

And We have already created man and know what his soul whispers to him, and We are closer to him than (his) jugular vein.

(The Letter Qaaf 50:16)

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NEWSLETTER
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NEWSLETTER Winter 2024
Issue 5

HIGHLIGHT

- Message By: Dr Zia Ur Rehman
- PRP in IVF
- TVT in Dog
- Feline Spaying
- A Case Study of Dystocia

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Theriogenology: Expanding Horizons in Veterinary Sciences & Biotechnology:

I strongly encourage DVM and Biotechnology students to pursue postgraduate studies in the field of Theriogenology. **Theriogenology**: the science of animal reproduction is rapidly evolving discipline with immense practical applications in livestock, biotechnology, wildlife conservation and research. Here is an overview of its scope and career opportunities to help students to make an informed decision about their future.

Scope of Theriogenology

Livestock & Dairy Sector – Improving fertility, enhancing genetic selection, and increasing productivity through:

- Artificial Insemination (AI) & Embryo Transfer (ET).
- Hormonal synchronization for timed breeding.
- Management of infertility and reproductive disorders.

Wildlife Conservation & Zoo Management – Assisted reproductive technologies (ART) for endangered species, including:

- Semen and embryo cryopreservation.
- IVF and cloning techniques.

Biotechnology & Genetic Engineering:

- Cutting-edge applications such as:
- Transgenic animal production, Stem cell therapy for reproductive disorders and Genome editing for superior livestock traits.

Companion Animal Reproduction:

- Managing breeding programs for dogs, cats and horses, including: Canine and feline infertility clinics.
- Advanced reproductive techniques in equine breeding

Public Health & One Health Approach:

- Controlling zoonotic diseases and ensuring safe breeding practices.

Poultry & Aquaculture Industries – Optimizing hatchery operations, improving fertility rates, and developing advanced breeding techniques.



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Career Opportunities in Theriogenology

Livestock & Dairy Industry

- **Reproductive Specialist** – Work with dairy farms, beef cattle ranches, and goat/sheep breeding centers to improve fertility and genetic quality.
- **AI Technician & Embryo Transfer Specialist** – Employed by semen production companies, livestock development boards, and private farms.
- **Veterinary Officer in Government Livestock Departments** – Develop and implement national breeding policies.

Biotechnology & Pharmaceutical Companies

- **Embryo Biotechnologist** – Work in IVF labs, cloning, and transgenic animal production.
- **Reproductive Drug & Hormone Specialist** – Develop and market fertility-enhancing drugs and vaccines.

Wildlife & Conservation Organizations

- **Wildlife Reproduction Scientist** – Collaborate with zoos, wildlife reserves, and NGOs to conserve endangered species.
- **Cryopreservation Expert** – Preserve genetic material (sperm, oocytes, embryos) of rare animals.

Poultry & Aquaculture Sector

- **Hatchery Manager** – Oversee fertility optimization and chick production.
- **Poultry Reproduction Consultant** – Advise on breeding strategies to enhance egg and meat production.

Companion Animal & Equine Industry

- **Small Animal Theriogenologist** – Run specialized clinics for pet breeding and infertility.
- **Equine Reproduction Specialist** – Work with stud farms and horse breeding centers.

Academia & Research

- **University Professor & Researcher** – Teach Theriogenology and conduct research in reproductive biotechnology.
- **Research Scientist in ARTs** – Lead projects on IVF, cloning, and stem cell applications.

Government & Policy Making

- **Livestock Development Officer** – Advise on national breeding programs.
- **Veterinary Regulatory Specialist** – Ensure ethical standards in animal reproduction practices.

