



Pregnancy toxemia, dystocia and uterine prolapse observed in does at the end of the gestation period

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The cycle of life includes gestation, which enables the perpetuation of the species. While much studied, gestation also keeps its part of mystery like the ties that unite a female to her fetuses from fertilization to kindling and beyond.

The ability of a female to adjust her energy metabolism to ensure life to her offspring during gestation and lactation is remarkable. This reorientation of the

metabolism is fragile and any rupture can affect the health of the doe and, at times, her own life. A sudden stress can lead to the onset of metabolic pathologies at the end of



Figure 1: A doe with a small progeny is less affected by gestation toxemia. Picture: Arie van Praag

the gestation period or during lactation, respectively pregnancy toxemia and ketosis. Indeed, during the second half of gestation, the development of the fetus is impressive. It causes a 30 to 40% increase in energy demand from the doe. In addition, the volume occupied by growing fetuses in the abdomen during the last week of gestation compresses the digestive system and the doe eats less. To compensate for the energy requirements of the fetuses, the body will tap heavily in its own fat reserves.

1. Pregnancy toxemia

Pregnancy toxemia is a serious disorder caused by a dysregulation of the energy metabolism in a rabbit suffering from pseudopregnancy or a pregnant doe during the last week of gestation. Pregnancy toxemia was first described in the mid-19th century. The name comes from the misconception that it was caused by toxins. Nowadays, this pathology has been renamed pre-eclampsia in humans, while the name has remained in animals. There are analogies between the human and animal pathology, such as an onset at the end of the gestation period, favoring genetic factors, hepatic and/or renal failure, vascularization problems of the placenta and imbalance of the molecules present in the blood. Differences too. Pre-eclampsia appears to be related to a poor implantation of the placenta, causing a poor vascularization of this organ, while toxemia is a breakdown in energy metabolism caused by a depletion of the carbohydrate reserves in prolific females.

Further triggers of pregnancy toxemia include inadequate diet, environmental stress like a sudden change in temperature resulting in hormonal misbalance, lack of exercise or the presence of a mass of hair in the stomach. Other favoring factors are an individual susceptibility of the doe, possible

hereditary factors linked to prolificacy or a poor blood circulation in the uterus linked to an insufficient development of this organ during pregnancy or a compression of its blood vessels by the fetuses in prolific does.

Gestation toxemia affects both underfed and obese rabbits, as well as prolific and healthy bunnies that are fed a balanced diet during the first 3 weeks of gestation. The transition to a high calorie protein-rich diet during the last week is sometimes badly accepted by the body. Very young and old rabbits are more susceptible to this pathology. Dutch, English-spotted, Polish and Havana breeds appear to be more susceptible to gestation toxemia.

A. Exhaustion of the glucose reserves

The level of blood glucose will drop rapidly when the energy required by the fetuses during their intra-uterine growth period is not compensated for by an adequate caloric intake through diet. This deficit causes a mobilization of fat from the adipose tissue. Fats will be transformed into glucose. The release of fat in the blood acts as a poison on the body of the doe and prevents the proper functioning of the liver and the elimination the substances resulting from the degradation of bodily fat (ketone bodies). In some cases, it is possible to detect an acetone odor in the air expired by the doe. Other vital organs are also affected, e.g. kidneys. Urine excreted by a doe suffering from pregnancy toxemia has a lower pH (5-6) than the standard one (7.6-8.8). It is lightly colored and does barely contain any calcium carbonate crystals. The latter are dissolved by the acidity of the urine. The urine also contains ketones and proteins. The intestinal transit may be decreased or even halted. Therefore, diarrhea and/or a decrease in the amount of fecal droppings are frequent.

A biochemical analysis of the blood shows a marked increase in nitrogen and phosphate of non-protein origin, excess potassium, ketones and acetates, and calcium deficiency. The acidity of the blood increases, i.e. the pH becomes lower than normal.

During a necropsy, organs such as the liver, thyroid, heart, kidneys and adrenal glands are very pale (Figure 2). These organs may have fatty infiltrations and necrotic foci. The stomach contains little food. Hemorrhages are visible in the placenta and uterus.

B. Precursor signs

The onset of toxemia is sudden, without warning signs. Its severity varies from one individual to another. The appetite of the doe is usually reduced. She is weak, lethargic and struggles to move in a

coordinated way. Breathing becomes laborious. Drooling of saliva from the mouth is observed.

