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Review on Clinical Management involving Post-Partum Diseases in Ruminants

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Abstract | The major aim of animal husbandry is to maximise production but over time reproductive problems have always contributed negatively thereby resulting to economic downturn to farmers. Reproductive disorders among livestock production animals such as buffaloes, cattle, sheep and goats are of major concern hence needed to be emphasized the more. These disorders have always lead to loss in fertility. The obstetrical problem was found to be the highest prevalence in clinical cases of genital tract and the major factor that renders the reproductive performance to be at low border is post-partum diseases. Post-partum being defined as duration right after parturition and the stages initially start on the second stage of parturition which is the expulsion of the foetus, followed by expulsion of the placenta. The occurrence of clinical cases of post-partum diseases can be tapered down by instantaneous treatment and clinical management by the veterinarians. The common post-partum conditions in ruminants are haemorrhage, retained placenta or retained foetal membrane (RFM), genital (uterine and vaginal) prolapsed, genital tears and uterine infections (metritis, endometritis, pyometritis). These conditions may influence the productive performances of the affected ruminants such as length of oestrous cycle, calving interval, service per concept, calving to first oestrous and service period. There is a limited review on clinical management of post-partum diseases involving ruminants. Hence, this review focused on the clinical management of common post-partum diseases involving ruminants. Therefore, this review may enlighten the field veterinarians on the common post-partum diseases of small and large ruminants and its clinical management.

Keywords | Clinical Management, Post-Partum, Clinical, Diseases, Condition, Ruminants

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Reduction in fertility level coupled with tremendous drop of economic gains are the consequences of disease occurrences associated with reproductive system (Crivei et al., 2017). This may lead to decreased production in life time, increased calving interval and cost of treatment of the affected farm animals (Samad et al., 1987). Reproductive problems definitely influence the reproductive failure either completely or partially. Therefore, having a systematic farms records and good relationship between veterinarians, farm workers, technicians and people who are responsible for the farm management can help to reduce the occurrence of reproductive problems. The obstetrical problem was found to be the highest prevalence in clinical cases of genital tract disorders up to 79.1% (Crivei et al.,

2017). The major factors that renders the reproductive performance very low are the post-partum diseases. Post-partum being defined as the duration right after parturition or any act that is related to birth giving (Bradford, 2002). Post-partum stage initially starts on the second stage of parturition which is the expulsion of foetus, followed by expulsion of placenta (Bradley et al., 2012). However, the occurrence of post-partum diseases can be tapered down by instantaneous aid and treatment by the veterinarians (Markandeya, 2014).

Reproductive disorders among livestock production such as buffaloes, cattle, sheep and goats are those that require greater emphasis. Small ruminants such as goats and sheep are vital for economic and nutrition values in rural area (Sultan et al., 2015). Goat is numerically and economically essential and guarantees large animal resources in the developing countries especially in Asia and Africa (Hussain, 1999). Prolificacy, fertility and fecundity efficiency in small ruminants vary in relation to many factors such as breed, season, age, nutritional status, health, breeding management and farm supplies (Đjuričić et al., 2012a). In buffaloes, the productive and reproductive performances are also affected by the post-partum diseases (Kahn 2005; Kapadiya et al., 2015).

In Malaysia, the livestock industry does give a significant impact to the economy pattern; however swine and poultry farming tend to overshadow the ruminant farming (Jelan Z.A. and Dahan M.M, 1997). Based on reports from the Federation of Livestock Farmers' Association of Malaysia (FLFAM) in year 2016 the total population of cattle, buffalo, goat and sheep are estimated to be 748,482, 118,608, 446,854 and 145,999 respectively. The common general productive performance records kept for ruminants are: length of oestrous cycle, calving interval, service per concept, calving to first oestrous and service period (Jelan Z.A. and Dahan M.M, 1997). In a report written during Workshop on Animal Recording for Smallholders in Developing Countries by Crivei et al. (2017) it was reported that the Holstein-Friesian cattle in Malaysia had 496 days of calving interval and age of first calving at 3 years old. Hence, the reproductive management for post-partum need to be more focus in order to target the ideal post-partum interval which ranges about 82 to 85 days to achieve 365 calving interval. Based on FLFAM, small and large ruminants in Malaysia have a strong market demand especially during Eid celebration amongst the Muslim community. Thus, reproductive performances of the ruminants need to be highlighted by considering the reproductive diseases that usually occur during post-partum.