Private Entrepreneurship

- Establishment of AI/ET Center & Reproductive Biotechnology Firm



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Why Theriogenology is a Smart

- ❖ **High Demand:** Pakistan's livestock sector contributes ~60% to agriculture GDP, creating a need for skilled reproduction experts.
- ❖ **Global Opportunities:** Theriogenologists are sought after in the Middle East, Europe, and North America.
- ❖ **Research & Innovation:** Be at the forefront of genetic engineering and conservation technologies.
- ❖ **Field-Based & Hands-On:** Unlike many lab-only fields, Theriogenology offers direct interaction with animals and farm





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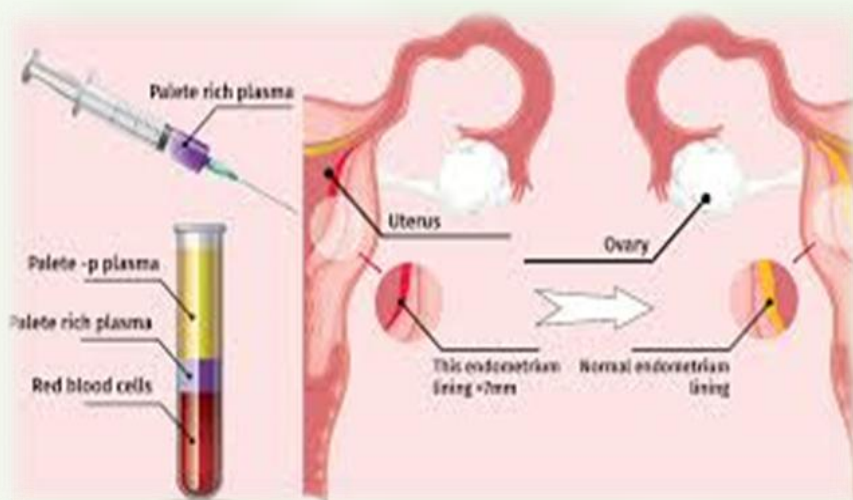
Aina Rashid

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Can Platelet Rich Plasma (PRP) Improves Endometrial Receptivity for Better IVF

Introduction: Platelet rich plasma can increase endometrial receptivity by promoting endometrial proliferation, enhancing endometrial thickness and improving endometrial immune environment. PRP, a concentrated solution of growth factors and cytokines derived from patients own blood can be administered into uterine cavity to stimulate cellular rejuvenation and improve blood flow, ultimately enhancing female fertility.



How PRP may improve endometrial receptivity:

- **Cytokines and Growth factors:**

PRP contains a high concentration of growth factors and cytokines, which can stimulate endometrial cells to proliferate, migrate, and differentiate. These factors also contribute to the development of a healthy endometrial lining.

- **Enhanced Vascularization:**

PRP can promote the formation of new blood vessels in the endometrium, which is a crucial for providing nutrients and oxygen to the growing embryo.

- **Anti-inflammatory Effects:**

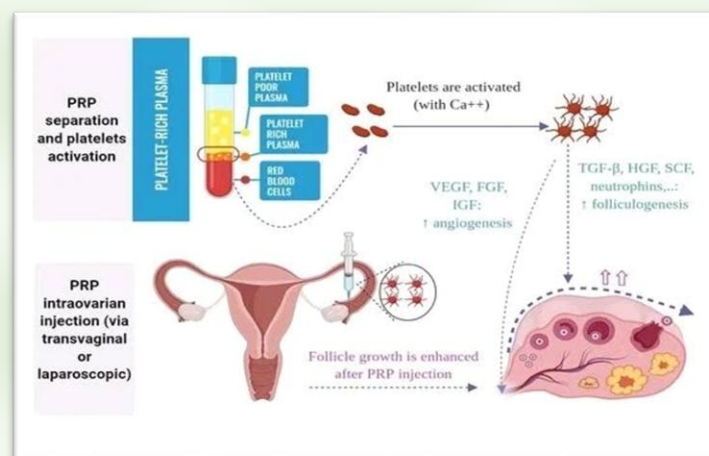
PRP can reduce inflammation in the endometrium, creating a more favorable environment for embryo implantation.

- **Improved Endometrial Thickness:**

PRP has shown to increase endometrial thickness, which is a key factor for successful implantation. The study results demonstrated that intrauterine PRP autologous increased endometrial thickness >7mm after 3 cycles, improved endometrial vascularization, and increased pregnancy rate after PRP application, compared to the group with standard hormonal therapy.

