1. INTRODUCTION

Water buffalo is an important animal in many countries in the world. However, their reproductive efficiency is typically low and multifactorially affected. A healthy genital tract is essential to maintain the normal reproductive performance of the animals. Any defects in the genital tracts can harmfully hamper the reproductive efficacy of the buffalo. Total incidence of genital tract in the water buffalo is very high, ranging from 47.9% to 67.3% (Al-Fahad et al., 2004; Alwan et al., 2001; Azawi et al., 2008a). Ovarian abnormalities impair the development of follicles and, subsequently, estrous cycles. Disorders in oviducts prevent the fertilization and transfer of embryos to the lumen (Azawi et al., 2009). Also, inflammation in uteri is an important cause of repeat breeding in the buffalo because it induces an unfavorable environment against the healthy development of embryos, resulting in embryonic death and return of estrus (Ghanem et al., 2002). Therefore, genital disorders are an important cause of infertility and sterility in the buffalo (Azawi et al., 2008a). This article provides a review on the understandings of the abnormalities in the reproductive tracts of the water buffalo.

SUMMARY

Reproductive disorders are one of the most important causes of low breeding performance of the water buffalo, thus induce substantial economic loss to buffalo breeders. Review of available studies shows that the incidence of the reproductive abnormality in buffaloes could be up to 67.3%. In ovaries, inactivity seems to be the most prevalent deformity while ovarian cysts are also common. Diseases in the oviducts are characterized by hydrosalpinx, pyosalpinx and adhesion which can be observed in about 10% buffaloes for each abnormality. Predisposing factors of the uterine inflammation such as dystocia, retained placenta and genital prolapse are frequently found in buffaloes, and may induce high prevalence of metritis and endometritis. Other genital disorders are also reviewed.

Key words: Reproductive disorders, water buffalo.
2. DISORDERS IN OVARIIES

Many disorders can be observed in ovaries of the water buffalo in which inactive ovary is one of the important defects. Nutrition plays an important role in the status of ovaries since most of buffaloes having inactive ovaries suffer from imbalance nutrition and poor body score condition (Ahmed et al., 2010; Anita et al., 2003; Atwal et al., 2003). Those authors reported that 32% to 33% buffalo heifers at breeding age and size and during breeding season had inactive ovaries due to malnutrition. Also, only 3% buffaloes fed with high level of nutrition had inactive ovaries while 30% buffaloes fed with low nutrition level were found to have inactive ovaries (Pitu et al., 1986). Furthermore, in summer, the incidence of this abnormality is higher than that in other seasons, viz. 41% to 46% and 7% - 33%, respectively (Chauhan et al., 1984; Rao and Sreemannarayana, 1982). Prevalence of inactive ovary in water buffaloes may vary from 1.5% to 46.6% (Ali et al., 2009; Azawi et al., 2008a).

There are three types of cysts that occur on the ovary, viz follicular cyst, luteal cyst and cystic corpora lutea. Being the result of anovulatory follicles, follicular and luteal cysts are true cysts associated with an abnormal condition in the animal while the cystic corpora lutea is considered non-pathological (Garverick, 1997). Follicular cysts may be single or multiple on one or both ovaries while luteal cysts are usually single structures on one ovary. The current basis for determination of the etiology of ovarian cysts is the insufficient release of LH or the lack of LH surge (Nadaraja and Hansel, 1976).

Follicular cysts are thin-walled, filled with fluid and associated with high blood oestrogen level. The incidence of follicular cyst in the buffalo could vary between 1.5% and 23.3% (Aiumlamai et al., 2004; Azawi et al., 2008a; Hatipoglu et al., 2000; Metwelly, 2001; Tiwari and Gupta, 1996).

Luteal cysts are thick-walled structures, associated with high concentration of progesterone, viz. more than 1ng/ml (Ribadu et al., 1994). From 0.2% to 11.0% buffaloes may have luteal cyst in their ovaries (Aiumlamai et al., 2004; Azawi et al., 2008a; Banerjee et al., 1992; Ghanem et al., 2002; Hatipoglu et al., 2000; Metwelly, 2001; Rao and Sreemannarayana, 1982; Tiwari and Gupta, 1996).

Cystic corpora lutea is formed after ovulation with a cavity filled with fluid (Morrow et al., 1966). In Egypt, Iraq and Turkey, 0.9%, 1.2% and 2.5% buffaloes were found to have cystic corpora lutea, respectively (Ali et al., 2006; Azawi et al., 2008a; Hatipoglu et al., 2000; Saxena et al., 2006).

Ovarobursal adhesions which may cover the surface of the ovary or prevent the opening of the infundibulum can interfere with the ovulation (Azawi et al., 2008a). The mechanism of its development is not clear. Some authors suggested that it may be the result of the inflammation in the abdomen cavity (Bondurant, 1999; Noakes et al., 2002) or the rough manipulation (Lewis, 1997). This defect occurs in 6.4% and 7.3% buffaloes in Iraq and Egypt, respectively (Ali et al., 2006; Azawi et al., 2008a).

Abnormalities in ovaries are an important factor that affects the normal reproduction of the water buffalo. Inactive ovaries lead to acyclicity and unestrus. Other diseases such as ovarian cysts and ovary adhesion also hinder the normal activity of ovaries and subsequently degrade the reproductive performance of the water buffalo.

3. DISORDERS IN OVIDUCTS

Disorders in the oviducts hinder the fertilization of female and male gametes and the transfer of embryos to the lumen. Obstruction of oviducts usually occurs near utero-tubal junction or at the end of the isthmus. It was reported that from 0.7% to 1.5% buffaloes had obstruction of oviducts (Azawi et al., 2008a; Azawi et al., 2009).

