Republic of Iraq

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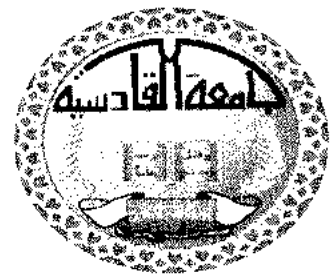
University of Al-Qadissiya

College of Veterinary Medicine



Cesarean section as a treatment of dystocia in cattle

A Research

Submitted to the Council of the College of Veterinary Medicine/ University of Al-Qadissiya in partial fulfillment of the requirements for the Degree of Bachelor of Science in Veterinary Medicine .

BY

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2016 A.D. 1437 A.H.

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Was prepared under my supervision at the College of Veterinary medicine/ University of Al-Qadissiya .

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Abstract:

Cesarean section is an important operation that can solve dystocia cases with almost minimal damages to cow's health and future cow's fertility. Also it can mostly save the newborn's life, if the operation done at a proper time from the beginning of the signs of dystocia case. There are certain known dystocia cases forces us to do the cesarean section such as, feto-maternal disproportion, uncorrectable uterine torsion or incomplete cervix dilation, irreversible fetal mal-position, and monster or emphysematous fetus. Cesarean section can be done either when the cow at standing position or when she is recumbent. The preferable side to do the operation is the left side, but some times it can be done from the right side also. The most common sites of cesarean section are standing or recumbent left (some times right) para-lumber incision, standing left oblique incision, recumbent ventro-lateral incision, recumbent midline ventral incision and recumbent ventral paramedian incision .

1- Introduction

Economy of any cattle farm depends entirely on reproduction, as the main gain depend on milk and meat production. Valuable cattle farm production based on healthy heifers and cows, complete pregnancy period, normal calving and calf survival. Gestation length extend for about 283 days in cattle, and the normal calving which called eutocia may divide theoretically into three connected stages represent the normal parturition process. The duration of the first stage lasts about 4-24 hours, and about 0.5 - 3 hours for the second stage (Jackson, 2004). The second stage ends when the fetus goes out through the birth canal. The difficult birth that called dystocia include all the causes that prolong the first stage of labor and prevent the normal expulsion of the fetus at the second stage. The term dystocia comes from the two Greek words *„dys'* meaning difficulty and *„tocos'* meaning birth, which have a great impact on cattle farms production by increasing the stillbirth and the dam mortality rates (Mee, 2004), increasing puerperium problems through increased risks of retained placenta and metritis (Bonneville Hebert, *et al.*, 2011 ; Hossein Zahed and Ardalan, 2011) that reduced productivity of the dam and reduced subsequent fertility and increased chance of sterility which may lead to increase the cows culling rate (Sewalem *et al.*, 2008). Cows which experience dystocia are more likely to experience dystocia at a subsequent calving (Mee *et al.*, 2011), so when we calculate the costs of dystocia, we can say that the total cost of dystocia is four times greater than treatment costs alone (Oltenacu *et al.*, 1988). Causes of dystocia listed usually under two groups maternal and fetal. The maternal causes include small pelvic area, failure cervix dilation, uterine torsion, uterine muscles inertia, weak or no abdominal muscles strain and weak dilation of vulva. The fetal causes include oversize or monster fetus, twins and abnormal fetal PPP (Ball and Peters, 2004; Jackson, 2004; Youngquist and

Threlfall, 2007). In this review, we will focus on cesarean operation, and the most dystocia cases that needs to be treated by cesarean section.

2- Literature review:

Nowadays, the caesarean operation is one of the most common surgical procedures performed by veterinarians in cattle practice, and is considered as a routine obstetric technique. It has high maternal and fetal survival rates, and often is less exhausting. There are three main goals obtained when we treat dystocia by cesarean section: (1) survival of the cow; (2) survival of the calf; and (3) maintenance of fertility. A successful prognosis depends on several factors, such as the skill and speed of the surgeon, duration of dystocia, physical condition of the dam, surgical environment, concurrent disease, and presence of a live calf. (Vermunt,2008).

2-1- indications

The six major indications for caesarean operation are:

1. Fetomaternal or fetopelvic disproportion (either relative or absolute fetal oversize)
2. Incomplete dilatation or induration of the cervix
3. Uterine torsion that cannot be corrected
4. Fetal monsters
5. Faulty fetal disposition (presentation, position or posture)
6. Fetal emphysema.

The most common cause of dystocia in cattle that represents 46% of all cases of dystocia, is caused by fetomaternal disproportion (Noakes *et al.*, 2001), so this consider a main problem specially in bad managed farms (Mee *et al.* 2009).

Fetomaternal disproportion occur due to two reasons, small pelvic area or big size fetus (Rice and Wiltbank, 1972). Uterine torsion cases is another main cause for cesarean section because of the occluded of the fetus passage through the birth canal. The incidence is known to be higher in pleuriparous cows, and the usual age (years) of animals that suffer from uterine torsion is 5 - 7 for cows (Roberts, 2002). The third important cause of treating dystocia by cesarean section is abnormal fetal PPP, and it is the most common cause of dystocia in older cows accounting for about 20 to 40% of dystocia cases of pleuripara (Meijering, 1984).