- **Increased Receptivity Markers:**

PRP can upregulate the expression of adhesion molecules and other receptivity markers in the endometrium, making it more receptive to embryo attachment.



Discussion:

- Improved endometrial health.
- Enhanced embryo implantation.
- Increased pregnancy rates.

Explanation:

When IVF is performed after egg collection and *in-vitro* fertilization the recipient cow is treated with PRP. The PRP is administered to the cattle, usually via intrauterine infusion for better IVF results. The recipient cow uterine environment is suitable for the embryo resulting in better results.



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Increased follicle count:

When donor cow is treated with PRP (intra ovarian PRP administration) before superovulation can increase the number of follicles responsive to gonadotropin treatment, leading to improved embryo recovery rates.

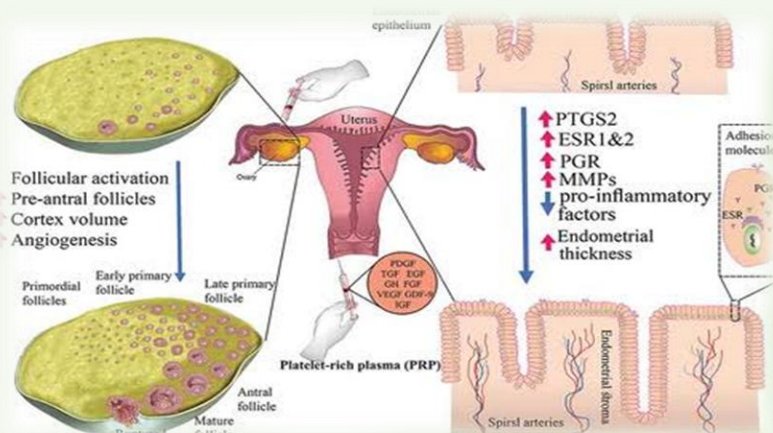
PRP treated ovaries showed a significant increase in follicle count (20.00 ± 9.17) compared to control ovaries (11.33 ± 2.89).

Increased Embryo recovery:

The number of grade 1-2 blastocysts harvested from PRP treated ovaries (14.7 ± 5.9) was significantly higher from control ovaries (6.63 ± 2.92).

Conclusion:

By using PRP we can increase IVF results. Embryo survival rate is increased, also different diseases can be treated with PRP like endometritis.



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Transmissible Venereal Tumor (TVT) Dog

Introduction: Transmissible Venereal Tumor (TVT) stands for Transmissible Venereal Tumor. Also known as Sticker's sarcoma. It is a naturally occurring tumor due to unregulated growth of skin histiocytes. They are malignant in nature. They affect mainly the members of family *Canidae* especially dogs. It can affect both male and female of any breed but mostly Mix breeds or free roaming dogs are prone for TVT. They transfer from one dog to another dog through direct skin contact e.g. mainly contact during mating however can be transfer through sniffing, licking or parturition. Shape of this tumor is Cauliflower like, and size may vary from $<5\text{mm}$ to $>10\text{cm}$. Their distribution is worldwide but mostly cases are recorded in tropical and sub-tropical areas. It is the oldest cancer in the world that is about 6000 years ago the first case was recorded, and till now all tumors contain same that DNA sequence.

Identifying the cause: As these are cancerous cell which are itself an infective agent which can be naturally transfer only through abraded mucous membrane. For their successful transfer there is a need of some neoplastic cells to be transfer. It is suspected that there is genetic mutation in wolves and wild dog which become the origin for TVT, and further mutation make it malignant. However, transmission of TVT from one animal to other is direct contact with tumorous cell mainly during mating and others like sniffing, licking and parturition.

Tracking the Spread: Actually, it is not a venereal disease but mainly transfer during coitus. Mostly dogs are affected. It can occur at any time and everywhere. Cases are reported throughout the world except Antarctica, most commonly case is reported in topical and sub-topical areas i.e., Asia, Africa, Southern US and South/Central America.

