engorges

the redundant tissue; thus, suturing of the eyelids is rarely necessary. Restraint is very important in this procedure to prevent the eye from being damaged with the needle.

2.4.3 Umbilical Bleeding

Occasionally, an umbilical vein will hemorrhage if it has failed to close properly after rupture, or if a foal is straining to defecate. The amount of bleeding may be significant. A commercially available umbilical clamp or ligation of the umbilicus with a #2 monofilament suture material can be used to stop the bleeding. The umbilicus should be observed carefully over the next 2 - 3 weeks, because these foals are more likely to have an infected cord, and they may require antibiotic therapy.

2.4.4 Umbilical Hernia

Umbilical hernias are easily palpated on the newborn examination; however, they are most obvious when the foal is a few weeks of age and the omental fat protrudes into the hernial sac (Rings, 1995; Riley et al., 1996; Orsini, 1997; Steiner and Lejeune, 2009). Umbilical hernias are rarely a problem in the neonate, and they are usually repaired surgically at a later date. Ventral hernia can result in foals due to dystocia (Witte et al., 2008). Specially designed straps have been suggested to support hernias in the horse.

2.4.5 Meconium Impaction

Meconium is the brown, black, or greenish brown feces that is composed of glandular secretions and digested amnion. Most is passed within 24 h after birth, and it is followed by typical yellowish-colored milk feces. Meconium retention is a common source of abdominal pain in the neonate, but is more common in colts. Affected foals are initially treated with warm water and soap enemas and a low dose of flunixin meglumine (0.5 - 1.0 mg/kg) along with 12 oz of mineral oil through a nasogastric tube. Foals that refract three enemas and continue to be in pain or foals who develop abdominal distention should be referred to the hospital and considered for surgery (Cable et al., 1997). Occasionally, the meconium is passed before or during delivery because of hypoxemia or asphyxiation (fetal distress). If significant amounts are passed into the amniotic fluid before foaling and the fluids are fecal tinged, the amniotic fluid that enters the foal's lungs may be contaminated. This contamination leads to meconium pneumonia.

2.4.6 Head Tilt

A head tilt is seen in many clinically normal foals. No outward signs of ataxia or cranial nerve VII deficits are associated with this syndrome, and it is a transient condition that usually does not persist for more than 7 days. This is possibly associated with birth asphyxia or maturation of the nervous system. A careful clinical examination and a CBC should be performed to detect underlying disease.

2.4.7 Congenital Papillomas

Foals may be born with papillomas (warts) on various sites of the body, most commonly on the head and legs. The growths are benign and rarely a problem; however, if the growths are traumatized, they will hemorrhage. Usually, the papillomas are pedunculated and can be easily ligated. If left alone, most will spontaneously regress.

2.4.8 Neonatal Maladjustment Syndrome or Hypoxic Ischemic Encephalopathy ("Dummy Foals")

This condition is a common abnormality (Baird, 1973; Palmer and Rossdale, 1976). This syndrome usually follows premature placental separation (red bag), dystocias, or non-elective C-sections. The clinical signs can vary in onset and clinical presentation. Most signs are apparent within 48 h of birth; however, in some rare cases, clinical signs are apparent as late as 5 days after foaling. Typically, the foal is slow to nurse or stand. Additionally, the foal may wander or have seizures. These foals are usually referred to the hospital.

2.4.9 Septicemia

Foals may be born with a bacterial septicemia. Sepsis is often apparent within the first few hours of life. Affected foals do not stand and nurse, and they have very discolored mucous membranes with poor perfusion (Welschen et al., 2005). The total WBC count is often Salmonella sp., latent infection post-parturition is common. Despite aggressive treatment early in life, many foals will develop septic arthritis and osteomyelitis later. Many foals septic at birth are associated with a bacterial placentitis. The most common pathogens are Salmonella sp., E. coli, and Actinobacillus equuli. Despite aggressive therapy, these foals usually die.

2.4.10 Leg Edema

On the initial examination, many apparently normal foals have severe distal limb edema of two or four limbs. The CBC and IgG concentration are normal, and the foals are afebrile. The cause is unknown. Clinically normal foals are turned out into a small paddock and given 0.5 - 1.0 mg/kg of flunixin meglumine or other non-steroidal anti-inflammatory drugs for 1 day. Most foals are normal the next day, and few require bandaging. All non-complicated foals with edema are normal within 48 h.

2.4.11 Neonatal Isoerythrolysis (Hemolytic disease)

Neonatal isoerythrolysis (NNI) occurs when the foal inherits different blood antigens (types) from the stallion and the mare. As a result, the mare has produced antibodies to these antigens, which are concentrated in her colostrum (Boyle et al., 2005).

How the mare is exposed to the foal's blood is uncertain, but it is thought that repeated exposure to red cell antigens after numerous foalings or placental leakage of blood is most likely (Becht et al., 1983). The condition is known to affect donkey and mule foals (Dargatz et al., 1995, McClure et al., 1994; Boyle et al., 2005).

The foal nurses the colostrum, and, depending on the concentration and type of antibodies, the foal develops hemolytic anemia within 24 - 96 h of age. Affected foals become icteric, depressed, and anemic. Red cell type's Q and A are the most lethal antibodies (Becht and Semrad, 1985; Bailey, 1982; Kahn et al., 1991; Mc Leay, 2001). Occasionally, the types U, S, T, and, more rarely, other antibodies can induce NNI. Many mares have anti-C type antibodies, which do not induce NNI.

Treatment of affected foals consists of supportive care and blood transfusions. Clinical NNI is rare in the Thoroughbred population at many places because of widespread use of a red blood cell (RBC) antibody screen before parturition. A false negative test can occur when the sample is drawn before the last 30 days of gestation (Pierce, 2003). Some mares have a rapid increase in anti-RBC antibodies very late in gestation. Therefore, if a mare has not foaled within 30 days of the RBC antibody screening, performing another test is suggested (Pierce, 2003)

Foals born to mares with suspect titers should be muzzled, and a cross match of the mare's colostrum and the foal's RBCs must be done. This is referred to as the Coombs Test. Some thoroughbred farms perform the test on mares before breeding by mixing the sires RBC with the mares' serum. The test is performed in the laboratory so that the RBCs can be washed before testing, and the reaction evaluated microscopically. Foals born to mares with high antibody titers to RBC type Q, A or other types associated with NNI are immediately muzzled for 15 h and bottle-fed approximately 12 oz of compatible colostrum or milk replacers hourly. The mare is milked, and the colostrum is discarded. Within 15 h, the removal of colostrum from the mare is completed. The amount of immunoglobulin absorbed by the foal also decreases after 15 h of age. However, some veterinarians elect to muzzle foals for 24 h. Development of liver failure and bacterial sepsis are the most common cause of deaths in foals with NNI (Polkes et al., 2008).

2.4.12 Diarrhea

The diagnosis of the etiologic agent(s) of diarrhea in the foal is difficult and frustrating. Diarrhea in the foal during the first 30 days of life can be a serious problem with many adverse consequences, but it is also very common in non-life threatening situations. A common non-infectious diarrhea is milk overload diarrhea characterized by the yellowish color (Magdesian, 2005; Pierce, 2003). This is thought to be secondary to the osmotic effect of the milk or caused by gastrointestinal floral changes. The clinical severity varies. Occasionally, using 10 cc of gentamycin sulfate orally for 2 days may help in less severe floral diarrheas but should not be used routinely in diarrheas. Foal heat diarrheas coinciding with the mare's estrus are usually not treated in any way. The cause of this diarrhea is unknown. The most common known viral cause is Rotavirus (Frederick et al., 2009). This can cause diarrhea at any age, but it is particularly frustrating in foals less than 2 days of age. These foals require intensive supportive care. It is a highly contagious disease, and when it has started on a farm, it is very difficult to control. Bleach seems to be the disinfectant of choice. The vaccine given to pre-partum mares may decrease the severity in the older foals, but it has not been a great help in the young foals. In addition, if Rotavirus is confirmed in a foal, especially early in the foaling season, they are immediately removed from the foaling barn and either sent to isolation in the hospital or to a different barn for treatment.

The most common bacterial diarrheas are Clostridium and Salmonella, both of which are serious infections. Symptoms can vary from profuse watery diarrhea alone to diarrhea with severe depression and toxemia. Fecal cultures, virus isolation, and Rotazyme tests are used as diagnostic tools. Initial therapy for diarrhea is supportive care that includes fluid therapy. Treating foals early can improve recovery time. Foals less than 2 days of age and not nursing are suggested to be routinely catheterized and given IV fluids (Pierce, 2003). Foals with diarrhea are suggested to be given 1 L of a balanced poly-ionic fluid every 4 h. Each day, as long as the foal requires fluid therapy. One teaspoon of light salt mixed with 60 ml of yogurt and given orally every 4 - 6 h is useful (Pierce, 2003). Many foals can be treated on the farm if the personnel are qualified. A major complicating factor is abdominal pain. Most painful foals are referred to the hospital.