2-2- Surgical Approaches

Different surgical approaches have been developed for the caesarean operation in cattle, with each having its advantages in specific situations. Considerations crucial to the choice of approach include: (1) the veterinarian's experience and confidence; (2) the kind of assistance that is available: and (3) the physical condition of the animal (e.g. whether it can stand for the entire procedure, whether the rumen is distended or whether there is evidence of calving paralysis due to prolonged dystocia). The options of cow positioning for caesarean operation are:

1. Standing (suitable for left or right paralumbar fossa and lateral oblique approach)
2. Lateral recumbency (suitable for ventro-lateral approach).

In a cow capable of tolerating surgery while standing, the left paralumbar fossa or flank approach is the standard technique for a viable or recently dead, uncontaminated fetus. One advantage of the left flank incision is that the rumen can be used to prevent exposure of the intestines. Another advantage of the flank approach in the standing animal is easier correction of uterine torsion. Finally, wound dehiscence is more manageable in the flank, compared with lower

abdominal incisions. The standing left paralumbar fossa approach is favored by most veterinarians and is described in detail below (Vermunt 2008).

2-3- Preparing the surgery

Even though there are several techniques, the pre-surgical procedures are common to them all . Before the beginning of the surgery all the necessary material should be prepared. It should include medication for sedation, local anesthesia, analgesia, antibiotics and any other drug that might be useful (such as clenbuterol and oxytocin), and materials to prepare the surgical site, such as soap, razor, povidone-iodine and alcohol. A surgery box with sterilized material, which must contain:

o scalpel and disposable scalpel blade;

o rat-toothed forceps;

o scissors;

o towel clamps;

o blood vessel clamps;

o obstetrical ropes/chains and handles for calf extraction;

o different kinds of needles for suturing (cutting and round needles);

o needle holder;

o uterine forceps

Sterilized swabs Suture material (absorbable and non-absorbable suture) (Hanzen *et al.*, 1999; Jackson, 2004; Kolkman *et al.*, 2007):

2-4- Preparation of the surgical area

The area for the surgical approach varies with the C-section method. Nevertheless the pre surgical steps to prepare this area are the same. Briefly, Initially, dirt and dust should be brushed from the flank and back of the animal before the operative field is clipped or shaved. In the case of a flank incision, the entire flank should be clipped from below the transverse processes dorsally, to just above the milk vein ventrally, and from the last rib to the hind leg, level with the tuber coxae, and disinfecting the area to allow local anesthesia to be performed in a cleaned animal; then the area should be rewashed with iodine soap, dried and finally disinfected with alcohol and povidone iodine solution (Kolkman *et al.*, 2007).

Ideally, surgeons and assistants should wear protective surgical scrub suits, even in the field situation. Alternative, a clean and disinfected apron can be used. Many practicing veterinarians prefer not to wear gowns and gloves, in which case the surgeon arms (all the way up including the armpit and shoulder) should be bare, washed and scrubbed thoroughly. However, due consideration should be given to wearing long-sleeved plastic gloves (rectal examination sleeves, with the finger tips cut off, and the gloves held in place with elastic bands) and surgical gloves, particularly by those veterinarians who do not wear protective gloves for claw trimming and other work in cattle practice that causes gross contamination of the hands (Vermunt,2008).