Clinical Manifestations: Signs of the TVT mainly depend on the location of the tumor either it is in genital region or extragenital region such as nasal and oral region. Mostly TVT affect the genital region in both male and female and appear cauliflower like lesions and is pendulated and may varies in size that is from 5mm to 10cm, and is firm mass. And animal will lick their genital organ frequently, there may be irregular swelling of genital organs and bleeding from them and sever discomfort to the animal. There may be retention of urine due to swelling.

In case of cutaneous and oral-nasal TVT there will be different signs i.e., sings related to oral-nasal cavity and skin. In oral TVT there will be halitosis, dental fistula and oral deformities, and in nasal TVT there will be sneezing and epistaxis. However, in cutaneous form there will be skin bumps.



TVT in male



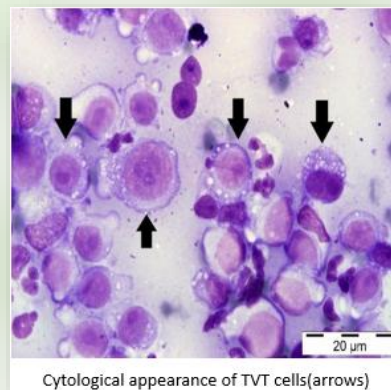
TVT in oral, nasal and skin region



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Pathogenesis: Usually TVT spread through direct contact of TVT affected dog with nonaffected dog mainly during coitus but how they escape the immune system of the host is not completely understood however there may be some involvement of immunosuppressive environment. TVT may gradually regress under the influence of immune system by itself but is very rare. However, it may be malignant that increasing in size continuously. TVT may spread to other parts of body i.e. to regional lymph nodes and other parts but here is very less chances i.e. only 5% chances. TVT affect the area that is originally come in contact with cancerous cells.

How to diagnose? We will go for laboratory diagnosis for example clinical histopathology or cytological examination of tumor cells and PCR technique. For cytological examination collect aspirate from the tumor and make a microscopic slide and observe under microscope there will be tumorous cell containing centrally located nucleoli surrounded by so many cytoplasmic vacuoles. But through this method we cannot differentiate the TVT from other tumors. To differentiate between different tumor and TVT, PCR is best technique. Through PCR we can identify that genetic sequence coded for these cancerous cells. As compared to cytological test PCR provide more accurate results.



Cytological appearance of TVT cells(arrows)



TVT before chemotherapy

Treatment: We can perform surgical excision, chemotherapy and radiations therapy. Surgical excision may be difficult to perform. For superficial tumor mass we can give **Vincristine sulfate @ 0.025mg/kg IV once a week**, and will be given 2 weeks after the complete regression of that gross tumor mass. However, at last the prognosis from radiations and chemotherapy are always good.



TVT before chemotherapy



TVT after chemotherapy

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The Science and Significance of Ovariohysterectomy

Feline Spaying and Its Significance:

- Spaying is a common veterinary procedure performed on female cats. This procedure is significant not only for the individual cat's health but also for helping to address the widespread issue of pet overpopulation. This report aims to provide a comprehensive understanding of feline spaying, including its definition, purpose, the optimal age for the procedure, associated health benefits, surgical details, recovery process, and potential risks.

What is Spaying?

Spaying, also known as "fixing" a female cat, is a surgical procedure that permanently eliminates her ability to reproduce. This procedure is equivalent to neutering in male cats. There are different techniques for spaying. The most common one performed at the Veterinary Teaching Hospital and Pet Center in Peshawar is ovariectomy, which involves the removal of only the ovaries while leaving the uterus intact. By removing the ovaries—the primary source of hormones that control the female's reproductive cycle and associated behaviors—this procedure effectively prevents reproduction and reduces hormone-driven behaviors.

Another common surgical technique is ovariohysterectomy, which involves the complete removal of the cat's ovaries, fallopian tubes, and uterus. Ovariectomy is reportedly less invasive and can be performed more quickly than an ovariohysterectomy. The primary purpose of spaying is to help control the problem of pet overpopulation. It also provides behavioral benefits by reducing the influence of sex hormones.