2.4.13 Premature Foals

Foals are considered premature if born before 320 days of gestation. Normal gestational length is 322 – 345 days (Ginther, 1992). Many farms use 11 months plus 5 days when determining the expected foaling date (Pierce, 2003). Many mares will foal considerably earlier than 335 days (310 - 325 days) and have completely normal foals. This is because in utero maturation varies between individuals. Foals at 305 - 310 days are gestationally premature, but many are

physically mature. Gestational lengths tend to be familial in nature. As many as three generations of a family of mares repeatedly having normal gestational lengths approaching 12 months have been seen (Pierce, 2003). Ascending placentitis, either bacterial or Nocardia, may cause premature delivery. Foals that are premature gestationally but clinically normal with normal CBC and IgG concentrations are not referred to the hospital. Foals born

2.4.14 Patent Urachus

The urachus is the in utero connection between the fetus' urinary bladder and allantoic cavity. In normal foals, this structure closes soon after delivery, and it eventually completely regresses to a group of ligaments. If the urachus does not close, urine will exit the umbilical area. The degree of patency is variable, and in some cases, only a urine soaked umbilicus is observed. This condition is common in foals that are weak, foals that struggle to rise, and foals that strain to defecate because of meconium retention. A patent urachus can result in bacterial entry into the foal's abdomen and circulatory system (Ndung et al., 2003). Hence broad spectrum antibiotics should be given to these foals (Pierce, 2003). A common choice is sulfamethoxazole/trimethoprim at 5 mg/kg. After 2 - 3 days of antibiotic therapy, silver nitrate sticks are used to cauterize the urachus to stimulate closure. Urine is allowed to pass from the urachus for 2 - 3 days before cautery. This results in remnant debris being flushed from the urachus, which decreases the likelihood of a subsequent umbilical or urachal abscess (Pierce, 2003). A once daily treatment with silver nitrate sticks for 3 - 4 days is all that is required. One must be careful in application of the silver nitrate sticks, because penetrating the urachus can cause uroperitoneum, omental hernia, or peritonitis. Usually, the silver nitrate stick is passed no more than 1 cm into the urachus. In refractory cases that are non responsive to silver nitrate cautery and sulfamethoxazole/trimethoprim (SMZ-TMP) therapy, surgery may be required.

2.4.15 Omphalophlebitis

Omphalophlebitis is predisposed by inappropriate handling of the umbilicus at delivery or an unsanitary environment. Umbilical hematomas are relatively uncommon, occurring in less than 1% of foals born, but they tend to pre-dispose a foal to this condition. In addition, weak or recumbent foals are more likely to have umbilical infections because of increased exposure to bedding, dust, and/or fecal material. Most farms routinely dip the umbilicus twice daily for 3 days using 0.5% chlorhexidine or povidone solution as recommended (Madigan, 1994). Umbilical infections are usually found around the time that the dried umbilical remnant falls off at 3 - 4 wk of age. Some foals are febrile and have leukocytosis at presentation; however, most foals have a normal physical examination except for purulent drainage or abscess formation surrounding the umbilicus. Inapparent urachal or umbilical vein abscesses do occur, and these foals usually present with fever of unknown origin, elevated WBC count, and fibrinogen or septic arthritis. Most foals with umbilical infections are examined with an ultrasound to determine the severity of the infection, the structures involved, and the extent of the infection. This will determine the length and type of treatment. If the abscess is draining, it is better to culture it for bacterial identification and sensitivity (Pierce, 2003).

The most common bacteria isolated are beta hemolytic Streptococcus sp. and E. coli. Occasionally, an abscess around the umbilical area can be surgically drained however; most are treated with antibiotics (Pierce, 2003). The most commonly used antibiotics are oral chloramphenicol or penicillin with Gentocin or amikacin. Follow-up ultrasound examinations and CBCs are necessary to decide the appropriate time to stop the treatment. The surgical repair of such conditions has been described (Edwards and Fubini, 1995).

2.4.16 Septic Arthritis (Joint Ill or Navel Ill)

The name (Joint Ill or Navel Ill) arises from an association with umbilical infections. It is common to have a septic joint subsequent to septicemia. It is very common to have a foal survive Salmonella septicemia and later become ill with a septic joint (Pierce, 2003). It is more likely that bacteria from the intestinal or respiratory tract are the more common sources. Circulating bacteria, whether from the umbilicus or other areas, are shed into the blood. They then lodge and grow in the epiphyseal or metaphyseal growth complex, extending into the joint cavity. Primary synovial colonization, although possible, is less common. Many foals that develop septic arthritis have no history or clinical signs of umbilical disease and most have adequate IgG levels as newborns. Any time a foal presents with lameness and fever, septic arthritis is the first problem to rule out. Waiting for just 1 day can many times make a serious difference in the eventual outcome (Pierce, 2003). These foals should be immediately sent to the hospital, where a diagnostic evaluation is performed. The confirmed septic joints must be lavaged, and systemic antibiotics should be given (Pierce, 2003).

The antibiotics selected depend on culture results and sensitivity. Broad spectrum antibiotics are used initially, but culture and sensitivity are imperative, because non-responsive infections are frequently found to be

resistant to the broad spectrum selection. It cannot be stressed enough that a lame foal with or without a fever should be looked at very closely for the presence of septic arthritis. Any edema or effusion in or around a growing area of the bone should be investigated. The longer one waits to lavage the joint, the more the cartilage is damaged.

Additionally, the infection seems to become more deeply seated in the bone, making the treatment more extensive and costly with a poorer prognosis (Pierce, 2003). Infections established in the bone quickly become hypo vascular because of the exudates pressure, and, therefore, they are more difficult to penetrate with systemic antibiotics. Foals with a clinically identifiable septic joint that is not obvious along with lameness and fever should be started on systemic antibiotics and monitored very closely. Many have a bacterial osteomyelitis that has not penetrated into the joint or abscess in some other area (Neil et al., 2010). These foals often have marked leukocytosis and a fibrinogen concentration of 1000 mg/dl. Radiographs will often identify metaphyseal osteomyelitis with resultant pain and lameness. Such foals have a poor prognosis (Neil et al., 2010).

2.5 Feeding and Care of Orphaned Foals

Feeding and raising orphaned foals can be an extreme challenge particularly if the foal was orphaned at birth. Losing a mare is never expected and being left with a motherless orphan can turn into an unexpected nightmare. Intensive management will optimize the foal's survival chances.

2.5.1 First 24 Hours

The primary concern for foals orphaned at birth must be that the foal has received sufficient amounts of colostrum, as colostrum contains a high concentration of immunoglobulin (antibodies) to protect the foal from disease and infection. Colostrum is secreted by the mare during the first 24 to 48 hours following parturition. There is no placental transfer of antibodies during pregnancy from mare to fetus, thus the foal is born without any protection from disease. Antibodies are acquired by the nursing foal through the colostrum, (passive transfer), to protect the newborn against diseases.

Gastrointestinal tract absorption of colostrum begins to decrease after 12 hours, with minimal absorption occurring 24 hours after birth. Ideally a foal should receive 250 ml of colostrum every hour for the first six hours after birth. Colostrum can be bottle fed, or administered via stomach tube by a veterinarian. A total of two to three liters of colostrum should be divided into three to four doses given at hourly intervals.

Foals that do not receive sufficient colostrum within the first 24 hours can receive 2-4 liters of blood plasma intravenously. Normal equine plasma is commercially available (Foal immune, Lake Immunogenics, Inc., Ontario, NY; Equine Plasma, Veterinary Dynamics, Inc. Chino, CA) at some places. Intravenous infusion should be done under veterinary supervision. Plasma may be prepared locally if an acceptable donor horse and equipment are available. Without either colostrum or plasma, foals will have insufficient antibody protection and will most likely succumb to infection.

Several tests can be used to evaluate the antibody level in the blood of a day-old foal. New tests include radio immunodiffusion tests, latex agglutination test, and enzyme immunoassay tests (CITE) (Pierce, 2003). Regardless of the test, an IgG level of >800mg/dl is considered adequate.

2.5.2 Collection and Storage of Colostrum

Colostrum can be collected from mares post-foaling when sufficient amounts are present. It has been shown; 200 to 500 ml can be milked from such a mare without compromising antibody passage to her own newborn foal. Additionally, if a mare is at risk of dying, colostrum should be harvested from her before the loss of the mare. Freezing colostrum is adequate for preservation and should have a shelf life of one year if kept frozen. Stored colostrum should be thawed at room temperature just before use. Thawing by microwave is not suggested as essential antibodies can be destroyed. Large broodmare farms routinely collect colostrum and freeze it to maintain a "colostrum bank" in cases of emergency.

2.5.3 Feeding Program

Once sufficient immune protection has been established, some type of continued nutritional plan must begin. Normally, foals nurse up to seventeen times an hour during the first week of life. Nursing frequency decreases to three times per hour in the first few weeks of life. There are two basic options to provide sufficient nutrition to the orphaned foal -- using a nurse mare or goat, or manually feeding the orphaned foal (Pierce, 2003). One substitute is to foster a foal on a milk-producing goat.

Most commonly, however, an intensive manual feeding program is developed. Initially, foals should be bottle fed either mare's milk, goat's milk, or a powdered mare's milk replacer ration (Pierce, 2003). Many mare milk replacer powders are commercially available at some places. Mare's milk replacers are preferred over milk replacers made for other species. Fresh cow's milk (whole) should be avoided. It has nearly twice as much fat content and only 2/3 the sugar content of mare's milk and generally causes loose stools in foals. Low fat cow's milk (2% fat) can

be substituted for mare's milk if 20 g dextrose is added per liter. This mixture should be fed to a total volume of 10 percent of the foal's weight at one day of age and increased to 25 percent of the foal's body weight from day 10 through weaning.