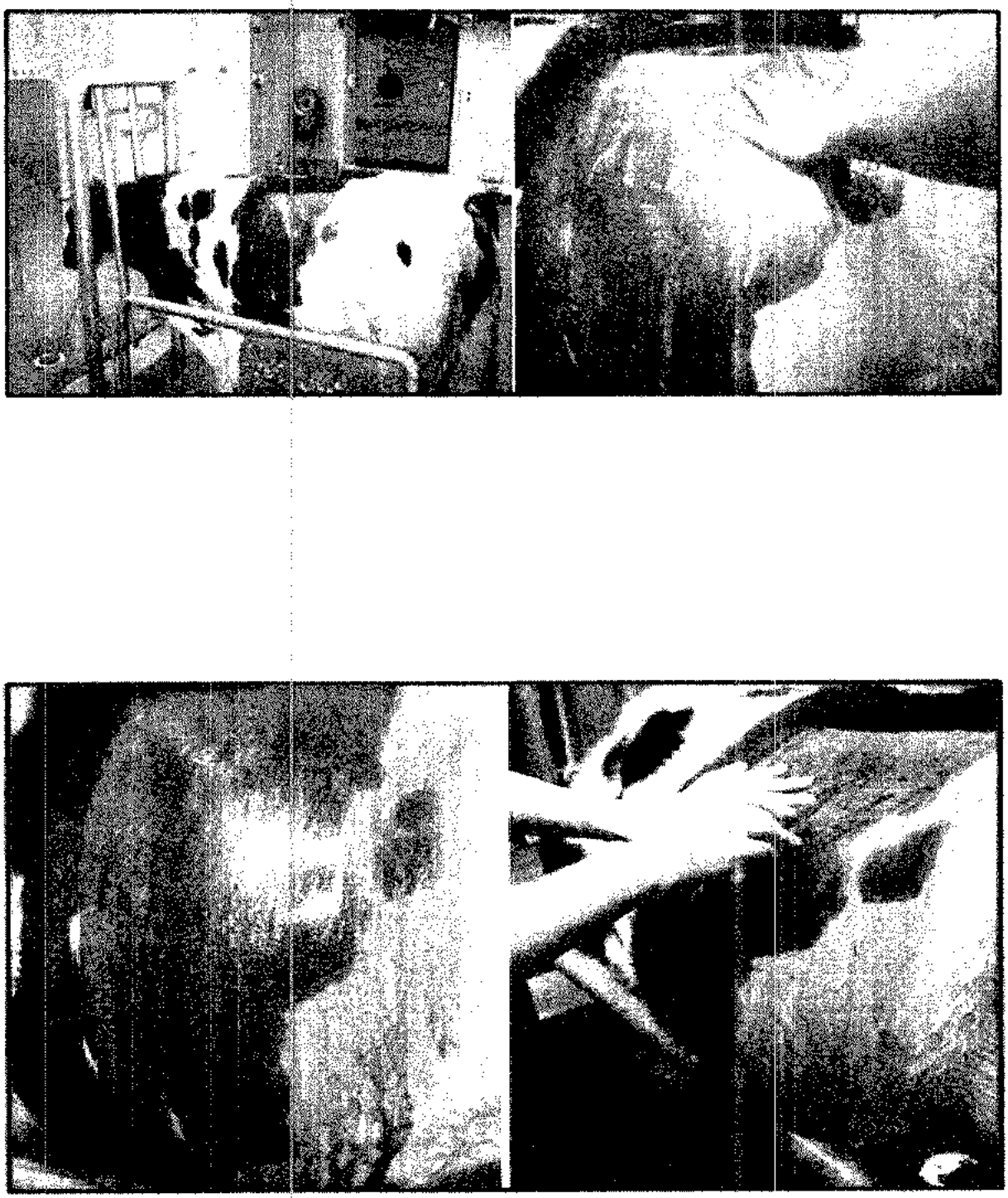


Figure-1, preparation to operation; cleaning, washing, shaving and disinfecting the pre-incision area. From Pires, 2010.

2-5- Anesthesia

This can be made in two steps, epidural and the local / regional anesthesia. This may be accomplished through several techniques that are influenced by the surgical approach: local infiltration by line block or inverted L block and the proximal or distal paravertebral injection, which are performed after the preparation of the surgery site. Lidocaine hydrochloride is the most frequently used drug for this anesthesia and each technique has its own advantages and disadvantages (Fubini and Ducharm, 2004; Jackson, 2004; Newman and Anderson, 2005; Weaver *et al.*, 2005; Newman, 2008).

a. Local infiltration

The line block or inverted L technique consists in injecting the anesthetic at several sites (+/- 5ml subcutaneously in each direction and then 10ml in the muscle) with the number of sites varying with the length of the incision that will be made (Noakes *et al.*, 2001). It was demonstrated that a volume of 125 ml of lidocaine hydrochloride 2% has no side effects for the animal (Carreira *et al.*, 2005). Usually 80 to 120 ml of anesthetic is needed for the infiltration that will be done along the line on which the incision will be made which vary with the C-section technique chosen (Jackson, 2004; Carreira *et al.*, 2005; Kolkman *et al.*, 2007). The inverted L method is used just for flank laparotomy and is performed injecting the anesthetic along the caudal part of the last rib and horizontally just ventral to the transverse processes of the lumbar vertebrae. This will create a wall of analgesia enclosing the incision site where all nerves entering the operative field are blocked (Turner *et al.*, 1989; Fubini and Ducharm, 2004).

Local infiltration is a fast procedure but can interfere with wound healing with an abscess formation relatively frequent, skin slough and necrosis in the injection sites mainly deriving from the vasoconstriction promoted by the adrenaline

(Hanzen *et al.*, 1999; Fubini and Ducharm, 2004; Carreira *et al.*, 2005; Newman and Anderson, 2005; Newman, 2008).

b. Paravertebral injection

Paravertebral anesthetic block provides the maximal analgesic region and relaxation of flank musculature, providing an excellent anesthesia for standing flank approaches. This sort of anesthesia is more difficult to perform than the other methods, in particular in beef breeds and fat animals (Frazer and Perkins, 1995; Noakes *et al.*, 2001; Jackson, 2004).

It is obtained injecting *ca.* 20 ml of anesthetic (usually lidocaine 2%) inserting an 18G and 10cm long needle midway between the spinous process and the tip of the transverse processes for the proximal paravertebral technique. Can also be done with an 18G and 3,75cm needle above and below the edge of the transverse processes in the distal technique (Frazer and Perkins, 1995; Noakes *et al.*, 2001; Jackson, 2004; Newman and Anderson, 2005). According to Newman (2008) the more efficient procedure for beef cows and for dairy cows are respectively the proximal and the distal technique.