Fig: The procedure was performed on a cat for practical by DVM students under the supervision of Dr. Zia-ur-Rahman

Typical Age range for spaying:

Veterinarians generally recommend spaying female cats between the ages of six and seven months. However, many now advocate for spaying at four to five months of age—or even as early as six to eight weeks—a practice known as **pediatric spay/neuter**. Kittens can become reproductively active as young as four to six months old. Spaying is not limited to kittens and can be safely performed on adult cats at any stage of life, provided they are in good health—even into their senior years. It is generally advised to schedule the procedure when the cat is not in heat. During a heat cycle, the blood vessels supplying the reproductive organs become engorged, and the blood flow to the uterus increases, which can slightly raise the risk of bleeding and infection during surgery

Health Benefits of Spaying:

1.Prevention of uterine infections

1.Reduced risk of mammary cancer, which is the most frequently diagnosed cancer in unspayed female cats. Cats spayed before their first heat cycle experience a dramatically lower risk—less than 0.5%—of developing this cancer.

1.Prevention of other reproductive system disorders, such as uterine rupture, uterine torsion, metritis and cystic changes in the ovaries or uterus.

1.Elimination of significant health risks and reduction in risky behaviors such as roaming, which can lead to injury. Spayed cats tend to live longer, healthier lives compared to intact cats



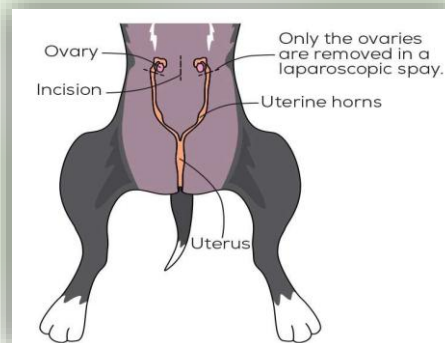
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The Surgical Procedure:

The surgical procedure for spaying a cat requires general anesthesia to ensure the animal remains unconscious and pain-free throughout the operation. Prior to surgery, it is essential to fast the cat—typically for 12 hours (as it is not an emergency procedure)—to minimize the risk of nausea and vomiting while under anesthesia.

The most common spay procedure, ovariectomy, is performed through a relatively small incision, usually made along the midline of the abdomen, just below the umbilicus. The surgeon makes incisions through the skin, underlying subcutaneous tissues, and abdominal wall to access the reproductive organs. Once the ovaries are located, the blood vessels supplying them are ligated, and the ovaries are separated from the surrounding tissues. After the ovaries are removed, the blood supply to the uterus is also ligated, and the entire uterus, along with the previously removed ovaries, is taken out of the abdominal cavity.

A specialized instrument called a spay hook is often used to gently bring the uterus into view through the small surgical opening. The layers of abdominal muscles are then carefully closed with sutures, using a technique at the linea alba to ensure a strong and secure closure. The skin incision is typically closed with sutures as well, and in many cases, dissolvable sutures (such as catgut or Vicryl) are used, eliminating the need for a follow-up appointment to remove them. Some veterinary clinics may also apply a layer of surgical glue or tissue adhesive over the skin. In contrast, the ovariectomy procedure involves a similar surgical approach and incision but focuses solely on the removal of the ovaries. This method is considered less invasive and can be completed in a shorter amount of time compared to an ovariectomy.



The recovery period after a spay surgery typically lasts between 10 to 14 days, during which time proper aftercare is crucial for ensuring a smooth and complication-free healing process.

Potential Risk and Complications:

It is important to be aware of the potential risks and complications associated with spaying. These include inherent risks related to anesthesia, bleeding at or inside the surgical site, infection at the incision site or within the abdominal cavity, and the development of a non-painful swelling near the incision known as a hematoma (an accumulation of blood). Other

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possible complications include the surgical wound reopening, mild gastrointestinal upset, unintended damage to the urinary tract or bowel during surgery, and the formation of hernias. **These potential complications** can vary depending on factors such as the cat's age at the time of spaying, her breed, and her overall health status. One commonly noted long-term effect is a tendency for some cats to gain weight more easily after being spayed, particularly if their diet and activity levels are not properly managed.