When bottle feeding, use of a lamb's nipple is preferred over a calf nipple, and small, frequent feedings are preferrable. Very weak foals can be fed initially via nasal gastric tube (stomach tube) by a veterinarian. Foals will begin to consume solid feed within a few weeks and should have access to grain and grass or hay.

2.5.4 Controlling Diarrhea

A common problem with feeding orphaned foals is diarrhea. Controlling this involves manipulating the three components of a feeding program: 1) amount of milk fed per day, 2) dilution rate of the mixture, 3) number of feedings offered per day.

2.5.5 Amount to feed

Mares are large milkers and can produce as much as 3 percent of their body weight in milk per day. A suckling foal will consume as much as 30 pounds of milk in a 24 hour period. It has been shown foals can consume up to 25 percent of their body weight per day of a dilute milk replacer without risk of diarrhea. For example a 100 pound foal could consume 25 pounds of milk per day, or 50 cups. Foals can easily be taught to drink from a bucket at a very young age. This reduces labor needed and allows the foal to consume the milk needed.

2.5.6 Frequency of feedings

The number of feedings per day can affect the growth rate of an orphaned foal. The more frequently fed, the more optimal is the growth rate. Foals will nurse their dams the most frequently the first week. Feeding frequency can decrease from every 1 to 2 hours the first week to every 4 to 6 hours after the second week of life. Within a few weeks of life, foals will begin solid feed consumption, allowing a fewer feedings. However, large, twice daily feedings generally produce diarrhea problems.

2.5.7 Dilution of milk replacer

Another important consideration is the dilution of powdered mare's milk replacer. Mare's milk contains about 10 percent dry matter (or 90% water), 2 percent protein, and 1.3 percent fat. Most milk replacers recommend a dilution rate leading to a much more concentrated milk mixture than what a foal would receive from a mare. Therefore, a much higher dilution rate (1:10), which is more similar to natural mare's milk is recommended. More diluted milk replacer solution should be fed to provide the recommended total dry matter intake.

2.5.8 Milk Replacer for Foals

Commercial milk replacer may not always be available when needed or may be too costly for some owners. Below are several recipes for home-made milk replacers. Formulas are to be used for a short period, when commercial mare milk replacers are unavailable (Pierce, 2003):

3 Care of New Born Pigs (From Farrowing to Weaning)

The most critical period in the life cycle of a pig is from birth to weaning. On an average, about two pigs per litter are lost during this period. Poor management is the major contributing factor, although the actual cause may be crushing, bleeding from the navel, anemia, starvation or disease.

Weaning large litters of thrifty, heavyweight pigs is a key factor for a profitable swine herd. Attempts to outline management practices that help keep pigs alive and profits high are outlined below

3.1 Preparation for farrowing

Newborn pigs have a better survival chance if they arrive in a clean, sanitized farrowing facility. In addition, most producers feel that a break between farrowing reduces disease buildup. Many producers, however, farrow continuously to maximize use of expensive facilities. They must do a top job of cleaning and sanitizing.

A steam cleaner or high-pressure sprayer can be used successfully to clean the farrowing house. Adding a detergent helps remove organic matter. A disinfectant can be applied after cleaning. Cleaning also can be done with a shovel and broom. Floors can be scrubbed using a solution of one pound of lye and 30 gallons of water.

Some producers fumigate, especially those who have had a consistent scours problem in a central house. Directions should be followed carefully and precautions taken to avoid accidents with fumigation.

In addition, the sow should be washed with soap and warm water immediately prior to being put into the farrowing pen.

3.2 Care at farrowing

The newborn pig has three basic requirements:

A good environment;

Adequate and regular nutrition; and

Safety from disease and crushing.

Individual attention from the producer at this point pays off with more live pigs. The amount of labor available may determine how much time can be spend in the farrowing house. One person in charge of the farrowing works well in larger operations. Attendance at farrowing will pay off in more live pigs but may not be economically feasible. Most deaths occur the first 3 days of farrowing. Table 3 indicates the scope of piglet mortality and the large proportion of deaths occurring the first few days after farrowing.

3.3 Management- first few days after farrowing

There are many essential chores to be done shortly after pigs are born. The navel should be disinfected the day pigs are born using tincture of iodine. If possible, equalize litter size.

If several sows are farrowing within a 24-hour period, pigs can be transferred successfully from one sow to another. Bigger pigs in the litter, should be transferred not the runts. Best results occur if pigs are transferred the first 3 days of life and have received colostrum before transfer.

The needle teeth should be clipped, being careful not to crush the teeth or cut the gums. At the same time, tails can be docked. To dock the tails, the same side-cutter pliers should be used. A stub on the tail about 1/4-inch long should be left. Tail-docking is best done when the pigs are one day old.

Ear-notching is a good practice even in commercial herds. This identification helps select replacement animals from top litters and gives a check on age when pigs reach market weight.

There are many good sources of iron that can be used to prevent anemia. Iron-dextran injected in the muscle is an effective method. Injections in the neck or forearm are preferred to injecting in the ham. Common levels are 150-200 milligrams of iron as iron-dextran, usually given the first 2 to 3 days after birth. Overdoses of iron should be avoided because it may induce shock. Iron also can be mixed in the feed or in the drinking water. Supplying uncontaminated soil in the pig area is another method of supplying iron but is not used much in today's confinement systems.

Checking the sow's temperature immediately after birth and each 12 hours the first two or three day’s helps head off problems. This has proven particularly helpful in initiating early treatment for Metritis-Mastitis-Agalactia (MMA). Temperatures of 104 degrees Fahrenheit and above indicate some action is needed.

Light birth weight pigs present a difficult management problem. It has been indicated that nearly 60 percent of pigs born under 2 pounds will perish. However, with extra care and nutrient supplementation, like milk replacers (Moody et al., 1966) many of these pigs can be saved. The optimal birth weight of pigs that survive successfully should be 3.0 pounds or more as below this weight the mortality is high.

3.4 Management during lactation

3.4.1 Baby pig scours

Baby pig scours are major ongoing problems for swine producers. Most common diarrheas are caused by various strains of Escherichia coli, a gram-negative bacteria common to the intestinal tract of all mammals. The symptom of E. coli-induced diarrhea is a watery, yellowish stool. Pigs are most susceptible from 1 to 4 days of age, at 3 weeks of age and at weaning (Pickering, 1979). Coccidial scours can occur in pigs (Stuart and Lindsay, 1986; Sangster et al., 1978).

Although pigs are born with little disease resistance, this resistance increases as they absorb antibodies from their mothers' colostrum. Because pigs' ability to absorb antibodies decreases rapidly from birth, it becomes important that they feed on colostrum soon after birth. Colostrum provides the only natural disease protection they will have until their own mechanism for antibody production begins to function effectively at 4 to 5 weeks. Disease resistance is lowest at 3 weeks. It is wise to avoid unnecessary stress (castration, vaccination, worming) at this time.

In treating common scours, orally administered drugs are usually more effective than injections. A drug effective against the bacterial strain on the farm should be used.

A dry, warm, draft-free environment is of primary importance in reducing scours. Sanitation is also very important in reducing the incidence of baby pig scours. Other diseases such as transmissible gastroenteritis (TGE) and swine dysentery may cause more serious diarrhea problems. Veterinary advice must be sought if diarrhea persists or does not respond to treatment.

3.4.2Castration

Boar pigs can be castrated any time before they are 4 weeks old. There is less shock on them at an early age and many producers do this chore the first week.

3.4.3 Creep feeding

In addition to sows' milk, pigs need a creep feed to make maximum gain through weaning. A fresh creep feed should be provided at one week of age in a place where pigs can get away from the sow.

A creep ration should be high-quality, complete mixed feed that is eaten readily (Kuller et al., 2007). Good creep rations can be purchased or mixed on the farm. When creep rations are formulated and mixed on the farm, particular care should be taken to use a high-energy palatable mixture that meets the pig's nutrient needs.

Getting pigs to eat adequate amounts of a creep ration is often a problem (Pulske et al., 2007). Placing the creep feeder in a warm, dry, well-lighted area is suggested. Feeding small amounts and feeding frequently helps to keep the ration fresh. Sprinkling feed on the floor or placing it in a shallow pan may help pigs start to eat. Pelleted feeds are usually eaten more readily than meal.

3.4.4 Weaning pigs

Where good management is practiced, pigs are consistently weaned successfully when three to six weeks old. The time of weaning depends somewhat on care, facilities and production schedules. Weaning

under five weeks of age requires more skill and attention. Warm, dry facilities free from draft are essential. Pigs weighing 15 pounds or more generally can be weaned successfully regardless of age if they are eating well (Cabrera et al., 2010). It is extremely important to have a dry, heated, well-ventilated, well-insulated house available for pigs weaned early, particularly in bad weather. Weaning must be done in small groups of 20-25 per pen allowing 3 to 4 square feet space for each pig.

3.4.5 Parasite control

Parasite problems should be monitored by analysis of worm eggs in manure and slaughter checks. Some confinement units have minimal problems with internal parasites. Several good products are available. Recommendations for parasite control are subject to change hence it is good to check carefully to see that all products used are current and that limitations on time of use prior to slaughter are observed.