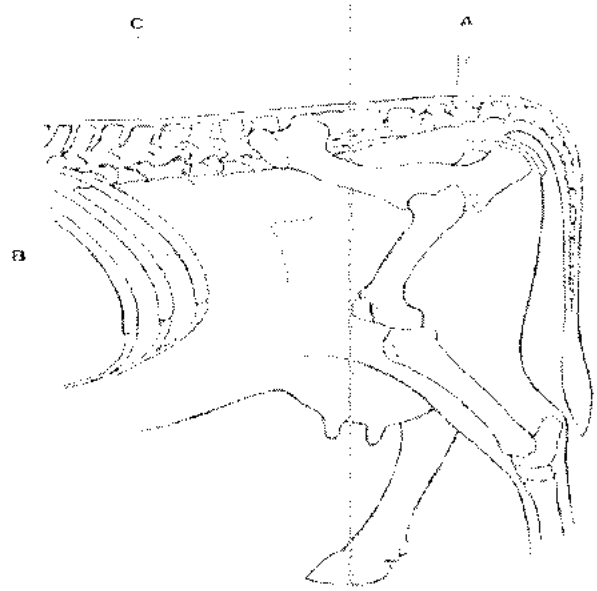


Figure -2, sites of anesthesia

A- epidural

B- local infiltration

C- paravertibral

From Jackson, 2004

2-6- The most common sites of cesarean section:

a. Standing left paralumbar incision

This is the most used approach in cases of uncomplicated C-section and the appropriated for the standing animal (Noakes *et al.*, 2001; Schultz, 2010). Usually, the area prepared for this surgery is located 10 cm cranially to the last rib until after the *tuber coxae* (Kolkman *et al.*, 2007). The incision of the skin and dermis is made 5 cm (+/- 3 fingers) caudally to the caudal part of the last rib or, in cases that is not the first C-section, the same distance from the previous scar. The incision should be made vertically (perpendicular to the spine) with the scalpel starting approximately 10 cm ventral to the transverses processes of the lumbar vertebras and ending about 35 to 40 cm below, large enough to remove the fetus safely (Jackson, 2004; Kolkman *et al.*, 2007; Newman, 2008; Schultz, 2010). Then is time to incise first the subcutaneous tissue followed by the muscle *Obliquus abdominis externus* and muscle *Obliquus abdominis internus*. The muscles are incised with the scalpel, one each time. Then we will find the muscle *Transversus abdominis*, which should be cut with the scissors or cleaved in the muscle fibers direction (Fubini and Ducharm, 2004; Kolkman *et al.*, 2007). To finish, the peritoneum is cut with scissors and the use of dissecting forceps to lift the peritoneum, avoiding cutting the rumen; after the first cut, 2 fingers are inserted through the peritoneum to help cutting. The abdominal cavity is now opened, and it is time to locate the pregnant horn (Frazer and Perkins, 1995; Kolkman *et al.*, 2007).

Figure- 3, standing left paralumber site.

From Schultz *et al.*, 2008.