The course of the disease can be rapid with the onset of attacks and convulsions followed by coma and death of the doe hours only after the observation of the first signs. The fetuses may already be dead in the uterus and will be aborted, but they can be alive when the doe dies. If newborns are viable, a caesarean and adoption by another doe with a small litter or a doe that has lost own litter can save them. A caesarean section should be performed by an experienced veterinarian with experience in the sterilization of rabbits. Indeed, the tissue of the uterus is delicate in these animals and tears easily, unlike that of female cats and dogs.

If the doe survives pregnancy toxemia and does kindle, she is often unable to take



Figure 2: Very pale liver in a prolific Belgian bearded doe that died from pregnancy toxemia. She was carrying 11 fetuses. Picture: Michel Gruaz

care of her newborn and to produce milk to feed them.

C. Acting rapidly in case of clinical signs

Although the severity of pregnancy toxemia disease and its progression are unpredictable, a treatment can be initiated as soon as possible after detection of the disease in a doe in order to stabilize her condition. Often the doe is in shock and suffers from hypothermia. She must be kept warm, for instance with a lukewarm water bottle. While awaiting the veterinarian, it is possible to feed her lukewarm water containing a lot of honey by means of a pipette or a syringe, slowly, to avoid the congestion of the respiratory tract. Glucose and fructose contained in honey provide a source of energy that can be quickly absorbed into the blood and tissues. The veterinarian will administer an intravenous or intraosseous solution of Ringer lactate solution with 5% glucose, 10% calcium gluconate, vitamins and amino acids.

Inadequate functioning of the organs may be "corrected" by the administration of low doses of a short-acting corticosteroid once the state of shock is stabilized. Assisted feeding completes the treatment. There are different commercial products available for sick rabbits, but it is also possible to give fruit or cereal-based baby purées by means of a syringe. Slowly. If the doe survives and her condition is stable, kindling will be induced with an injection of oxytocin. Prognosis is poor.

2. Dystocia

Dystocia, or difficult birth, is an uncommon phenomenon in female rabbits. Kindling is usually quick and easy, and takes less than 30 minutes. The fetuses are expelled one by one. During this stage the

relationship between the longitudinal axis of the fetus and the passage through the narrow canal of the pelvis is more important than the direction of the fetal body in the uterus. The young are born by a posterior (breech) as well as an anterior (head first) presentation. A bent limb joint or a curved position of the neck or head may, however, cause a blockage and prevent the expulsion of the fetus.

There are several types of dystocia:

- Primary uterine inertia, due to prolonged gestation, without signs of kindling. Common causes are hypocalcemia, obesity or the presence of large fetuses, which causes tension on the broad ligament of the uterus (mesometrium) or the presence of a small number of fetuses unable to induce contractions (Figure 3).
- Secondary uterine inertia, caused by the exhaustion of the myometrium during difficult and long kindling, or obstruction.
- Obstruction.

The most common causes in does include:

- Uterine inertia and weak contractions;
- Abnormal position or presentation of the fetus;
- Disproportion between the size of the fetus and that of the pelvis, narrowness or structural abnormality of the pelvic canal, fracture of the pelvis;
- Prolonged gestation, in this case, the newborns may be lightly haired. Beyond 35 days, fetuses die in the uterus and mummify (Figure 4);
- Parasites;
- Obesity or malnutrition;
- Hereditary or breed-related predispositions.

The most common causes of dystocia related to the fetus include:



Figure 3: Does that have only a few newborn, here one kit aged 4 weeks, may suffer from dystocia. Picture: Arie van Praag

- Abnormally large fetal size, often large fetuses in small litters;
- Wrong presentation during kindling;
- Fetal malformations or monster;
- Intrauterine death.

A. Precursor signs

The rabbit is exhausted despite uterine contractions. A bloody vaginal or green-brown vaginal discharge is present.

B. Examination of the doe

Several methods can be used to confirm the blockage when a case arises. At the breeder, it is possible to perform an abdominal palpation and a digital manual examination of the vagina by an experienced person. At the veterinarian, ultrasound and X-ray can confirm the

diagnosis.