There is a limited review on clinical management of post-partum diseases involving ruminants. Hence, this current review aims at focusing on the clinical management of common post-partum diseases involving ruminants. Therefore, this review may enlighten and awaken the field veterinarians on the common post-partum diseases of small and large ruminants and its clinical management in managing these clinical cases.

Definition Post-partum

According to Merriam-Webster dictionary post-partum as a word is a verb that originated from the Latin phrase which consists of post and partus. Post-partum being defined as duration right after parturition or any act that is related to giving birth (Bradford, 2002). Post-partum stages initially start on the second stage of parturition which is the expulsion of the foetus, followed by expulsion of the placenta (Bradley et al., 2012).

A Refresh on the Anatomy and Physiology of Ruminant Reproductive System

The reproductive system in small and large ruminants are the same. It consists of two ovaries, two oviducts, uterus, cervix, vagina and vulva (Scott et al., 2004).

Ovaries

The ovary is characterized as a solid structure which is considered as the primary reproductive organ in a female. It is described as almond-shaped, the ovary in cows can differ according to the growth of follicles and corpus luteum but with a general size of about 35mm x 25mm x 15mm while the ovaries in the ewe and doe are smaller than half size of those ovaries of a cow (Scott et al., 2004). In larger animals such as cows, the ovaries can be palpated directly via rectal palpation (Cynthia., 2010). Being the only place for the production, growth and maturation of the follicles which will eventually lead to production of oocytes, ovaries also act as a producer of hormones such as oestrogen (from the Graafian follicles) and progesterone (from the corpus luteum) (Scott et al., 2004).

Oviducts

The oviducts are instrumental in transporting the ova and spermatozoa. They are also known as fallopian tubes, it ranges about 20cm to 30cm in length especially for farm species (Scott et al., 2004). These convoluted tubes are separated into 3 parts which are the infundibulum, ampulla and isthmus. Infundibulum is a vent-shaped tube which serves to catch the ovum post ovulation and located close to the ovaries. However, in ruminants, ovaries and infundibulum are unconnected, unlikely in other species (cat, rabbit) where a bursa that originates from the infundibulum, surrounds the ovary (Scott et al., 2004). The ampulla is the mid part and it is made up half of the total length of the oviduct and has slight wider section which even connects to narrow section of isthmus which is the last part of oviduct that extends to the point of the uterine horn at the

uterotubal junction.

Uterus

Uterus is located from the uterotubal junction that extends to the cervix and normally the average length of a uterus can range from 35 to 60 cm in cows, while half of the size is seen in ewe and doe (Scott et al., 2004). In ruminants, the uterus is classified as bicornuate due to the anatomical structure with two long uterine horns and small uterine body cranial to the cervical canal (Frandson et al., 2003). Uterus acts as a placement for the development of embryo to foetus as well as nourish and sustain the embryo, before the function being taken over by placenta once the embryo attached to the uterus (Scott et al., 2004). The endometrium and its fluids also help in the regulation of the CL function and also assist in fertilization, pregnancy and parturition (Hafez and Hafez, 2000): The uterine wall thickness ranges from 3mm to 10mm with 3 layers: inner layer (endometrium), muscular layer (myometrium) and outer serosa layer.

The entire uterine wall is made up by glandular tissues with stratified columnar epithelial (in sow and ruminants) while the endometrium thickness and vascularity may vary depending on the hormonal changes (Scott et al., 2004).

Cervix

Cervix, is a non-elastic canal located between vagina and uterus where it extends to the uterus and construct with a thick wall and an average length of 5cm to 10cm especially in farm animals (Scott et al., 2004). Transverse interlocking ridges which also refers as annular rings are the special characteristic in the cervix of ruminants (cow, ewe and doe) which act as locks to prevent contaminants into the uterus (Hafez and Hafez, 2000). Generally, the main function of cervix is to avoid any bacterial contamination. In ruminants, it become the reservoir for sperms and purifies any defect sperms before transferring them to the uterus. The anterior cervix may act as a site for the semen deposition as well as reservoir of semen during artificial insemination (AI), as well as giving conducive environment for survival of sperms (Prange and Duby, 2007).