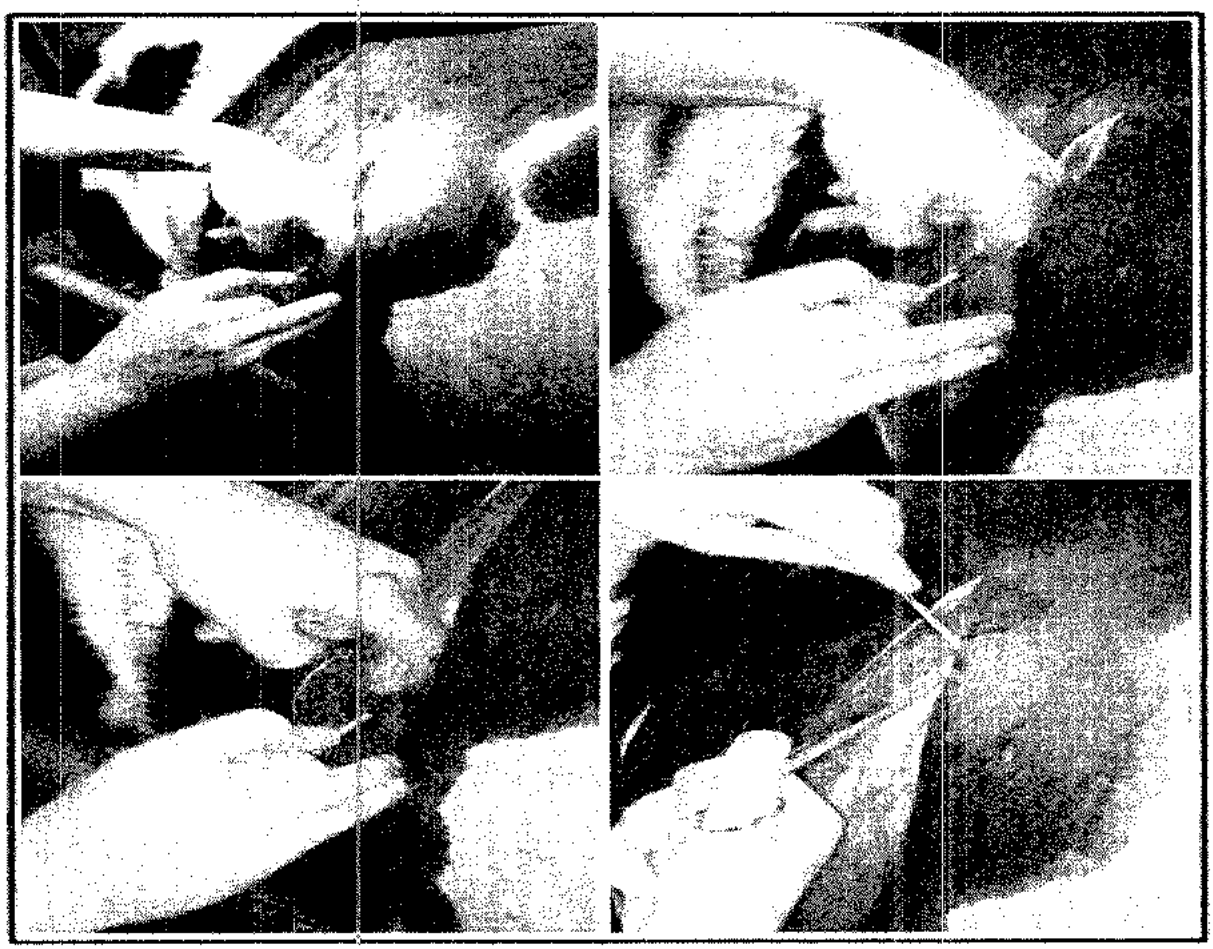


Figure-4, standing left paralumber incision. From pires, 2010.

If the calf is presented in anterior position the hind limbs should be located and, by placing one hand under the hock, the calf is "lock" into the dorsal end of the skin incision, facilitating the incision of the uterus outside of the abdomen (Noordsy, 1994; Kolkman *et al.*, 2007; Newman, 2008). The incision usually starts over the fetal claws and should have between 20 to 30 cm performed along the uterine *Curvature major*, with scissors, avoiding cutting the placentomes or reaching the cervix (Hanzen *et al.*, 1999; Noakes *et al.*, 2001; Carreira *et al.*, 2005; Kolkman *et al.*, 2007; Newman, 2008). When the uterine incision is not long enough it can be prolonged, but always in a ventral direction (Kolkman *et al.*, 2007). The calf should be delivered by applying traction on the hindlimbs, first

dorsally and laterally from the dam skin incision, and then caudally (Jackson, 2004). If the calf is in posterior position his forelimbs and the head must be found; one forelimb can be used to bring the uterus into the surgical incision and then the uterus should be incised, if possible similar to anterior presentation (Kolkman *et al.*, 2007). The difficulty in exteriorizing the uterus with a calf in this presentation increases and frequently a larger incision is required (Newman, 2008). Nevertheless, even when the calf is back towards to the skin incision, the surgeon should be able to turn the uterus and the calf around their longitudinal axis (Kolkman *et al.*, 2007). In some situations it might also be impossible to exteriorize the uterus. In such situations, it is advised to proceed to the denominated "blind incision", to be performed inside the abdomen (Hanzen *et al.*, 1999; Carreira *et al.*, 2005).

After uterine incision, the incision or manual rupture of the fetal membranes should be performed, between the claws to free the limbs; the loops of the calving chains are placed around the limbs and the calf is carefully pulled out of the uterus, which is massaged backward. When in cranial presentation, the pulling is stopped when both hind limbs and the backside are delivered to allow the surgeon to "cut" the umbilical cord with his hand by compression and stretch, 10 cm from its base. The calf can be then completely delivered and brought to a box with clean straw. The umbilicus should be disinfected with tincture of iodine (Hanzen *et al.*, 1999; Carreira *et al.*, 2005; Kolkman *et al.*, 2007). After ensuring the absence of a second calf, the suture of the uterus starts. The incised uterine horn should be completely exteriorized and immobilized by an assistant by using uterine forceps (Kolkman *et al.*, 2007; Newman, 2008). If possible, the placenta is manually detached from the uterus; alternatively, the fetal membranes hanging out are cut, and the uterine wall and placentomes examined for bleeding (Noakes *et al.*, 2001; Jackson, 2004;

Kolkman *et al.*, 2007; Newman, 2008). Whenever a bleeding is detected, a ligature should be done in the vessels.

Figure-5, exteriorizing the calf after pulling out and incise the uterus. From Pires, 2010.

b. Standing right paralumbar incision

Although uncommon, this procedure is performed similarly to the standing left paralumbar celiotomy, taking into account the disadvantages mainly the difficulty to retain the small intestines (Jackson, 2004).

c. Standing left oblique incision

This is a variation from the standing left paralumbar celiotomy. Here, the incision starts 8 to 10 cm ventral and cranially to the *Tuber coxae*, going from a caudodorsal position, cranioventrally in a 45° angle until 3 cm caudal the last rib (Hanzen *et al.*, 1999; Noakes *et al.*, 2001; Carreira *et al.*, 2005; Schultz, 2010). For this surgical approach, the left abdomen is prepared like in the standing left paralumbar celiotomy (Parish *et al.*, 1995). While the muscle *Obliquus abdominis externus* is incised in the same direction as the skin, the incision of the *Obliquus abdominis internus* and *Tranversus abdominis* muscles is performed along the direction of their fibers (Parish *et al.*, 1995; Schultz, 2010). After incision of the peritoneum, the uterus is located and exteriorized. Uterus incision and suture is performed as for the standing left paralumbar celiotomy, as well as the closure of the abdominal cavity, which is made in 3 layers plus the skin (Parish *et al.*, 1995).