3.5 Care of the Orphan Piglet

Saving an orphan piglet involves a lot of "luck" and care. It is possible to do it even on new born's, but the odds are fifty-fifty with those very young babies. Feeding on a flat pan is better compared to bottle feeding. For the very young piglets the most important thing to remember is that these babies need to be warm, very warm. The ideal temperature for them is 90 degrees. Either using a heating pad or a safety heat lamp hooked where it won't come down is useful. If it's a new born in a small carrier it is better to place it on a table or up off the floor.

Baby pigs cannot produce their own heat when they are born so by keeping them warm, the energy that they would have to use for this purpose is saved. Their body heat abilities kick in at about two weeks.

3.5.1 Feeding

A flat small ash tray can be used for feeding that can be held with one hand while holding the pig in the other. His nose is dipped into the ash tray and he will eventually start taking the milk. In the beginning he will fight and sputter, but after a few tries of biting the milk instead of eating they do get the picture. Even 12 h babies can be taught how to eat out of a dish this way. Bottle feeding should be avoided for reasons of sanity and the habbit that would be formed.

Using goat’s milk is a good sow milk replacer. It must be warmed slightly. A baby pig won't take much at one time so they need to be fed often when very young. (By very young means a few days up to a week.) At a week old piglets can do quite well on a feeding of every 3 or 4 hours during the day. At one week feeding throughout the night can be avoided by arranging the last feeding around midnight and as an early riser the first feeding at about 7 or 8 am. It’s important to make the formula as close to the same each time as possible. Also it is important to make sure that all utensils are clean along with the dish you give it in.

Most replacer milk is only good made up for 12 hours; old formula can cause a problem. Also never change formulas as this can cause diarrhea which can take a piglet down very quickly. Adding Gerber's rice baby cereal at about three days is good, making it very liquid at first then gradually increasing the cereal. At about two weeks it will be a more of a paste. A little water must be offered during the day at this time. The cereal not only gives them more nutrition, but it also keeps the chance of diarrhea down.

New born piglets will have a dark stool to start with. This is the old stuff from before they were born that must come out. At about three days it will be more yellow. This also is normal. A clear liquid stool (more felt than seen) is not normal and must be viewed with caution. Nothing will kill a baby pig any quicker than bad diarrhea. They dehydrate quickly and a bad feeding at this time increases the diarrhea. Sometimes the iron shot can set off the diarrhea that we are trying to avoid. It is true that all baby pigs are born anemic and they do not get iron from the mother. There is a natural way to give this to them that is much safer and better for them.

Baby pigs born outside don't need iron as they get it from the dirt as they go along. If you supply a flat cookie sheet of clean dirt (dirt that has not had pigs on it) then he will walk through it and snuffle it and get his own iron from it. If it has tufts of grass in it, all the better, as he will enjoy rooting them around the pan. The less you put into this baby that isn't necessary the better off he will be. No extras till he hits an age that is safe.

Every day that goes by gives him more of a chance of survival. So the idea is to keep him going as best you can until that time when you can switch him to solid pellets and heave a big sigh of relief.

4 Care of Newborn Puppies and kittens

4.1 Immediate care during and after birth

The rearing of puppies is one of the most important animal husbandry procedures. A successfully weaned puppy or kitten has made a series of critical transitions at specific times during development (Bebiak et al., 1987). Immediately after whelping make a whelping record incorporating the bitch’s temperature chart, her actions pre-labor and what she does during labor are important (Lawler, 2008). The time of each birth, the sex of each puppy and anything pertinent about that delivery as well as any identification markings that can help later to identify each puppy must be recorded. Especially important is to weigh each puppy with an

accurate cooking type scale (accurate to the ¼ oz) because that will become an important benchmark for monitoring growth of the puppies over the next few days. A high proportion of low birth weight puppies and kittens do not survive (Lawler and Monti, 1984; Wilsman and Van Sickle, 1973).Weighing of neonatal puppies and kittens should be done at birth, 12-24 hours postpartum and then daily up to weaning (Lawler, 2008).

Following birth, if a pup is slow to get going, appears lifeless and if swinging and rubbing briskly with a coarse towel does not work; a drop of Brandy on the tongue must be placed. Or alternating the puppy in bowls of hot water and cold water can be tried. Immersing the puppy first in one pan (hot water) and then in the other (cold tap water) (to the neck) can shock the system with the puppy taking that first breath. This can be done for about 10 times. If it works, towel dry the puppy vigorously until he is breathing normally and then put him with the dam. Sometimes there isn't time to fill water dishes and with a lifeless puppy, time is of the essence. In a case such as this, hold the puppy under the water faucet with alternating cold and hot water -- as hot and as cold as is safe. Also try artificial respiration by laying the puppy on his back and blowing gently into his mouth (pull the tongue forward), while alternating with applied pressure on the puppy's chest (Macintire, 1999). Continue rubbing briskly. Don't give up on a lifeless pup if the color is good. It is possible to revive a seemingly dead puppy up to 20 minutes after delivery. Do not waste time on obviously defective pups.

Also if a puppy sounds congested and swinging and rubbing briskly do not work, using a baby ear syringe can be helpful for clearing throat and nasal passages. Make sure the bulb is deflated (pressed flat) before inserting gently into the back of the throat area. Release the bulb slowly to remove any fluid or mucus. Following the throat area, do the same action in the nostrils. Neonatal depression of pups can be treated by the application of 0.1-0.2 mL of Narcanti (Naloxone) (Schmid and Russe, 1987). Hypoxic puppies and kittens may require immediate attention, because combined respiratory and metabolic acidosis is a normal event following canine and feline births complicating the situation (Lawler, 2008) resulting into deaths (Swann et al., 1984). Sublingual injections of respiratory stimulants, sheltering in an incubator, or temporary introduction to a 30-40% oxygen environment may reduce distress if respiratory function continues to be inadequate (Lawler, 2008).

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.

Right after birth, if a pup or kitten bleeds excessively from the umbilical cord, swab the cord in iodine and tie it off at the base of the cord with dental floss.

When the bitch is finished whelping, an old piece of advice is to give her a bowl of heated milk. This should consist of canned (condensed) milk, with equal parts water and two egg yolks. Many bitches won't eat right after whelping, but few will turn down a warm bowl of milk. This gives a warming assurance and is helpful for encouraging milk production.

Encourage puppies to nurse right away. 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. Not only does nursing help stimulate contractions, but the puppies need "colostrum": that first milk produced during the first 24 hours. This early milk, which is different looking than later milk, is loaded with antibodies and special nourishment that will protect the puppies and kittens from infection and viruses (Yamad et al., 1991; Center et al., 1991). Many periparturient complications like placental insufficiency, prematurity or poor ambient conditions can predispose neonatal pups to hypoglycemia (Shelly, 1961) and hence they should be fed as early as possible (Lawler, 2008). It's really imperative that all puppies get colostrum. Close attention should be paid to the smaller puppies. Though no fault of their own, they may get pushed off the nipples by the bigger puppies. Some bitches don’t lie on their side completely and thus tend to keep half of the teats covered and not accessible to the pups. Gently force the bitch completely on to her side occasionally and allow as many pups as possible to nurse all at once.

If after a moment or two of birth, if the puppy is not breathing or moving then provide help by holding the puppy by its tail while it is lying on a soft surface and rubbing it vigorously with a towel until it begins to respond. Check the puppy’s mouth to see if there is fluid or perhaps its tongue is rolled back into the throat. If the puppy is making gurgling noises as it tries to breath, using the small aspirator, sterile cloth or cotton swab to remove as much fluid as possible is often helpful. If an aspirator is used, be gentle to avoid causing too much suction that could damage internal organs. Performing an act what is called “shaking a puppy down” is helpful to remove fluids from the lungs. Wrap the puppy in a small towel and hold it with its spine down along your fingers and with its head away from you being careful to fully support the puppy’s

head with your fingers. Stand slightly straddle-legged and think of the puppy as a delicate but large mercury thermometer that you must shake down. Rapidly move the puppy down from about shoulder height to almost between your legs stopping abruptly at the bottom. Sometimes fluid can even be seen flying out of the puppy's nose. Repeat several times and then put the puppy up near your ear and listen to see if the gurgling has stopped. Most puppies likely will let you know when they have had enough as the gurgling will change into a lusty cry. Such puppies should be observed frequently to be certain the gurgling doesn't reoccur.

The umbilical cord of the puppy should 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.

It is very important to keep new-born puppies warm. If a puppy is not kept warm enough, its entire system, including digestion, could shut down and that puppy could die or develop future complications, like pneumonia. Puppies should be kept at about 85-90 degrees Fahrenheit (29-320C) for the first 8 days of life and then at 800 F (270 C) from day 8 to day 28 and finally at 700 F (210 C) from day 29 and thereafter (Lawler, 2008). But, over heating puppies should be avoided as this can cause severe dehydration if they are panting all the time. Keep the heat source general for the entire area or keep a heating pad entirely underneath the whelping box.

4.2 Subsequent Care of puppies

The most critical period of a dog's life is during the first week however, the transitions upto 28 days and at weaning are also important (Lawler, 2008). A high percentage of neonatal puppy and kitten mortalities have combinations of pulmonary congestion, edema (Fox, 1963), hemorrhage and atelectesis (Lawler, 2008). The early care and environment of the newborn puppy are of the utmost importance. Early causes of death can usually be attributed to: difficult whelping, congenital or genetic defects, and environmental factors (i.e. too cool or drafty), carelessness of the dam, infection, viruses, toxic milk or insufficient nourishment.