Vagina

Anatomically, the vagina is characterized as an elastic, thin wall tubular shaped that mainly functions as a place for semen ejaculation with the average length of 25cm to 30cm in cow, while in doe and ewe, it ranges from 10cm to 15cm (Scott et al., 2004). It lies within the pelvis between the cervix cranially and vulva caudally, vagina serves as a canal during the parturition of the foetus and as a sheath for the penis during the copulation (Prange and Duby, 2007) . Vagina is made up from a tough and elastic wall, which gets modified according to the stages of the oestrus cycle . Histologically it was observed that cranial part of vagina has mucous cells at the mucous membrane, loose sub mucosa with inner circular and outer longitudinal layer of smooth muscle at the muscular layer (Akhtar, 2012). Vagina also has vital function of defensive mechanism against invasion of bacteria as the fluids secreted from the epithelium of vagina is able to inhibit the growth of opportunistic bacteria (Prange and duby, 2007).

Vulva

Vulva is the external genital organ in female and it ranges from 10cm to 12cm in cow while for doe and ewe, it is a quarter of the length (Scott et al., 2004). It is made of two main components which are vestibule that is attached to the external urethral orifice (demarcation of vestibule in vagina) and labia which consist of labia minora (inner folds) and labia majora (outer folds). The vestibule is the reproductive organ that shared with the urinary system where the opening from the urinary bladder and a blind sac ventral to the urethra opening called sub urethral diverticulum (Prange and Duby, 2007).

Common Post-partum Diseases in Ruminants

Haemorrhage, retained placenta, genital prolapsed, uterine prolapsed, vaginal tears and paralysis due to nerve problems are common post-parturition complications (Akhtar, 2012). Normally, complications that occurs during parturition such as dystocia may lead to post-partum problems. Dystocia is defined as challenging parturition that will take a longer period than normal and usually requires external help and assisted delivery (Scott et al., 2004). The common consequences post dystocia are retained placenta and other post-partum problems encountered are delayed post-partum oestrus, reduced fertility, extended calving interval and decreased calving number in the following year after an episode of dystocia (Scott et al., 2004). According to John et al. (2004), 5% to 15% of healthy herd of cows suffer a retained placenta after dystocia episodes. It is also defined as retained foetal membrane (RFM) if placenta is not expelled within certain time presumably 12hours post calving (Hanafi et al., 2011). Attention should be given if the occurrence exceeds 15% to 20% clinical cases of retained placenta in the herds (Scott et al., 2004). According to John et al. (2004) in cases of RFM, spontaneous expulsion of placenta occurs 5 to 7 days after which during that duration decaying retained placenta eventually become a good environment for development of bacterial that lead to uterine infections such as endometritis, pyometra, perimetritis and parametritis, and this clinical conditions are normally observed in buffaloes. Incidence of RFM in cattle is 4% to 16.1% with higher morbidity in problematic herds (Hanafi et al., 2011). In small ruminants, incidence of RFM that was reported up to 6.4% (Smith, 2014). Dairy

goats and does with dead kid or been removed have higher incidence of RFM (Pugh and Baird, 2012). The prevalence of RFM among goats ranged from 10.6% to 11.8% based on previous studies by (Durrani and Kamal, 2009; Sultan et al., 2015; Jesse et al., 2017). Incidence of clinical cases of RFM is high in farm animals' especially in dairy cows (Hanafi et al., 2011).

Metritis is a severe inflammatory reaction to all layers of uterus; endometrium, sub mucosa, muscularis and serosa (BonDurant, 1999). The incidence of clinical cases of metritis among dairy cattle are 18.5% (Drillich et al., 2001; Sheldon and Dobson, 2004). However, the variation can goes up to 40% between different farms settings. For the past 40 years, pyometra, metritis and endometritis are the common uterine infection diseases that occur in ruminants (Sheldon et al., 2006). Pyometra is defined as accumulation of purulent or mucopurulent exudates from the uterus which might be caused by the development of pathogenic bacteria in the uterine lumen right after corpus luteum being formed (Sheldon and Owens, 2017). The incidence of pyometra especially during post-partum is rare, with incidence rate less than 2% (Sheldon and Owens, 2017).