Conclusion:

Spaying is a safe surgical procedure that provides numerous benefits for female cats. It effectively prevents unwanted pregnancies and reduces behavioral issues associated with heat cycles. Importantly, spaying offers significant health advantages, including the prevention of uterine infections and a reduced risk of developing mammary, ovarian, and uterine cancers and tumors. Additionally, spaying plays a vital role in controlling pet overpopulation, contributing to community well-being by reducing the number of stray and unwanted animals. While, like any surgical procedure, spaying carries some inherent risks, these are generally low—especially in healthy young cats. Overwhelming evidence supports spaying as a responsible and beneficial choice that contributes to the overall health and behavior of female cats.



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A Case Study of Dystocia

Abstract

A 30 kg pregnant doe was presented to the Veterinary Teaching Hospital, CVS-UAP, Peshawar, with a history of dystocia. The owner reported that the doe had been involved in a fight with a buck, which precipitated excessive straining and premature parturition. The doe was treated, and the non-viable, premature fetuses were euthanized.

Introduction

Dystocia or Difficult birth, is a relatively common obstetric emergency in small ruminants. It can be attributed to a variety of maternal, fetal, and environmental factors. **These factors can be broadly categorized as:**

Maternal Factors:

- **Anatomical abnormalities:** Hypoplasia of vagina, cervix, and vulva; uterine duplication.
- Congenital conditions: White heifer disease (defective Müllerian duct development).
- Physiological factors: Uterine inertia (primary or secondary).

Fetal Factors:

- Fetal malpresentation, malposition, and mal posture.
- Fetal oversize (feto-pelvic disproportion).
- Fetal abnormalities: Ankylosis, prolonged gestation, bulldog, muscular hypertrophy, anasarca, ascites, fetal tumors, and fetal gigantism.

Infectious Causes:

- Systemic diseases that compromise the dam's general health and contribute to weakness at parturition.
- Uterine infections leading to loss of uterine tone, incomplete cervical dilation, and uterine inertia.
- Infections causing fetal death or premature birth, which may result in postural defects.

Traumatic Causes:

- Conditions such as abscesses and ventral hernias that impair ability of abdominal muscles to expel fetus.
- Rupture of the prepubic tendon.
- Uterine torsion due to sudden slipping, falling, or rolling.
- Pelvic fractures resulting in stenosis of the birth canal.

Hormonal Causes:

- Endocrine imbalances involving estrogen, progesterone, relaxin, and oxytocin, which can disrupt the normal progression of parturition.

In this particular case, the dystocia was attributed to trauma (a fight with another goat)

History and Clinical Signs:

A pregnant doe was presented to the Veterinary Teaching Hospital (VTH), Peshawar, with a reported history of dystocia. The owner stated that the doe had engaged in a fight with a buck, after which she began to strain. The owner had purchased the goat two days prior, and the exact gestational stage was unknown. Upon presentation, the doe was emaciated, weak, exhausted, and straining.

Diagnosis

Dr. Zia Ur Rehman (Theriogenologist) examined the doe. Per vaginal palpation was performed to assess cervical dilation. The uterus was slightly prolapsed which made locating cervix difficult. Eventually, cervix was found to be dilated, but the fetal membranes were intact. After ruptured the membranes and extracted the fetuses.

Treatment:

The doe was treated with the following medications:

- Amoxicillin (@11 mg/kg)
- Meloxicam (@0.5 mg/kg)
- Cyanocobalamin (Cyanosil)
- Ringer's lactate (1000 ml)
- Dextrose 5% (500 ml)

“The fetuses were live but premature. Given the prematurity and the lack of facilities for neonatal care, the fetuses were deemed non-viable and were euthanized. The method of euthanasia was not specified, but slaughter is listed. Euthanasia should be performed by veterinary personnel according to AVMA guidelines”

Conclusion:

Dystocia is a veterinary emergency that requires prompt intervention to maximize the likelihood of survival for both the dam and the fetus(es). In this case, the doe's life was preserved through timely veterinary treatment.

Acknowledgement

The authors gratefully acknowledge **Dr. Zia Ur Rehman** for providing his expertise and saving the life of the doe.



Fig 1

Doe after delivering premature fetuses



Fig 2

Two premature fetuses recovered from doe