B. Treatment

If the person or breeder is familiar with the technique of abdominal palpation of a fetus in the abdomen of the doe, the blockage can be located and the fetus can be gently repositioned. This is possible by gently pushing the fetus back into the uterus horn while trying to reposition it correctly along a longitudinal axis in order to pass the pelvis. If a limb is bended, an attempt should be made to extend it in the longitudinal axis of the fetus. When the fetus is already in the narrow canal of the pelvis, it is possible to remove it manually, with the fingers, and to rapidly free it from fetal membrane.

In the case of uterine inertia, the doe is administered calcium gluconate (10% solution, 5 to 10 ml) and, after 30 minutes,

an intramuscular injection of oxytocin (1-3 units, IM). After rest period of 30 to 60 minutes, uterine contractions should appear. If the doe does not respond to treatment, an emergency caesarean section or ovariohysterectomy may be attempted. The prognosis is, nevertheless, guarded.

When there is a blockage, the obstructing fetus must be removed before administering drugs in order to prevent rupture of the uterus. Treatment consists in the administration of oxytocin (1-3 units, IM) and calcium gluconate (10% solution, 5-10 ml). They promote contractions, but also decrease the volume of the uterus (uterine involution) after kindling, reduce postpartum hemorrhages and helps expulse placentas retained in the uterus.

If the treatment does not work, a caesarean

section may be attempted to save the doe's life and, if possible, that of her fetuses. This surgical procedure must be done by a veterinarian specialized in exotic animals, who has experience in the sterilization of rabbits.

3. Uterine prolapse

Prolapse of the genital organs is rare in rabbits. There are two types:

- Prolapse of the vagina and the vulva, observed mainly when a doe is receptive to a buck (Figure 5). One possible cause is the extreme enlargement of the blood vessels sinuses located beneath the mucous membrane of the vagina wall and the *vestibulum vaginae* - region comprising the opening of the vagina, the urethra, and the excretory ducts of major