Endometritis is a superficial inflammation of the endometrium, with no further destruction than stratum spongiosum (Bon Durant, 1999). Endometritis happens when there is disruptions of the endometrial epithelial, infiltration of inflammatory cells, accumulation of lymphocytes, congested vascular tissues and stromal oedema (Bon Durant, 1999; LeBlanc, 2008). According to the study by Kelton et al. (1998), involving 43 cows the researcher found that prevalence of endometritis ranged from about 2.2% to 37.3% among the sampled cows. Till date there is no mortality reported cases due to endometritis (Fourichon, 1999). Based on the 23 studies conducted by Fourichon (2000), showed that endometrits condition can lead to decreased in pregnancy by 150 DIM by 31%, reduced pregnancy rate by 16% and increased mean of open day by 15%.

Uterine prolapse commonly occurred right after few hours of delivery since the cervix is still open and lack muscle tones (Hanie, 2006), which can occurs in all species of large animals but with a higher frequency in cows and ewes, less in doe (Makhdoomi and Gazi et al., 2015).-Prolapsed of uterine commonly occurs during third stage of parturition, where the foetus already been delivered and foetal cotyledons has separated from the maternal caruncles (Noakes et al., 2001). Vaginal prolapse is a complication that often occurs on sheep and cattle, but rare in goat (Abdullah et al., 2016, Abdullah et al., 2014a), where the eversion and prolapse of the vaginal commonly being experienced during last trimester of pregnancy among mature female (Kuijlaars, 2011). This vagina prolapse condition is being influence by hormonal changes during this last trimester of pregnancy, where the oestrogen starts to rise and relaxin being produced which lead to relaxation of the pelvic ligaments and surrounding soft tissue structures (Wolfe, 2009). The combination of this tissue relaxation with the increased intra-abdominal pressure caused by the pregnant uterus, is considered the number one predispaosing factor for vaginal prolapse (Kahn, 2005). Vaginal prolapse can be graded as I (intermittent prolapse, especially when recumbent), II (continuous prolapse), III (continuous prolapse of vagina, bladder, and cervix), or IV (grade II or III with tissue damage by trauma, infection, or necrosis) (Gilbert et al., 2018). Vaginal prolapse is also claimed to be genetically hereditary thus culling of the affected animals is usually suggested (Kahn, 2005).

Uterine tears have varied consequences, from none at all to life threatening. A small tear usually goes unnoticed while uterine tear usually secondary to some other form of dystocia as predisposing factors (Pearson et al., 1975).

Clinical Management of Post-partum Diseases in Ruminants

Retained placenta: Through physical examination, the condition can be detected by visual at the genital area although small portion of tissue may attached but not distinct. In cows, majority will show no other clear signs than anorexia and drop in milk productions (Bradford, 2002). In mild cases, temperature, pulse rate, appetite and milk production may look normal while in severe cases, there will be unstable pulse rate, drop in milk yield, fever and unpleasant bloody discharges from the vulva (Ramamohana, 1991). Approximately 50% to 80% of untreated cows that having RFM will have pyrexia with temperature more than 39.5°C ranging from 1 day to 10 days post-partum based on several studies (Callahan and Horstman, 1987; Stevens et al., 1995; Stevens and Dinsmore, 1997; Le Blanc, 2008).