HEALTHY PUPPIES

1) Look and feel vibrant, vigorous and strong. Feel like a glove with a hand in it.
2) Twitch while sleeping (activated sleep)
3) Nurse with great energy and are strong enough to fight their way to a nipple.
4) Tongues are pink and warm
5) Skin returns quickly to normal when it is pinched
6) Tummies feel full, but not bloated.7) Sound like a well tuned motor. 8) Are quiet, either busy nursing or sleeping.

SICK PUPPIES

1) Look and feel unthrifty, limp and flaccid feeling like a glove without a hand in it.
2) Stop twitching in their sleep
3) Rattle when breathing Sounds like it has emphysema or gurgles when it breaths
4) Cease nursing, show weak attempts at nursing or cry while nursing
5) Tongue is not pink colored and is cool to the touch (sometimes looks ruffled)
6) Cry most of the time and acts like it is colicky
7) Double up in cramps
8) Skin stays creased when pinched
9) Diarrhea and/or vomiting

Classic warning signs of trouble in neonatal puppies are failure to nurse, insufficient weight gain, temperature drop, dehydration, continuous crying, Diarrhea and/or vomiting.

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 help. Warm them to 98-100° F rectally, and provide the necessary food. 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.

4.2.1 Rectal temperature:

Rectal temperature normally declines just after birth probably as an adaptation to protect from hypoxia by reducing metabolic demand (Van der Wyden et al., 1986). Post recovery from initial decline normal rectal temperature is 35.0-37.2 0 C (95-990 F), increasing to 36.1- 37.8 C (97-100 F) by day 14 (Lawler, 2008). Adult rectal temperature and auto regulation occurs by day 28 of birth. Hypothermia during the neonatal period, especially below 34.4 C (94 F) suppresses appetite and gut motility. Pups should be warmed slowly over 1-3 h, followed by parentral fluid support (Lawler, 2008).

4.2.2 Hydration:

Hydration is one of the most important things to monitor in new pups, as it can be one of the first signs

of trouble. Many intrinsic and extrinsic factors can lead to fluid deficit in neonatal dogs and cats (Lawler, 2008). It can either be a result of inadequate nourishment, too much heat, or sickness. Accompanied with diarrhea and/or vomiting, it can be dangerous and fatal.

Hydration can be checked by pinching the skin on the back of the neck or on the top of the back. If hydration is OK, the pinched skin will bounce right back into place. If the pinched skin stays creased, the puppy is dehydrated and needs fluid replacement. Also a dehydrated pup's coat will sometimes have a ruffled look or scruffy appearance. Another way to tell if a puppy is dehydrated is by the color of the urine. Using a cotton ball on the genital area, if the urine is dark and scant, it means the puppy is dehydrated and there is electrolyte depletion. Normal urine will flow freely and be light yellow in color.

To alleviate the situation, Lactated Ringers Solution (about 10 to 20cc's, depending on the breed and size of the puppy) can be given under the skin (fluids given subcutaneous are absorbed much quicker than giving orally) (Lawler, 2008). This should be done very carefully. Oral feeding of pediatric electrolytes can also be done.

4.2.3 Puppy crying

A classic warning sign of a puppy in trouble is incessant crying. If this is combined with cramping. If the puppy is bloated and has loose stools, it could be the dam's milk. It could just involve a simple correction in the dam's diet or it could be something more serious, such as mastitis (bacteria-infected milk). Check the mother's milk and keep an eye out for discolored milk (green or brown) or streaks of blood. If the puppies are sick and you suspect the milk, have a veterinarian do milk cultures.

Be very careful what you feed the nursing mother. It's important to remember that whatever you feed her will go right through the milk and into the puppies. In the case of an extreme emergency when a puppy is really bloated and not nursing, it is possible to remove contents from the stomach. If this is attempted, it should be done very carefully, using a feeding tube and syringe.

4.2.4 Puppy rejection

Puppies almost always pile together in relative proximity to one another. Sometimes the dam may reject a puppy - sometimes for a reason (there may be something wrong with the pup) and sometimes she can do it for no reason at all. If a puppy continually gets separated from the others, ending up in a corner by himself, he bears watching. There may be something wrong. Sometimes it can just be a simple matter of chilling. If the separated puppy is cool to the touch, you need to warm him up before putting him back with the dam.

4.2.5 Puppy stools

Puppy stools are normally fairly soft, but formed and usually are yellow/brown in color. Green puppy stools and stools that have an appearance of bunches of tiny seeds have been observed but if all else seems normal, these phenomena seem to be harmless and short-lived. Watery diarrhea, however, can present a serious problem if left unchecked. There can be many causes such as, the dam's diet or infection. Diarrhea in combination with vomiting usually means infection. Check the dam's milk and discharge from the vulva. If either appears abnormal, consult a veterinarian. If her milk has clear streaks and/or blood or appears yellow/green, pull the puppies until the situation is diagnosed and corrected.

Rarely does a puppy ever become constipated, but if one does, this can be easily corrected by using children's Castoria or by giving an enema. An enema can be given, using a #8 feeding tube, attached to a syringe, filled with approximately 2-5 cc's of warm water (the amount depends on the size of the puppy). Put a dab of Vaseline on the end of the tube and insert it into the rectum, may be an inch (again, how far in, depends on the size of the puppy). Gently push the plunger until the liquid is entirely gone from the syringe. Within a few minutes, you will get results. Constipation rarely occurs in puppies that are nursing, but it can be a frequent problem in hand-raised litters, especially if the water amount in the formula is not sufficient. If constipation continues to be a problem in the hand-raised litter, a tablespoon of Karo syrup can be added to the formula.

When hand-raising a litter, in order to prevent the dry flakes that can sometimes result (because nothing takes the place of the mother's continual licking and cleaning), wash the pups face and entire body with a rough washcloth several times a day. Also, a mild baby shampoo can be used in the water solution. Daily grooming is important for the neonatal puppy. Think about how the dam spends all her time washing and cleaning every puppy several times a day. If the pups become odorous, they can be washed in warm water and towel dried. They usually dry right away.

For the first week or so, puppies rely completely on maternal stimulation for elimination. If the mother cannot or will not take care of the pup's elimination, the owner has to take care. Using a cotton ball moist with warm water, rub the abdominal and anal area with sweeping motions. Urine should come out easily every single time. Not so easy (and a big source of frustration when hand-raising pups) is defecation. They may not eliminate every single time but should

produce a stool every third time or so.

Sometimes a puppy can develop inhalant pneumonia, through nursing, tubing or bottle feeding. The most common cause is bottle feeding. It starts with green gunk coming from the nostrils. Then the puppy becomes listless, has difficulty breathing and finally stops nursing. If something isn't done quickly, the puppy will not make it. Antibiotics and antihistaminic should be given to pups that develop pneumonia.

4.2.6 Low Blood Sugar: There is a low blood sugar phenomenon that sometimes can occur the first few days of a puppy's life (Shelly, 1961). Everything will go along fine and all of a sudden, a puppy will stiffen like a board. Usually the tongue will stick out between the lips. This is generally the result of low blood sugar, especially if more than one puppy is doing this. The simple solution is to start supplementing the puppy with a formula that has Karo syrup in it. Or the puppy can be tube fed a sugar/water solution. Or a dextrose solution can be given under the skin. Sometimes this phenomenon goes hand in hand with dehydration. This stiffening is basically a seizure and it has nothing to do with epilepsy. It is totally dietary and usually means either the dam does not have adequate milk or the puppies are not getting enough to eat. It can happen to the largest puppies or the smallest. Generally puppies affected will be very small and the dam may not have much milk (such as following a Cesarean section) or the puppy might be an ineffectual nurser. If left untreated, it will most assuredly lead to the death of the puppy. Following a day or two of supplementing, usually the problem corrects itself (if the dam has sufficient milk).

4.2.7 Puppy eye opening

The reason why dogs' eyes are closed at birth and humans' or other animals' eyes are open at birth is a puzzle with a lot of parts. The brains of most mammals grow at a very constant rate. Eye opening is linked to brain growth, and the eyes open when the brain is at a certain maturational point, whether or not there is anything to look at. Puppies are born immature as far as the brain development is concerned hence the eyes are closed at birth.

The eyes of puppies will open sometime between ten and eighteen days. Let this eye opening happen on its own and do not worry if some open their eyes before others. At around three weeks, the puppies will begin to hear loud sounds. By two weeks the pups will begin to stand and by three weeks they will be walking around. By four weeks, the pups will be aware of their surroundings and will begin to play with each other - usually consisting of trying to chew on each other's ears or tails

If eyes are still closed by 18 days and look swollen with pus coming out of the corners, the eyes should be gently cleaned with a boric acid solution, while trying to gently express the pus through the corners. Then carefully insert a small amount of antibiotic eye ointment into the inside corner. Usually, one or two treatments take care of the problem. Once you notice this sort of problem occurring, monitor the litter carefully because if this is ignored, it can result in serious damage to the eyes or in the worst case scenario, the loss of one or both eyes. Normally this problem occurs prior to the eye opening. Typically puppy eyes open around 12-14 days, but this is not a hard and fast rule and variation ranging from 8 to 18 days can occur. If eyes are not open by 3 weeks, it could mean there's a problem and needs a Veterinarian's assistance.