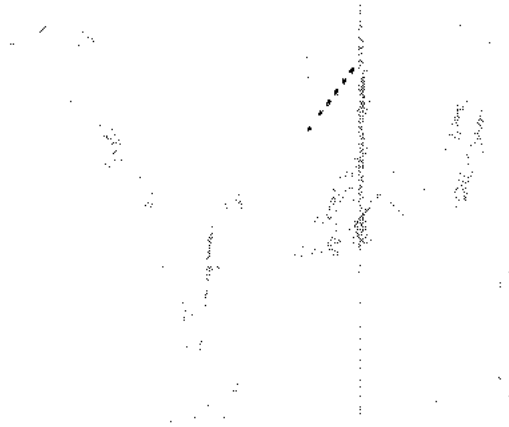


Figure-6, standing left oblique incision site.
From Schultz *et. al,* 2008

d. Recumbent left paralumbar incision

The difference from the standing left paralumbar celiotomy beyond a recumbent cow is that the incision is made slightly more ventral (Schultz *et al.*, 2008; Schultz, 2010). Conversely, the uterus exteriorization is often more difficult because the uterus falls away from the incision site and the closure is also more difficult due to the increased tension in the muscles (Schultz *et al.*, 2008; Schultz, 2010). The incision should be done in an oblique way starting at the hock level (Hanzen *et al.*, 1999; Carreira *et al.*, 2005).

e. Recumbent right paralumbar incision

This procedure is rarely used and very similar to the corresponding in the left side (Schultz *et al.*, 2008; Schultz, 2010). The disadvantage towards the standing right paralumbar celiotomy is that the rumen does not retain the abdominal viscera (Schultz *et al.*, 2008; Schultz, 2010).

f. Ventro-lateral incision

For the ventro-lateral celiotomy, the cow should be positioned in right lateral recumbence. The incision starts +/- 5 cm lateral to the umbilicus extending out caudo-dorsally toward the inguinal area (Noakes *et al.*, 2001; Schultz *et al.*, 2008; Schultz, 2010). The incision run laterally to the milk vein continuing lateral to the attachment of the udder (Fubini and Ducharm, 2004). The incised muscle in this approach is the *Rectus abdominis* and their sheaths (Fubini and Ducharm, 2004; Jackson, 2004).

Figure-7, ventro-lateral incision. from Jackson, 2004.

g. recumbent midline ventral incision

The recumbent ventral midline celiotomy is the most used approach in recumbent animals, and is a relatively simple procedure because the only layers incised are the skin, the sub-cutaneous tissue and the *linea alba*, making this probably the easiest and faster C-section technique. For that the cow should be in dorsal recumbence (Hanzen *et al.*, 1999; Fubini and Ducharm, 2004; Jackson, 2004; Carreira *et al.*, 2005; Schultz *et al.*, 2008; Schultz, 2010). The incision starts immediately in front of the udder and continuous for 30 to 40 cm forward (toward the xiphoid if necessary) (Frazer and Perkins, 1995; Fubini and Ducharm, 2004; Jackson, 2004). To close the incision on the peritoneum and fascia, Frazer and Perkins (1995) referred the use of an absorbable material in a far-near-near-far pattern while for the skin they suggest an interrupted cruciate suture using non-absorbable material.

h. recumbent ventral paramedian incision

The difference between the ventral paramedian and the ventral midline recumbent celiotomy is that the incision is made 5 cm lateral and parallel to the *linea alba*, halfway to the mammary vein. This technique can be performed on the left or the right side. The incision starts cranial to the udder and is extended cranially until the umbilicus (Noordsy, 1994; Frazer and Perkins, 1995; Hanzen *et al.*, 1999; Carreira *et al.*, 2005; Schultz *et al.*, 2008; Schultz, 2010). In this procedure an incision is made through the skin, subcutaneous tissues and the muscle *Rectus abdominis* (Frazer and Perkins, 1995).

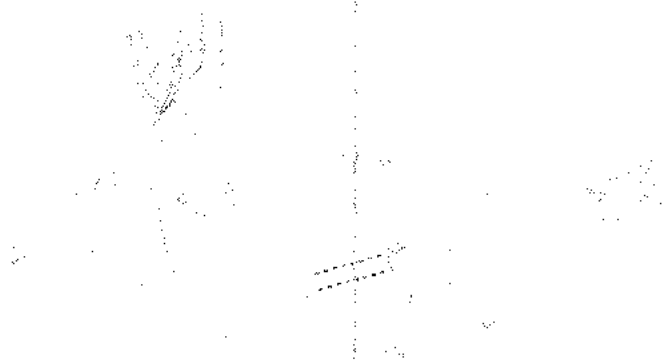


Figure-8, recumbent ventral midline and paramedian incision site. From Schultz *et al.*, 2008.

