

## Caesarean Section in Cattle – Anatomical Considerations and Surgical Approach

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### 1. Introduction

A **Caesarean section** (C-section) in cattle is a critical surgical intervention primarily performed in cases of dystocia, where natural delivery is not feasible. Its success relies on a solid understanding of bovine anatomy, adherence to aseptic techniques, careful surgical planning and diligent post-operative management. Widely accepted in veterinary practice, the C-section offers a safe alternative for calf delivery when vaginal birth poses a risk to either the dam or the foetus. While dystocia remains the leading indication, the procedure is also applicable in situations involving foetal abnormalities, uterine torsion, or maternal pelvic issues. With adequate training, C-sections can be effectively carried out in field settings, making them an essential option for both large animal veterinarians and livestock producers.

### 2. Anatomical Considerations

A thorough understanding of bovine anatomy is critical for performing a caesarean section efficiently and safely. Key anatomical considerations include:

#### 2.1. Abdominal Wall Layers

In cattle, the abdominal wall consists of the following layers from superficial to deep:

- **Skin**
- **Subcutaneous tissue**
- **External abdominal oblique muscle (Musculus obliquus externus abdominis):**

A superficial muscle covering the lateral abdominal wall, originating from the last eight ribs and inserting onto the linea Alba, pubic symphysis and xiphoid process via a broad aponeurosis. It functions in abdominal support, trunk flexion and increasing intra-abdominal pressure.

- **Internal abdominal oblique muscle:**

Located deep to the external oblique and superficial to the transversus abdominis. Its fibres run cranioventrally, perpendicular to those of the external oblique. It assists in trunk rotation and flexion and contributes to abdominal compression.

- **Transversus abdominis muscle (Musculus transversus abdominis):**

The deepest of the flat abdominal muscles. It arises from the caudal ribs and lumbar transverse processes and inserts onto the linea alba. It functions to compress abdominal contents, stabilise the trunk and support visceral structures.

- **Transversalis fascia:**

A thin fibrous membrane lining the inner surface of the abdominal muscles, providing separation between the muscular layers and the peritoneum.

- **Peritoneum:**

The serous membrane lining the abdominal cavity and covering the abdominal organs.

All these layers must be incised and subsequently closed appropriately to maintain abdominal integrity and minimise post-operative complications.

## 2.2. Location of the Uterus

During late gestation, the gravid uterus predominantly lies on the right side of the abdomen due to displacement by the rumen. However, a left paralumbar fossa approach is generally preferred for caesarean section, as it offers better access with reduced risk of intestinal contamination. The pregnant uterus is enlarged, fluid-filled and often occupies a major portion of the abdominal cavity.

## 2.3. Blood Supply

The uterus is vascularised primarily by the uterine arteries, which are branches of the internal iliac arteries. Gentle handling is essential to prevent vascular rupture or haemorrhage.

## 2.4. Innervation and Restraint

Effective pain management is crucial. The flank region receives innervation from the last thoracic and first few lumbar spinal nerves. Anaesthesia is achieved using paravertebral block or inverted-L block techniques. Sedation is typically avoided to reduce the risk of recumbency.

## 3. Surgical Approach

### 3.1. Indications for Surgery

- Foetal oversize (feto-pelvic disproportion)
- Incomplete cervical dilation
- Malpresentation or malposition
- Foetal abnormalities (monsters or severe deformities)
- Uterine torsion: Rotation of the uterus along its longitudinal axis, often resulting in dystocia, especially during late gestation or parturition.

### 3.2. Pre-operative Preparation

- Ensure the cow is restrained standing in a chute or stanchion.
- Clip and aseptically prepare the left paralumbar fossa.
- Administer regional anaesthesia (paravertebral block or line block).
- Prepare sterile surgical instruments and drapes.

## 3.3. Surgical Procedure

### 1. Skin Incision:

Make a vertical or slightly oblique incision (~40 cm) in the left paralumbar fossa.

### 2. Layered Dissection:

Incise each abdominal wall layer sequentially, taking care to avoid injury to underlying viscera.

### 3. Exteriorisation of the Uterus:

Gently exteriorise the gravid uterine horn to minimise peritoneal contamination.

### 4. Uterine Incision:

Make a 20–30 cm incision along the greater curvature of the uterus, avoiding major blood vessels and placental sites.

### 5. Delivery of the Foetus:

Deliver the calf carefully, clamp and sever the umbilical cord.

### 6. Uterine Closure:

Close the uterus using an inverting suture pattern (e.g., Utrecht or Cushing) with absorbable suture material to ensure serosal apposition and minimise peritoneal adhesions.

### 7. Abdominal Wall Closure:

Close the peritoneum and muscle layers in a simple continuous pattern, followed by skin closure with non-absorbable sutures.

## 3.4. Post-operative Care

- Administer systemic antibiotics and non-steroidal anti-inflammatory drugs.
- Monitor for complications such as wound infection, dehiscence, or retained placenta.
- Provide supportive care, including nutritional management, to promote recovery.

## 4. Complications and Prognosis

### 4.1. Common Complications

- Peritonitis:  
Inflammation of the peritoneum, potentially due to intra-operative contamination or leakage of uterine contents.
- Haemorrhage:  
May result from uterine atony, vascular trauma, or clotting abnormalities. Uterine atony is the most common cause due to failure of uterine contraction to compress blood vessels.

- Retained foetal membranes
- Metritis:

Bacterial infection of the uterine lining, commonly initiated at or following parturition.

#### 4.2. Prognosis

With prompt intervention and meticulous surgical technique, prognosis is generally favourable, and cows often return to normal fertility. However, multiple caesarean sections may adversely affect future reproductive performance.

#### 5. Alternative Surgical Approaches

- **Right paralumbar approach:**  
Utilised when uterine access is better achieved from the right side.
- **Midline or paramedian approach:**  
Less common due to increased contamination risk and prolonged recumbency recovery.
  - **Standing flank vs. recumbent ventral approach:**  
Choice is determined by animal condition, surgical environment, and surgeon preference.

#### 6. Conclusion

Caesarean section stands as an indispensable surgical intervention in bovine obstetrics, offering a vital lifeline for both the cow and her calf in cases of complicated delivery. The success of this procedure hinges not only on a surgeon's technical skill but also on a meticulous pre-operative plan, a profound understanding of bovine anatomy and a commitment to post-operative care. By mastering the surgical approach and being prepared to manage potential complications, veterinary professionals can significantly enhance the likelihood of a positive outcome. The C-section remains a testament to the value of skilled veterinary medicine in preserving the health and productivity of cattle herds.

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