4.2.8 A puppy's ears: Any one that has a dog will know that the slightest noise even a rattle of a cookie bag will wake them up, this illustrates till what point their ears are sensitive, wolves and other wild canines need a very fine ear to track down their prey, to protect their families and to communicate between themselves. Puppies are born deaf, a couple of days later they can only hear strong sounds and in the next weeks they can hear better than what we can. A healthy teenage dog can detect sounds in six hundredths of a second, that's just about four times better than what we can. Dogs can also do some thing that we can't; they can close their inner ear that helps them to concentrate on one sound without getting distracted.

4.2.9 Worm care

Puppies should be treated for worms at 2, 4, 6 and probably again at 8 weeks of age. Puppies can be infected with worms from the bitch or even from dirt on her nipples brought in from her trips outside. It is really horrible to have a litter of 5 to 6 week old puppies actually pooping sheaths of round worms that look like bundles of angel hair spaghetti. Providing an appropriate wormer is essential to accomplish this de-worming. De-worming the bitch during lactation is also suggested.

4.3 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.

Weaning of puppies can begin anytime from 2½ weeks to 5 weeks depending on each individual situation. There are many, many theories about what to feed the puppies during weaning – probably all will work. One good technique is to use a small amount of a good brand of puppy chow or kibble and soak the dog food in water until it can be mashed with a fork. At first use very little of the mashed dog food mixed with condensed milk and add scrapings from a piece of inexpensive beef or venison steak. Warm this thin gruel slightly in a microwave and present it to the puppies. As days go by and the puppies are eating eagerly, use proportionally more dog food and add egg yoke (raw or cooked), finely ground hamburger instead of steak scrapings plus cottage cheese or yogurt. Always add enough warmed water or condensed milk to make gruel - gradually thickening the consistency of this gruel. Use a straight side bowl such as a cake pan – not a sloping sided bowl. With straight sides, less food will be pushed out of the pan.

For the first week or so the pups will waste more food than they eat by wading through the bowl and tracking it out onto the floor. In the beginning, help the pups realize that there is food in the bowls, putting a little on the end of your finger and sort of “rake” it off into the mouths of the puppies. Then push their noses toward the food to get a little on their lips. Once they realize what it is all about, they are usually eager eaters. It is advisable to feed the pups when the bitch is elsewhere otherwise she will quickly eat all of their food. When the puppies have finished, let the bitch clean up what is left. Gradually increase the volume of food and make it a thicker consistency as the pups become more proficient at eating. Weanlings should be fed three to four times a day. Gradually begin keeping the bitch separated from the pups for longer periods of time but after the weanlings have just been fed, allow them to nurse briefly when the bitch returns for so long as she will allow unless health issues with the bitch dictate that she should completely cease nursing the pups. Hopefully, the bitch will also play briefly with the puppies as this maternal contact and early discipline is good for their personality developments. Always keep fresh water available for both the bitch and the puppies in the whelp box area.

By the time the pups are 4 weeks of age, the breeder should have worked out with their veterinarian the planned vaccination program for their pups. Parental immunity is present so long as the pups are nursing, but this begins to gradually weaken and the pups need to be protected by their own vaccinations. Many vets recommend that vaccines begin at 5 to 6 weeks of age with three subsequent shots on a three week schedule thereafter. However, some vets are beginning to recommend later vaccinations starting at 8 weeks with the shots repeated at 4 week intervals thereafter for a total of three shots.

Outside visitors should be kept to a minimum until the pups have been given their vaccinations. If outsiders are allowed to pick up the puppies, they should wash their hands with a disinfectant soap and avoid placing the pups against their faces or clothing. There is nothing worse than having a litter of perfectly healthy puppies get sick from Parvo or some other puppy disease.

4.4 Care of Orphan 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. In warm weathers coolers are necessary.

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. The procedures of nutritional support for young puppies and kittens have been described in detail recently (Lawler, 2008).

When preparing the commercial 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 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.

4.5 Wasting (Fading) syndrome:

Unresolved maladjustment between birth and post weaning can terminate in a non-specific syndrome called wasting. Wasting is characterized by progressive clinical decline associated with anorexia, growth failure, depression, dehydration, and increasingly poor response to environmental stimuli (Lawler, 2008). Wasting is not a single type of event, but can have numerous etiologies. The predisposing events often begin during early to mid lactation. Management of wasting is primarily supportive, in addition to identifying and treating problems at presentation (Lawler, 2008).

4.6 Puppy vaccination

The age at which puppies can effectively be immunized (protected) is proportional to the amount of antibodies the puppy received from its mother. High levels of maternal antibodies present in the puppies' bloodstream will block the effectiveness of a vaccine. When the maternal antibodies drop to a low enough level in the puppy, immunization by a commercial vaccine will work.

The antibodies from the mother generally circulate in the newborn's blood for a number of weeks. There is a period of time from several days to several weeks in which the maternal antibodies are too low to provide protection against the disease, but too high to allow a vaccine to work. This period is called the window of susceptibility. This is the time when despite being vaccinated, a puppy or kitten can still contract the disease.

4.6.1 Vaccination time

The length and timing of the window of susceptibility is different in every litter, and even between individuals in a litter. A study of a cross section of different puppies showed that the age at which they were able to respond to a vaccine and develop protection (become immunized) covered a wide period of time. At six weeks of age, 25% of the puppies could be immunized. At 9 weeks of age, 40% of the puppies were able to respond to the vaccine. The numbers increased to 60% by 16 weeks of age, and by 18 weeks, 95% of the puppies were protected by the vaccine. Almost all researchers agree that for puppies and kittens, we need to give at least three combination vaccinations and repeat these at one year of age.

It has also been realized that in the face of an infection, due to the window of susceptibility, some litters will contract a disease (e.g., parvo) despite being vaccinated. By using quality vaccines and an aggressive vaccination protocol, we can make this window of susceptibility as small as possible. Our vaccination protocol may not be right for every puppy. Puppies that are not exposed to other dogs and have a very small chance of coming in contact with parvo-virus, may not need to be vaccinated as frequently. At the same time, some 'high risk' puppies may need a more intense and aggressive vaccination program. It is best to work with the veterinarian on a vaccination protocol that is best for an individual puppy or kennel, taking into consideration the individual situation.

4.6.2 Diseases for which puppies should be vaccinated

The AVMA Council on Biologic and Therapeutic Agents' Report on Cat and Dog Vaccines has recommended that the core vaccines for dogs include distemper, canine adenovirus-2 (hepatitis and respiratory disease), canine parvovirus-2, and rabies.

Noncore vaccines include leptospirosis, coronavirus, canine parainfluenza and Bordetella bronchiseptica (both are causes of 'kennel cough'), and Borrelia burgdorferi (causes Lyme disease). Veterinarians can formulate the most effective and proper vaccines for the puppy.

4.6.3 Vaccine dose

It is NOT true that a small breed of puppy should receive a smaller vaccine dose than puppies of larger breeds. All puppies regardless of age, body weight, breed, and gender are given the same vaccine dose. Vaccines are generally administered in one milliliter (cc) doses. Simply follow the manufacturer's recommendations. To administer a lesser vaccine amount than recommended will likely result in insufficient immunity.

4.6.4 Time to produce protection

Vaccines do not stimulate immunity immediately after they are administered. Once a vaccine is administered, the antigens must be recognized, responded to, and

remembered by the immune system. In most puppies, disease protection does not begin until five days post vaccination. Full protection from a vaccine usually takes up to fourteen days. In some instances, two or more vaccinations several weeks apart must be given to achieve protection. In general, modified live vaccines and those vaccines administered intranasally provide the fastest protection.

Authors Contribution(s)