2-7- Suturing the uterine incision

The edges of the uterine incision are inspected for haemorrhage, particularly from the cotyledonary vessels. It is advisable to exteriorize both uterine horns before the genital tract begins to involute, which will facilitate inspection and repair of the wound. Large vessels that are bleeding profusely should be ligatured. The uterus is supported by an assistant or held using uterine forceps, keeping the entire uterine incision outside the abdominal incision, and the incision is sutured using absorbable suture material, such as chromic catgut (3 USP or 7 metric). Complete closure of the hysterotomy incision is critical to preserve future fertility of the dam. Adhesions between the incision site and surrounding organs or the body wall are associated with infertility following caesarean operation (Vermunt, 2008). A variety of suture patterns have been employed; all are continuous. The Utrecht method, which is a modified Cushing pattern that is turned to a 30-45o angle away from the incision, is commonly used these days. The suture should start approximately 2 cm above the upper end of the incision, using oblique bites so the knot is buried within a fold of the inverting tissue. Similarly, the continuous interlocking, inverting pattern is inserted using oblique bites; these should begin about 2 cm from the incision edge, but are inserted some distance back from the emerging previous bite. Each bite should exit the uterine tissue near the edge of the incision. It is important not to perforate the uterine wall (the needle should pass through, but remain within the tissue), and to pull each suture tightly following its insertion. This suture pattern approximates the peritoneal surfaces, while the wound edges are not inverted too much (uterine healing occurs across the wound edges, rather than on the opposed peritoneal surfaces). The final knot is buried in the same manner as the knot at the start of the suture line. If done correctly, there will be no leakage of uterine fluid and little, if any, exposed suture material.

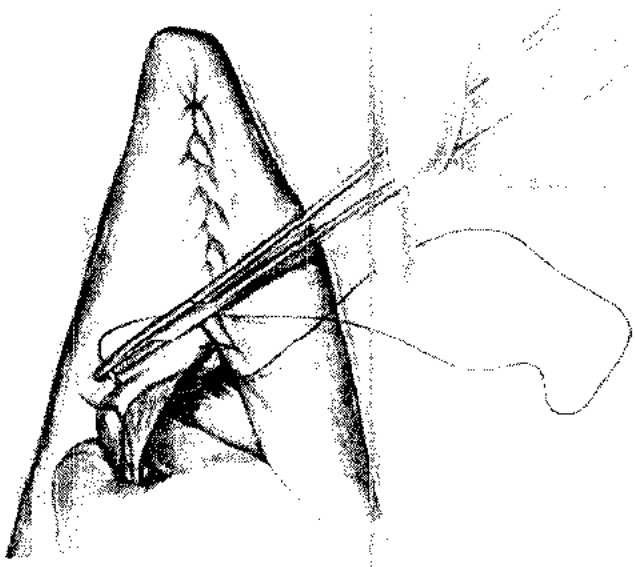


Figure-9, Technique to suture the uterus (Utrecht pattern) (from Turner *et al.*, 1989)

The advantage of this suture pattern is minimal adhesion formation following surgery. A single layer is sufficient if the uterine wall is healthy and the uterine contents are not septic. This pattern is particularly efficient if the uterine wall is flaccid during repair of the wound. Alternatively, a Lembert suture pattern can be used with the needle passing at right angles to the incision, or a Cushing pattern, where the needle passes parallel to the incision (Jackson, 2004; Vermunt,2008).

Once the uterine incision has been repaired and the uterus checked for tears, the surface should be cleaned with sterile gauze to remove blood clots and other debris. The uterus is then returned to its correct location within the abdomen, ensuring that there is no torsion of the genital tract. The abdominal cavity is inspected for large blood and fibrin clots, which should be carefully scooped out by hand. The administration of water-soluble antibiotic, such as crystalline penicillin, within the abdominal cavity is recommended by some surgeons, but not others. However, metronidazole should not be used because it is prohibited in food-producing animals in many countries, despite being recommended by some surgeons. Oxytocin (20-40 IU) may be administered intramuscularly at this point

to hasten uterine involution and expulsion of the placenta. (Jackson, 2004, Vermunt, 2008).