Different clinical presentations will influence the treatment regimes of this condition. Historically, manipulation and traction of placenta manually had been practiced (Le Blanc, 2008). However, none of the researchers stated that this practice is beneficial (Drillich et al., 2006), but mostly have indicated this act will give out more harmful effects. Manual traction is advisable with less force that is adequate enough to pull the placenta out, but if there are signs of septicaemia it is recommended to skip this step (John et al., 2004). In some cases, manual traction only applies if earlier treatment failed (Jesse et al., 2017). Meanwhile based on Smith and Sherman (2009) manual traction of placenta should be avoided but intrauterine antibiotics are recommended. Certain studies have indicated that infusion of 5g oxytetracycline intrauterine (IU) daily as long the placenta still retains can help to taper down the incidence of pyrexia in RFM cases from 50% to 30% (Le

Blanc, 2008). Meanwhile, different studies stated that usage of Ceftiofur (1.1mg/kg IM, SID for 5 days) in cows with RFM can treat pyrexia as effective as mixture usage of systematically and IU ampicillin together with removal of placenta manually; though there is no significant different in terms of reproductive performance between these two treatment (LeBlanc, 2008). Systemic and intrauterine antibiotics are suggested especially if cow shows several signs like anorexia, fever and drop in milk yield (John et al., 2004). Intrauterine tetracycline may help to minimize the occurrence of metritis, however pyometra can still occur even in a treated cow with suggested dose 4g to 6g/day of oxytetracycline until expulsion of placenta occurred (Bradford, 2002). The best approach in treatment of RFM is the administration of oxytocin to stimulate the motility of uterus as contractility plays an important role in the dehiscence of the foetal membranes (Noakes, 2009). Additionally by applying warm water lavage into the uterus and flushing out, by flushing in iodine 1% on the last portion of lavage, with other alternatives of iodine such as Lysol solution (John et al., 2004) may also help in clearing the infection. Meanwhile, injection of Estradiol cypionate (ECP) through intramuscular is also advisable in order to stimulate the contraction of myometrium to ease the expulsion water and retained placenta (John et al., 2004). Intravenous calcium therapy in cases of retained placenta due to hypocalcaemia can be considered as well (John et al., 2004).

Uterine infection: Generally, up to 25% to 50% cows with RFM will develop metritis (LeBlanc, 2008). Metritis is defined as acute systemic illness due to inflammation of uterus caused by bacteria and occurs usually within 10 days of post-partum period (Sheldon et al., 2006). Another study by LeBlanc (2008) stated that this condition usually happens in the first seven days post calving. In cases of metritis presence of lochia in uterus is commonly observed and findings during rectal palpation where reddish to blackish watery vulva discharges are noticed (Bradford, 2002). In septic metritis, toxaemia signs are normally exhibited in the host and can be indicated by fever, depression, anorexia, laminitis with difficulty in standing and drop in milk yield (Sheldon et al., 2006; LeBlanc, 2008). The feed intake and normal behaviour of the affected cows will have drastic changes compared to normal herds of animals (Huzzey et al., 2007). Affected cows tend to eat less 2-3kg DM before they start to exhibit the clinical signs (Huzzey et al., 2007). The common bacteria that are being isolated from metritis cases are *E.coli* and various anaerobic bacteria (LeBlanc, 2008). However, attention need to be focused on the physiological changes of the affected animals such as fever, duration of red-brown lochia to differentiate from normal physiology responses post calving and early diagnosis of metritis (Sheldon et al., 2004).

Endometritis usually occur between week 2 to 8 of post parturition with presence of whitish, pus, mucoid discharges (Bradford, 2002), and this may lead to chronic bacterial infection in the uterus and usually occur from week 3 of post-partum (Le Blanc, 2008). To examine the affected animals rectal palpation technique must be performed. In early phase of the infection, the cows need to be examined between 20 to 33 DIM. Low first-service pregnancy rate will be one of the main indication in the cases of endometritis. The most accurate method to diagnose endometritis is examination of the vagina content for the presence of pus (Bretzlaff, 1987; Le Blanc et al., 2002; Sheldon and Dobson, 2004). Odour and character of vaginal mucus by manual vaginal examination can be scored to classify the severity of endometritis infection where the clinical scores ranges from 0 to 6, which reflects the density growth of the bacteria and this scoring system may help in the treatment regime and to know the prognosis of the condition (Sheldon and Dobson, 2004). The common causative organisms involved in the cases of endometritis are *Clostridium pyogenes*, *Coliforms*, *Pseudomonas aeruginosa*, *Streptococci*, *Bacillus sp* and *Proteus* (Sheldon and Dobson, 2004). As the major causative agents involved are bacterial origin and therefore it is advisable to performed antibiotic sensitivity test (AST) prior to prescribing antibiotic as treatment regime for this clinical condition (Robert & Walter 2007).