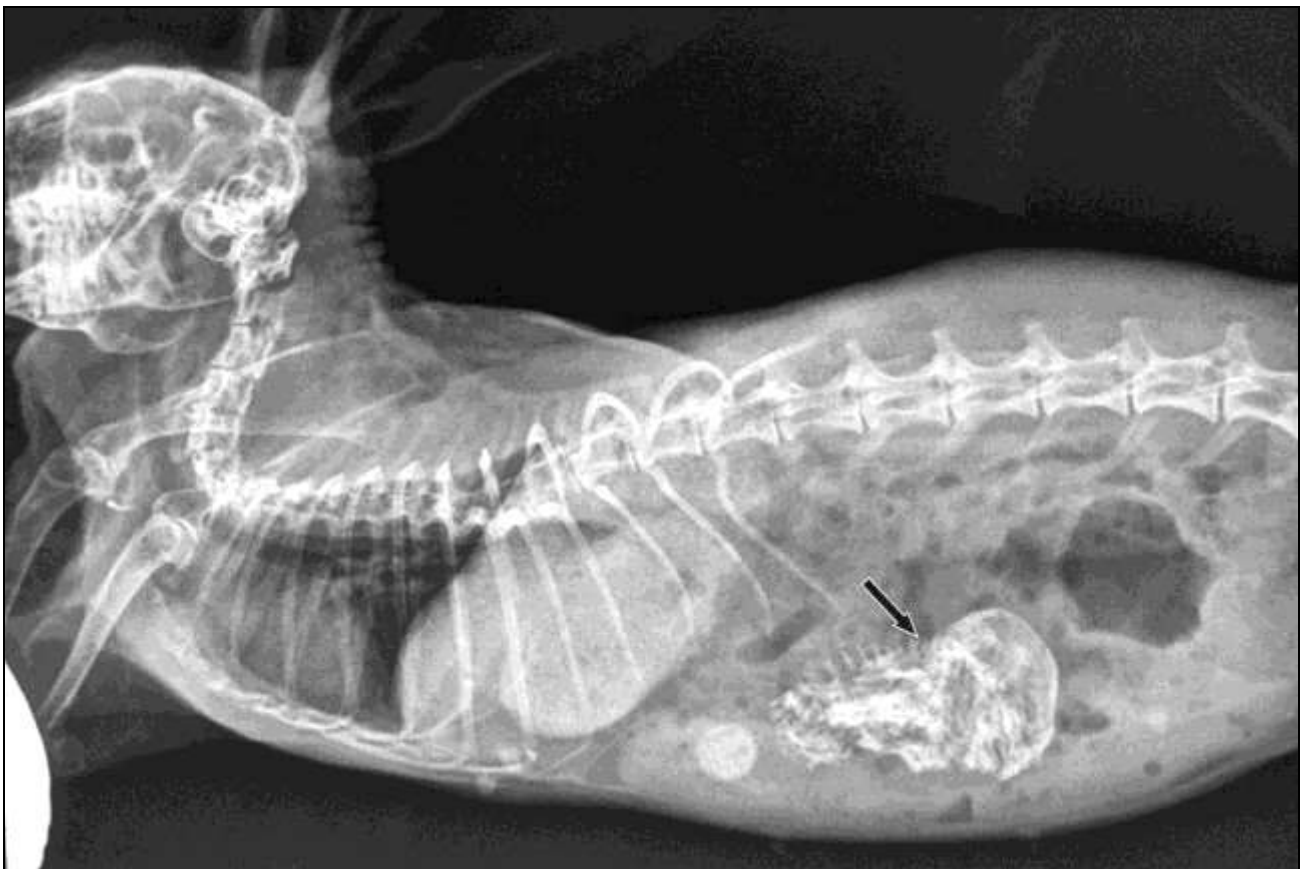


Figure 4: Radiography of a doe with a mummified fetus (arrow) in a uterine horn. Picture: <http://getmeintovetschool.tumblr.com/page/9>

vestibular glands. It results in severe blood loss and hypovolemic shock.

- Bladder eversion is sometimes observed in does during kindling. A mass protrudes from the vagina and the rabbit presents difficulties to urinate.
- A descent of the uterine horns and the cervix is observed during difficult kindling, e.g. when there is a pelvic blockage (Figure 6). Indeed, these tissues become more friable and less flexible during the gestation.

The causes of vaginal or uterine prolapse are not well understood in does. They include:

- Trauma during a difficult delivery (dystocia) or retention of placental membranes in the uterus;
- Presence of polyps in the urinary tract;
- Difficult urination due to bacterial infection and/or the presence of stones in the bladder or kidneys;
- Increased receptivity and/or sexual activity with a male;
- Presence of mycotoxins in food;
- Lack of exercise;
- Hereditary predisposition in certain rabbit lines.

The prognosis for healing depends on the extent of prolapse, organ damage and the amount of blood lost, but also on the time that has elapsed between the prolapse and veterinary care. Most often, the prognosis is guarded and the doe dies within hours after the uterine prolapse.



Figure 5: Vaginal prolapse in a doe. Picture : Zodiac Pet & Exotic Hospital
<http://www.zodiacvet.com/services-detail.php?id=99>

A. Clinical signs

In general, the doe is in severe hypovolemic shock because of the large amount of blood lost. Mucous membranes and ears are often cyanotic and bluish. The extremities of the limbs are cold. There may be hemorrhage or bleeding. She is depressed, lying down, and the rate of breathing is high. This condition may be accompanied by constipation, difficult moving, difficult urination or incontinence, and sometimes bleeding. A reddish inflamed mass protrudes from the vulva. It contains dilated blood vessels.

The longer the time between prolapse and treatment, the greater the risk of shock, bleeding and thromboembolism becomes. The hematocrit is between 8 and 15%.

B. Differential diagnosis

A vaginal or uterine prolapse should be differentiated from:

- Natural abortion;
- Trauma after the sexual activity of a buck;
- Constipation;
- Hernia;

- Rectal prolapse ;
- Presence of kidney stones ;
- Infection of the urinary tract, urinary incontinence.

C. Treatment

Treatment depends on the condition of the organ. If the tissue is not damaged or necrotic, the organ may be cleaned and replaced by gentle finger pressure. Care should be taken not to block the urethra during this procedure. Sedation of the animal and local anesthesia may help bring the organ back into the body.

A relapse is possible.

The treatment of choice usually remains the removal of the damaged part, followed by an emergency ovariohysterectomy.

Administration of analgesic medication is necessary after the surgical procedure to reduce discomfort and pain (e.g. flunixin or meloxicam).

In the event of a bacterial infection, antibiotic treatment should be administered.

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Figure 6: Doe suffering from a uterine prolapse. The mother did not survive but her fetuses could be saved and were adopted by a nursing doe. Picture: Luc Page



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Thank you

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