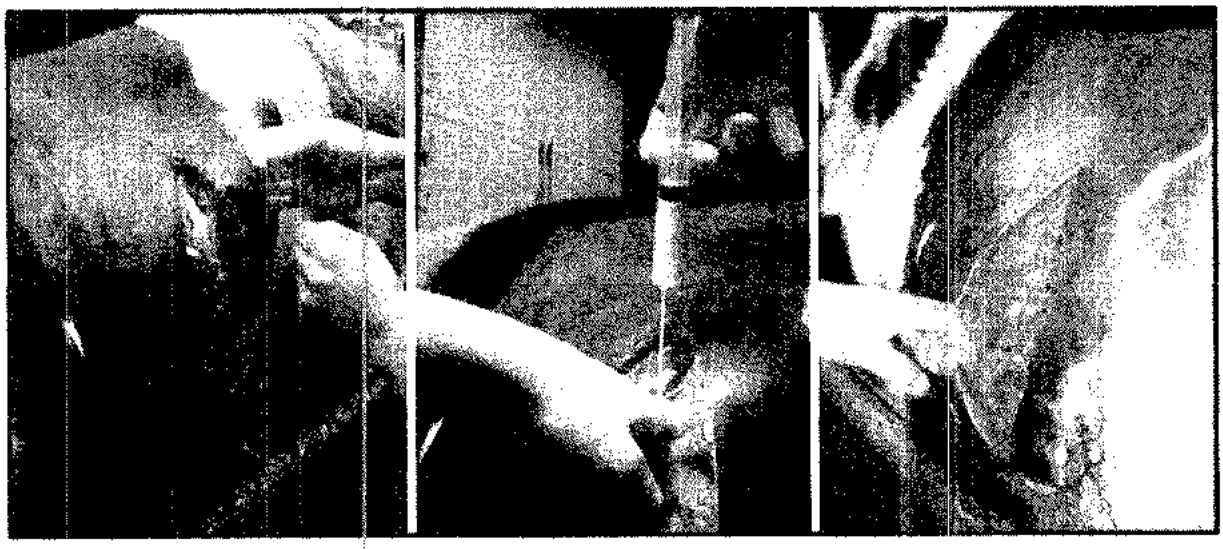


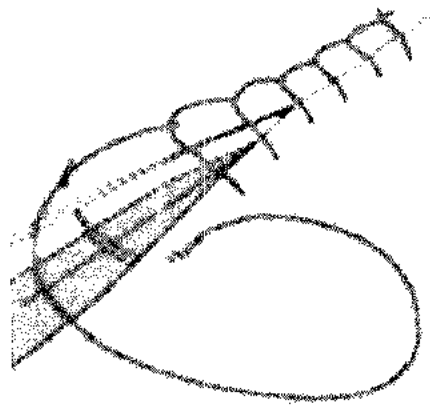
Figure-10, Closing the flank incision. From Pires, 2010.

2-8- Closing the flank incision

The peritoneal cavity should be closed as quickly as possible to reduce the chance of bacterial contamination. Closure of the abdominal wall can be at the discretion of the surgeon. Chances of failure of the closure and subsequent herniation following incisions in the paralumbar fossa are minimal. Nevertheless, it is recommended that the abdominal flank incision is repaired in two layers: peritoneum and transverse abdominal muscle in the first, and internal and external abdominal oblique muscles in the second layer. A simple continuous suture pattern is used, starting at the ventral commissure of the incision. Sutures should be placed approximately 1cm apart using chromic catgut (3 USP or 7 metric). To reduce dead space between the suture layers, deeper bites with the suture can be made periodically into the deeper muscle layer, thus intermittently anchoring the suture into the underlying tissue. Antibiotics may be infused between the suture layers; approximately 250 mg/ml each of procaine penicillin G and dihydrostreptomycin

as a mixture is commonly used. However, the value of this in preventing wound infection is debatable. Before closing the skin, it is advised to place several simple interrupted tension sutures wide and deep through the abdominal muscles, using chromic catgut. The skin incision is closed in a standard manner (e.g. a simple interrupted horizontal mattress) using a cutting needle and non-absorbable suture material, such as sheathed monofilament nylon (3 USP or 6 metric). Moderate tension should be applied to the sutures to bring the wound edges into complete apposition, which will ensure a good seal and promote first-intention healing. (Noakes *et al.*, 2001; Jackson, 2004; Vermunt, 2008).

Figure-11, Closing the skin
(from Turner *et al.*, 1989)



2-9- Post-Operative Fertility

Under normal circumstances, the three main goals of the caesarean operation in cattle are: a) survival of the cow; b) survival of the calf; and c) maintenance of post-operative. productivity, which implies not only the maintenance of body condition and an acceptable level of lactation, but also the ability to conceive again and sustain a developing fetus to term. Numerous data have been published on fertility rates after a caesarean operation, but their significance is qualified by the

fact that many animals are culled without being inseminated or served again. Although the calving interval is increased in cows following a caesarean operation compared with normal calvings, the principal cause of economic loss is the higher culling rates. Reduced fertility may occur as a consequence of increased incidence of retained fetal membranes and endometritis, uterine adhesions that hinder involution, adhesions that affect the ovary or uterine tube, and reduced endometrial tissue competence. In addition, there is an increased risk of abortion during subsequent pregnancy, possibly as a result of scar tissue formation within the uterine wall, limiting expansion of the uterus and/or nutrition of the fetus (Jackson, 2004).

Conclusions:

As a conclusion, the cesarean section is

1- an important operation that can treat dystocia cases without damages to cow's pelvic and cow's future health and fertility.

2- can save the cow's life and almost the newborn's life, if the operation done at a proper time from the beginning of the signs of dystocia case.

3- very helpful to treat difficult dystocia cases such as fetomaternal disproportion, uncorrectable uterine torsion or incomplete cervix dilation and irreversible fetal malposition.

4- can be done either when the cow stands or when she is recumbent.