Sole contribution

References

1. Albridge BM, Garry FB, ASdams R (1993). Neonatal septicaemia in calves: 25 cases (1985-1990). J Am Vet Med Assoc 203:1324-9.
2. Bailey EC (1982). Prevalence of anti red blood cell antibodies in the serum and colostrums of mares and its relationship to neonatal isoerythrolysis. Am J Vet Res 43:1917-21.
3. Baird JD (1973). Neonatal maladjustment syndrome in a thoroughbred foal. Aust Vet J 49:530-4.
4. Bali M K, Juneja IJ, Khanna RMS et al (1979). A clinical note on buffalo calf mortality. Indian J Dairy Sci 32: 370-372.
5. Bebiak DM, Lawler DF, Reutzel LF (1987). Nutrition and management of the dog Vet Clin North Am 17:505-33.
6. Becht JL, Page EH, Morter RL (1983). Experimental production of neonatal isoerythrolysis in the foal. Cornell Vet 73:380-9.
7. Becht JL, Semrad SD (1985). Haematology, blood typing, and immuno0logy of the neonatal foal. Vet Clin North Am Equine Pract 1:91-116.
8. Bernard WV, Williams D, Tuttle PA, et al (1993). Hematuria and leptospiruria in a foal. J Am Vet Med Assoc 203:276-278.
9. Binns SH, Cox IJ, Rizvi S et al (2002). Risk factors for lamb mortality on UK sheep farms. Prev Vet Med 52:287-303.
10. Boyle AG, Magdesian KG, Ruby RE (2005). Neonatal isoerythrolysis in horse foals and a mule foal: 18 cases (1998-2003). J Am Vet Med Assoc 227:1276-83.
11. Cable CS, Fubini SL, Erb HN et al. (1997). Abdominal surgery in foals: a review of 119 cases (1977-1994). Equine Vet J 29:257-61.
12. Cabrera RA, Boyd RD, Jungst SB et al (2010). Impact of lactation length and piglet weaning weight on long term growth and viability of the progeny. J Anim Sci 88:2265-76.
13. Castagnetti C, Veronesi MC (2008). Prognostic factors in the sick neonatal foal. Vet Res Commun 32:87-91
14. Center SA, Randolph JF, Man Warren T et al (1991). Effect of colostrum ingestion on gamma-glutamyl transferase and alkaline phosphatase activities in neonatal pups. Am J Vet Res 52:499-504.
15. Corley KT, Axon JE (2005). Resuscitation and emergency management for neonatal foals. Vet Clin North Am Equine Pract 21:431-55.
16. Dargatz TJL, McClure JJ, Koch C et al (1995). Neonatal isoerythrolysis in mule foals. J Am Vet Med Assoc 206:67-70.
17. Donovan GA, Dohoo IR, Montgomery et al (1998). Calf and disease factors affecting growth in female Holstein calves in Florida, USA. Prev Vet Med 33:1-10.
18. Dubey JP, Wouda W, Muskens J (2008). Fatal intestinal coccidiosis in a three week old buffalo calf (Bubalus bubalis). J Parasitol 94:1289-64.
19. Edwards RB, Fubini SL (1995). A one stage marsupialization procedure for management of infected umbilical vein remnants in calves and foals. Vet Surg 24:32-5.
20. Fecteau G, Smith BP, George LW (2009). Septicaemia and meningitis in the newborn calf. Vet Clin North Am Food Anim Pract 25:195-208.
21. Fox MN (1963) Neonatal mortality in the dog. J Am Vet Med Assoc 143:1219-23.
22. Frederick J, Giguere S, Sanchez LC (2009). Infectious agents detected in the feces of diarrheic foals: a retrospective study of 233 cases (2003-2008). J Vet Intern Med 23:1254-60.
23. Ghosh SS, Patalunda B (1998). Goat health problems in West Bengal- an appraisal Indian Vet J 75:1137-79.
24. Ginther OJ (1992). Reproductive biology of the mare, 2nd ed. Cross Plains, WI: Equiservice; 329-330.
25. Gitau GK, Mc Dermott JJ, Mc Dermott B et al (2001). The impact of Theleria parva infections and other factors on calf mean daily weight gains in small holder dairy farms in Murangas District Kenya Prev Vet Med 51:149-60.
26. Godden SM, Haines DM, Konkol K et al (2009). Improving passive transfer of immunoglobulins in calves II: Interaction between feeding method and volume of colostrums fed. J Dairy Sci 92:1758-64.
27. Gulliksen SM, Lie KI, Loken T et al (2009). Calf mortality in Norwegian dairy herds. J Dairy Sci 92:2782-95.
28. Gundram RS, More SJ (1999). Health and growth of water buffalo calves in Nueva Ecija, the Phillipines.

Prev Vet Med 40: 87-100.
29. Haughey KG (1991) Perinatal lamb mortality-its investigation, causes and control. J South Afr Vet Assoc 62:78-91.
30. Kahn W, Palmer J, Vaala W (1992) Respiratory support techniques in foals in a newborn intensive care unit for large animals. Tierarztl Prax 20:492-502.
31. Kahn W, Vaala W, Palmer J (1991). Neonatal isoerythrolysis in new born foals. Tierarztl Prax 19:521-9.
32. Kasper CA, Clayton HM, Wright AK et al (1995) Effects of high doses of oxytetracycline on metacarpophalangeal joint kinematics in neonatal foals. J Am Vet Med Assoc 207:71-73.
33. Khan ZU, Khan S, Ahmad N et al (2007). Investigation of mortality incidence and managemental practices in buffalo calves at commercial dairy farms in Peshawar city. J Agri Biol Sci 2: 16-22.
34. Koterba AM, Drummond WH, Kosch PC et al (1990). Equine clinical neonatology. Philadelphia: Lea and Febiger.
35. Kuller WI, Soede NM, van Beers-Schreurs HM et al (2007). Effects of intermittent suckling and creep feed intake on pig performance from birth to slaughter. J Anim Sci 85:1295-301.
36. Kumar A, Haque S, Shekhar P (2009). Preweaning kid mortality in an organized farm. Intas Polivet 10:295-97.
37. Lawler DF (2008). Neonatal and paediatric care of puppy and kitten Theriogenol 70:384-392.
38. Lawler DF, Monti KL (1984).Morbidity and mortality in neonatal kittens. Am J Vet Res 45:1455-59.
39. Leadley SM (2003) Keeping calves healthy. Proc Western Dairy Mgmnt Conf Reno NV 51-58.
40. Leiva M, Pena T, Armengou L et al (2009). Treatment of septicaemia and severe bacterial infections in foals with a new cefquinone formulation: a field study. Dtsch Tierarztl Wochenschr 116:316-20.
41. Leman AD, Knudson C, Rodeffer HE (1972). Reproductive performance of swine on 76 Illinois farms. J Am Vet Med Assoc 161:1248-50.
42. Macintire DK (1999). Paediatric intensive care. Vet Clin North Am Small Anim Pract 29:971-88.
43. MacLeay JM (2001). Neonatal isoerythrolysis involving the Qc and Db antigens in a foal. Equine Vet J 219:79-81.
44. Madigan JE (1994). Manual of equine neonatal medicine, 2nd ed. Woodland, CA: Live Oak Publishing. pp 957-976.
45. Magdesian KG (2005). Neonatal foal diarrhea Vet Clin North Am Eq Pract 21:295-312.
46. McClure JJ, Koch C, Dargatz TJL (1994). Characterization of a red blood cell antigen in donkeys and mules associated with neonatal isoerythrolysis. Anim Genet 25:119-20.
47. Moody MW, Speer VC, Hays V W (1966). Effects of supplemental milk on growth and survival of suckling pigs. J Anim Sci 25:1250.
48. Mulei CM, Gitau GK, Mbuthia PG (1995). Causes of calf mortality in Kabete area of Kenya. Onderstepoort J Vet Res 62:181-85.
49. Nagy DW (2009). Resuscitation and critical care of neonatal calves. Vet Clin North Am Food Anim Pract 25:1-11.
50. Naylor JM (1990). Oral fluid therapy in neonatal ruminants and swine. Vet Clin North Am Food Anim Pract 6:51-67.
51. Ndungu FK, Ndegwa MW, de Maar TW (2003). Patent urachus with subsequent joint infection in a free living Grevys zebra foal. J Wildl Dis 39:244-5.
52. Neil KM, Axon JE, Begg AP et al (2010). Retrospective study of 108 foals with septic osteomyelitis. Aust Vet J 88:4-12.
53. Orsini JA (1997). Management of umbilical hernias of the horse: treatment options and potential complications. Equine Vet Edu 9:7-10.
54. Palmer AC, Rossdale PD (1976). Neuropathological changes associated with the neonatal maladjustment in the thoroughbred foal. Res Vet Sci 20:267-75.
55. Palmer JE (2007). Neonatal foal resuscitation. Vet Clin North Am Equine Pract 23:159-82.
55. Panchsara HH, Sutaria TV, Shah RR (2009). Factors affecting mortality in Mehsana buffalo calves Intas Polivet 10:170-73.
56. Pickering LK (1979). Gastroenteritis due to enteropathogenic, enterotoxigenic, and invasive Escherichia Coli: A review. Am J Med Technol 45:787-92.
57. Pierce SW (2003). Foal Care from Birth to 30 Days: A Practitioner's Perspective 49th Annual Convention of the American Association of Equine Practitioners, 2003, New Orleans, Louisiana, pp 1-9.
58. Pluske JR, Kim JC, Hansen CF et al (2007). Piglet growth before and after weaning in relation to a qualitative estimate of solid (creep) feed intake during lactation: a pilot study. Arch Anim Nutr 61:469-80.
59. Polkes AC, Giguere S, Lester GD et al (2008).Factors associated with outcome in foals with neonatal isoerythrolysis (72 cases, 1988-2003).
60. Rao MK, Nagarcenkar R (1980). Calf mortality in crossbred dairy cattle. Trop Anim Hlth Prodn. 12:137-44.
61. Reddy MP, Chaudhari PC (2000). Epidemiological studies on lamb mortality in lambs. Indian J Vet Sci 47:1-3.
62. Riley CB, Cruz AM, Bailey JM et al (1996). Comparison of herniorrhapy versus clamping of