Pyometra is a clinical condition being indicated by accumulation of purulent exudates in the endometrial cavity (Sheldon et al., 2006). Pyometra also can be due to trichomoniasis infection caused by *Trichomonas fetus* (Robert & Walter 2007). Using sonography technique of examination, pyometra is characterized by corpus luteum in ovary, clumping together with echodensity fluid in the uterine lumen together with distension in uterus (Sheldon et al., 2006). In summary, pyometra can be seen as accumulation of purulent material within uterine lumen with presence of corpus luteum and closed cervix (Sheldon et al., 2006). In pyometra cases, the infected animals may not show or exhibit systemic signs (Cynthia, 2010).

In cases of moderate to severe metritis, there is slight argument in the usage of systemic antibiotics (Le Blanc, 2008). There is a study stating that usage of 1mg/kg Ceftiofur can maintain the concentration of *E.coli* (Sheldon et al., 2006; LeBlanc, 2008) in affected uterine tissue, although not all affected cows are treated (Le Blanc,2008). The highlighted treatment in the cases of metritis is the choice of antibiotic either to use Ceftiofur (1mg/kg, IM, SID) or procaine penicillin (21,000 IU.kg, IM, SID or BID) for 3 to 5 days (Drillich et al., 2001, 2006a; Chenault et al., 2004 LeBlanc, 2008). There is also a study stated that tetracycline at 10mg/kg can be used in treating the metritis (Schmitt et al., 2001). Meanwhile, IU oxytetracycline or ampicillin seem to be non-effective over systemic ceftiofur or peni-

cillin alone based on a clinical trials (LeBlanc, 2008). Currently, the treatment of choice for metritis cases is only to converse the animals' welfare and minimize the severity and death, however the recovery rates are still questionable (LeBlanc, 2008). Based on recent studies, about 66% to 76% of treated cows are recovered from fever after 5 to 10 days post treatment, but the foul odour of discharges may be difficult to resolve (Drillich et al., 2001; Chenault et al., 2004; LeBlanc, 2008).

In cases of endometritis, the main goal is to overcome the bacterial load in the uterus and stimulate more defensive and repair mechanisms to combat any inflammation that took place by administration of antibiotic via IM or IU and systemically administer PGF2α (LeBlanc, 2008). Prostaglandin has been also suggested as one of the treatment options in treating these clinical conditions (Bradford, 2002). The intrauterine antibiotics of choice are either penicillin (1 million IU) or oxytetracycline (4g to 6g) (Bradford, 2002). The IU antibiotics are mainly to concentrate the high dose of anti-bacterial activity at the infected site (Gustafsson, 1984; Gilbert and Schwark, 1992). Other antibiotics of choices that can be used as in IU infusion are tetracycline, penicillin (Thurmond et al., 1993), cephapirin (Dohmen et al., 1995; McDougall, 2001) chloramphenicol, diluted Lugol's iodine (Callahan and Horstman , 1987 and Bradford, 2002), gentamycin, spectinomycin, sulfonamides, nitrofurazone, iodine and chlorine (Gustafsson,1984; Gilbert and Schwark, 1992). Bradford (2002) recommended the usage of intrauterine with antiseptics and diluted povidone iodine solution (1 iodine:10/20 normal saline) or uterine lavage by flushing 500ml to 1000ml of normal saline via catheter until the flushed out fluid is clear in treating these conditions. However, it is reported that usage of iodine and oxytetracycline can cause coagulation necrosis on the endometrium (Gilbert and Schwark, 1992), but based on previous field studies, it is reported that there were significant improvements observed in the reproductive performance of cows with clinical endometritis condition when they are treated via IU (McDougall, 2001). In cases of pyometra, the recommended treatments are similar with endometritis and metritis (Bradford, 2002) where the main aim of the therapeutic regime is to reduce the infection and inflammation on the uterus.