umbilical hernias of horses: A retrospective study of 93 cases (1982-1994). Can Vet J 37:295-98.
63. Rings DM (1995). Umbilical hernias, umbilical abscesses, and urachal fistulas. Surgical considerations. Vet Clin North Am Food Anim Pract 11:137-48.
64. Rohdich N, Zschiesche E, Heckeroth A et al (2009). Treatment of septicaemia and severe bacterial infections in foals with a new cefquinome formulation: a field study. Dtsch Tierarztl Wochenschr 116:316-20.
65. Rook JS, Scholman G, Wing-Proctor S et al (1990). Diagnosis and control of neonatal losses in sheep. Vet Clin North Am Food Anim Pract 6:531-61.
66. Rossdale PD, Ricketts SW (1980). Equine stud farm medicine, 2nd ed. Philadelphia: Lea and Febiger, 1980.
67. Sangster LT, Stuart BP, Williams DJ et al (1978). Coccidiosis associated with scours in baby pigs. Vet Med Small Anim Clin 73:1317-9.
68. Schmid G, Russe M (1987). Resuscitation of puppies after cesarean section. Tierarztl Prax 15:219-20.
69. Shelly HJ (1961). Glycogen reserves and their changes at birth and in anoxia. Br Med Bull 17:137-43.
70. Speicher JA, Hepp RE (1973). Factors associated with calf mortality in Michigan dairy herds. J Am Vet Med Assoc 162: 463-466.
71. Steimer A, Lejeune B (2009). Ultrasonographic assessment of umbilical disorders. Vet Clin North Am Food Anim Pract 25:781-94.
72. Stuart BP, Lindsay DS (1986). Coccidiosis in swine Vet Clin North Am Food Anim Pract 2:455-68.
73. Swann HG, Christian JJ, Hamilton C (1984). The process of anoxic death in newborn pups. Surg Gynecol Obstet 99:5-8.
74. Tiwari R, Sharma MC, Singh BP (2006). Studies on buffalo health and production practices in small farms. Indian J Vet Med 26: 62-64.
75. Van der Wyden GC, Tavberne MAM, van OOrd R (1986). Changes of jugular blood pH, blood gases, base excess, and body temperature of newborn pups during the first few hours after birth. Tijdschr Diergeneeskd 111:85-105.
76. Waldner CL, Rosengren LB (2009). Factors associated with serum immunoglobulin levels in beef calves from Alberta and Saskatchewan and association between passive transfer and health outcomes. Can Vet J 50:275-81.
77. Weaver BM, Angell-James J (1986). A simple device for respiratory resuscitation of newborn calves and lambs. Vet Rec 119:86-88.
78. Weaver DM, Tyler JW, Van Metre DC et al (2000). Passive transfer of colostral immunoglobulins in calves. J Vet Intern Med 14:569-77.
79. Welschen SE, de Bruijn CM, Sloet van et al (2005). The short and long term results of the “Intensive care” of 160 sick neonatal foals. Tijdschr Diergeneeskd 130:168-73.
80. William GJ, Theodore ME (1986). Calf management practices and health management decisions on large dairies. J Dairy Sci 69: 580- 590.
81. Wilsman NJ, Van Sickle DC (1973). Weight change patterns as a basis for predicting survival of newborn pointer pups. J Am Vet Med Assoc 163:971-5.
82. Witte S, Rodgerson D, Hunt R et al (2008). Traumatic ventral herniation in foals as a complication of dystocia. Comp Equine 1:137-42.
83. Yamada T, Yoshinori N, Motoo M (1991). Changes in immunoglobulin values in kittens after ingestion of colostrum. Am J Vet Res. 52:393-6.

Illustrations

Illustration 1

Table 1

Table 1 Constituents of milk in various species

Species	Protein %	Fat %	Lactose %
Friesian cow	3.1	3.5	4.9
Jersey cow	3.9	5.5	4.9
Sheep	4-7	6-9	4-6
Goat	3.1-3.4	3.5-4.1	4.6
Mare	2.2-2.7	1.1-1.6	6.1
Buffalo	4.0	6-8	4.8-5.2
Camel	4.0-10	1.0-3.0	4.0-6.0
Sow	1.3	4.8	3.4
Bitch	11.2	9.6	3.1
Cat	9.1	3.8	4.9

Specially designed feeders are commercially available at many places and can be used when a large number of orphan calves are to be fed. Oesophageal feeders are also available for feeding of individual calves, kids and lambs.

Illustration 2

Table 2 Normal physiological parameters of a new born foal.

Parameter	Normal Observation
Temperature	99^0 F-102^0F
Heart rate	80-100 beats per min
Breathing rate at rest	20-40 breaths per min
Meconium	Passage complete by 12-24 hours
Nursing frequency	Average of 3-5 times per hour

It may be required to give the foal an enema; however, this is generally not necessary. But, one enema, if given carefully, is unlikely to harm the foal. Too many enemas can be harmful. If the foal continues to strain to defecate without success, one should contact the veterinarian.

Illustration 3

2.5.8 Milk Replacer for Foals

Formula 1[a]	24 oz. 12 oz. 4 tsp.	cow's milk saturated lime water dextrose[b]
Formula 2	4 oz. 4 oz. 1 tsp.	evaporated milk warm water white corn syrup[b]
Formula 3	8 oz. 1 tsp.	2% cow's milk white corn syrup[b]
Formula 4	3.5 qts. 3.5 qts. 10 oz. 10 oz. 2 oz.	cow's milk water wheat flour ground malt potassium bicarbonate

[a]Preferred formula

[b]Table sugar may produce diarrhea and thus should be avoided

Illustration 4

Table 3 Piglet mortality of sows and gilts (Lemann et al, 1972)

Pig deaths after first observation:	
Crushing	30.9 percent
Starvation	17.6 percent
Born weak	14.7 percent
Chilling	5.5 percent
Transmissible gastroenteritis	3.9 percent
Other diarrheas	12.9 percent
Pneumonia	1.4 percent
Others	13.1 percent
Total	100 percent

Illustration 5

Illustration 1

AVMA Vaccination Recommendations for Dogs

Component	Class	Efficacy	Length of Immunity	Risk/Severity of Adverse Effects	Comments
Canine Distemper	**Core**	**High**	**> 1 year for** modified live virus (MLV) vaccines	**Low**	
Measles	**Noncore**	**High in preventing disease, but not in preventing infection**	**Long**	**Infrequent**	**Use in high risk environments for canine distemper in puppies 4-10 weeks of age**
Parvovirus	**Core**	**High**	**> 1 year**	**Low**	
Hepatitis	**Core**	**High**	**> 1 year**	**Low**	**Only use canine adenovirus-2 (CAV-2) vaccines**
Rabies	**Core**	**High**	**Dependent upon type of vaccine**	**Low to moderate**	
Respiratory disease from canine adenovirus-2 (CAV-2)	**Noncore**	**Not adequately studied**	**Short**	**Minimal**	**If vaccination warranted, boost annually or more frequently**
Parainfluenza	**Noncore**	**Intranasal MLV - Moderate Injectable MLV - Low**	**Moderate**	**Low**	**Only recommended for dogs in kennels, shelters, shows, or large colonies; If vaccination warranted, boost annually or more frequently**

Bordetella	**Noncore**	**Intranasal MLV - Moderate Injectable MLV - Low**	**Short**	**Low**	**For the most benefit, use intranasal vaccine 2 weeks prior to exposure**
Leptospirosis	**Noncore**	**Variable**	**Short**	**High**	**Up to 30% of dogs may not respond to vaccine**
Coronavirus	**Noncore**	**Low**	**Short**	**Low**	**Risk of exposure high in kennels, shelters, shows, breeding facilities**
Lyme	**Noncore**	**Appears to be limited to previously unexposed dogs; variable**	**Revaccinate annually**	**Moderate**	

Illustration 6

Illustration 2

A possible vaccination schedule for the 'average' puppy is shown below.

Puppy Vaccination Schedule	
Age	**Vaccination**
5 weeks	**Parvovirus**: for puppies at high risk of exposure to parvo, some veterinarians recommend vaccinating at 5 weeks. Check with your veterinarian.
6 & 9 weeks	**Combination vaccine*** without leptospirosis. Coronavirus: where coronavirus is a concern.
12 weeks or older	**Rabies**: Given by your local veterinarian (age at vaccination may vary according to local law)
12-16 weeks**	**Combination vaccine** **Leptospirosis**: include leptosporosis in the combination vaccine where leptospirosis is a concern, or if traveling to an area where it occurs. **Coronavirus**: where coronavirus is a concern. **Lyme**: where Lyme disease is a concern or if traveling to an area where it occurs.
Adult (boosters)§	**Combination vaccine** **Leptospirosis**: include leptospirosis in the combination vaccine where leptospirosis is a concern, or if traveling to an area where it occurs. **Coronavirus**: where coronavirus is a concern. **Lyme**: where Lyme disease is a concern or if traveling to an area where it occurs. **Rabies**: Given by your local veterinarian (time interval between vaccinations may vary according to local law).

*A combination vaccine, often called a 5-way vaccine, usually includes adenovirus cough and hepatitis, distemper, parainfluenza, and parvovirus. Some combination vaccines may also include leptospirosis (7-way vaccines) and/or coronavirus. The inclusion of either canine adenovirus-1 or adenovirus-2 in a vaccine will protect against both adenovirus cough and hepatitis; adenovirus-2 is highly preferred.**Some puppies may need additional vaccinations against parvovirus after 15 weeks of age. Consult with your local veterinarian.§ According to the American Veterinary Medical Association, dogs at low risk of disease exposure may not need to be boostered yearly for most diseases. Consult with your local veterinarian to determine the appropriate vaccination schedule for your dog. Remember, recommendations vary depending on the age, breed, and health status of the dog, the potential of the dog to be exposed to the disease, the type of vaccine, whether the dog is used for breeding, and the geographical area where the dog lives or may visit.
Bordetella and parainfluenza: For complete canine cough protection, Intra-Trac III ADT is suggested. For dogs that are in shows, in field trials, or are boarded vaccination every six months with Intra-Trac III ADT is recommended.

Disclaimer