Uterine prolapse: In a clinical case of uterine prolapse, the general clinical signs that can be observed for this condition are anorexia, increase in heart and respiratory rate, abdominal pain and frequent straining (Bradford, 2002), but these signs can vary and are temporary depending on the severity of the condition. This condition can be diagnosed by visual observation as a large mass protruding from the vulva, hanging below the animal's hock (Makhdoomi et al., 2015). At the same time, the placenta might retain as well for this clinical condition (Roberts, 1982). The main goal in treating uterine prolapse is placement of uterine and secures the position back to normal (Makhdoomi et al., 2015). For clinical management of uterine prolapse, firstly the local epidural block must be administered to minimize the pain and welfare of the affected animals. To perform epidural block, 2mL of Lidocaine (Makhdoomi et al., 2015) will be administered between the first intercoccygeal vertebrae and this will act as epidural anaesthesia to minimize the straining during disposition of uterine starting from cervical pole to ensure horns are fully reposition into the uterine cavity (Bradford, 2002). Makhdoomi et al. (2015) detailed out that the body portion should be first push into followed by the horns. Then, the prolapsed tissue will be washed and cleaned using presurgical scrubs (Bradford, 2002) such as diluted potassium permanganate solution (Hosie, 1993; Makhdoomi et al., 2015) and during this procedure it is important to make sure the debris or faecal stains on the uterine tissue are fully removed (Makhdoomi et al., 2015). Cold compression can be applied on the mass to shrink the size of mass (Makhdoomi et al., 2015), before lubricant ointment applied into the oedematous tissues (Bradford, 2002). Recommended procedure to correct back the uterine prolapsed is by massaging gently and repositioning the retention using purse-string suture by leaving one or two fingers opening (Jean and Anderson 2006; Borobia-Belsué 2006). After the mass is pushed, the suturing of the vulva can be performed using horizontal mattress suture pattern as well by using the nylon to secure the uterus in its position (Makhdoomi et al., 2015). The suture can be removed 7 days later. Broad-spectrum antibiotics therapy can be given in this case (Bradford, 2002) and the choices are Procaine penicillin 20,000 I.U/kg and streptomycin 10 mg/kg for 5 days (Makhdoomi et al., 2015).

Vaginal prolapse: Vaginal prolapse can be defined as protruding mass measured about 8cm is out of the vulva and can be diagnosed via physical examination approximately 8 hours post-partum (Kuijlaars, 2011). This clinical condition is not consider as emergency however, if the vaginal tissue showed signs of swelling, oedema and congestion, the vagina wall may rupture (Hosie, 1989). In extreme cases, vaginal prolapse can be observed with the presence of cervix (Kuijlaars, 2011).Vaginal prolapse are corrected via applying Buhner suture technique, where the patient firstly will received an epidural block (Gilbert et al., 2018). Then washing and cleaning of the involved tissues will be performed to make sure it is clean (Gilbert et al., 2018) prior repositioning the prolapsed vagina to its position. Then, Buhner needle will be inserted through the vulva to performed Buhner suture technique (Kuijlaars, 2011). The Buhner suture and its modifications attempt to replicate the support normally provided by the constrictor vestibuli muscles that are lacking in cases of prolapse. Permanent fixation techniques (cervicopexy or vaginopexy) have been

described in which the cervix or vaginal wall is anchored to other pelvic structures (Kahn and Line, 2005) which may be useful in individual cases of chronic or recurrent prolapse, but most cases are resolved by a well-placed Buhner suture.

Uterine tear: The clinical signs may vary according to cases, but the abdominal pain responses may present during palpation (Magwood, 1954). The conditions of large tears in uterus will lead to questionable reproductive performance of the affected animals in future. These animals should be allowed to raise their calves and then culled. Laparohysterectomy is being recommended in case of uterine tear (De Nooij, 1982). Penicillin and streptomycin (in tablet forms) were placed in the uterine cavity as well as systemic antibiotic (penicillin) administered via IM (Magwood, 1954). The uterine rupture is closed by using Lambert suture pattern, corpus luteum being dislodged, and the muscle and skin are being closed using simple interrupted suture pattern (Magwood, 1954).

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