Hydrosalpinx characterized by the distension of the oviduct filled with the amber fluid is sometimes reported in buffaloes. Dilated oviducts may have a diameter of 30 mm (Azawi et al., 2008a). This defect was reported to be a congenital disease (Ellington and Schlafer, 1993). In contrast, Mastroianni (1999) was of the opinion that the condition was the result of inflammation around uterine tubes. Hydrosalpinx was also suggested to be the sequel of the salpingitis (Miller and Campbell, 1978) which is 0.5%, 1.0% and 1.2% in Turkish, Indian and Iraqi buffaloes, respectively (Azawi et al., 2008a; Hatipoglu et al., 2000; Rao and Sreemannarayana, 2003). The incidence of hydrosalpinx varied among studies. In a Turkish
study, 0.4% buffaloes had this abnormality (Hatipoglu et al., 2000). The prevalence was higher in Iraqi buffaloes since 4.9% to 6.9% investigated genital tracts had hydrosalpinx (Azawi et al. 2010; Azawi et al., 2008a; Azawi et al., 2009). Lower proportions of buffaloes contracting the disorder were also reported (Al-Fahad et al., 2004; Alwan et al., 2001).

Pyosalpinx characterized by the dilatation of the oviduct due to thick whitish-yellowish pyogenic fluid is another disorder in the oviduct (Azawi et al., 2008a). Pyosalpinx can be found in 2.2% to 2.9% buffaloes (Azawi et al., 2008a; Azawi et al., 2009).

Bacteriological study of the hydrosalpinx suggests that there is no association between hydrosalpinx with the presence of bacteria in the uterus. By contrast, pyosalpinx has a correlation with the presence of bacteria in the lumen of buffaloes. In hydrosalpinx, the most prevalent bacteria are *Actinomyces bovis* and *Corynebacterium bovis* while those in pyosalpinx are *Archanobacterium pyogenes* and *Corynebacterium kutscheri* (Azawi et al., 2009).

Adhesion of the oviduct was depicted in many studies. The prevalence of this disorder in Turkish buffaloes was 0.1% (Hatipoglu et al., 2000). In Iraqi buffaloes, it was reported that 1.5% - 10.4% buffaloes suffered from this deformity (Alwan et al., 2001; Azawi et al., 2008a; Azawi et al., 2009). The condition is, perhaps, the result of the inflammation around the oviduct. Beside mentioned abnormalities, oviduct filled with blood and double oviduct are also rarely detected (Azawi et al., 2009).

Healthy oviduct is essential for the fertilization and maintenance of the embryo until it transports to the uterus. High proportions of deformities in the oviducts, viz. hydrosalpinx, pyosalpinx and adhesion may be the essential cause of infertility and sterility of buffaloes.

4. DISORDERS IN THE UTERI

Healthy uterus is the vital condition for the implantation and development of the embryo and fetus. The presence of bacteria in the uterus causes the inflammation and lesions in the endometrium, and delays the uterine involution, thus perturbs embryo survival (Sheldon et al., 2006). Also, uterine inflammation compromises function of the uterus which could lead to infertility (Sheldon and Dobson, 2004).

Dystocia is a predisposing factor for the uterine inflammation. The incidence of dystocia in buffaloes is from 2.6% to 23.2% with most found prevalence is less than 10% (Azawi et al., 2008b; Durrani and Kamal, 2009; Ishaq et al., 2009; Rabbani et al., 2010).

Retained placenta is an important disorder in the buffalo. It is reported that the prevalence of retained placenta in Surti buffaloes is from 2.7% to 7.6% (Murugeppa, 1998; Murugeppa and Dubey, 1997). In Murrah buffaloes, the incidence of the disease is also demonstrated from 4.0% to 9.6% (Prasad and Prasad, 1998; Taraphder, 2002; Tomar et al., 2002).

Genital prolapse is a peri-parturient disorder which may seriously affects the healing of the genital tract, and thus obstructs the reproductive performance of the buffalo. The incidence of this abnormality varies enormously. In average, about 10% buffaloes have this disorders but the prevalence may range from 1.9% to 42.9% (Durrani and Kamal, 2009; Ishaq et al., 2009; Khan, 1994; Mandal et al., 2004; Rabbani et al., 2010; Samad and Qureshi, 2001).

Metritis is usually the result of the retained placenta and dystocia (Konigsson et al., 2001). Many authors find that prevalence of the metritis in buffaloes ranges from 2.7% to 12.5% (Azawi et al., 2008b; Murugeppa and Dubey, 1997; Prasad and Prasad, 1998; Singh and Joshi, 1991; Taraphder, 2002; Tomar et al., 2002).

Bacteriological study shows that most prevalent bacteria in the vagina of metritis-afflicted buffaloes are *Escherichia coli*, *Klebsiela pneumoniae*, *Lactobacillus acidophilus* and *Pseudomonas aeruginosa* while the most
commonly found bacteria in the uterus are *E. coli* and *Archanabacterium pyogenes* (Azawi et al., 2008b). Chronic metritis is mainly found in buffaloes (58%) and most of them are severe cases. Sub-acute and acute metritis proportion 28% and 14%, respectively (Azawi et al., 2008b).

Endometritis is a very common disease in buffaloes. Like the metritis, endometritis is thought to be the result of retained placenta, dystocia, genital prolapse and abortion. Incidence of endometritis in water buffaloes is usually less than 20% (Ali et al., 2009; Azawi et al., 2008a; Hussain and Maniraju, 1984; Pandit, 2004; Selvaraju et al., 2005; Singh et al., 2003). Higher prevalence of endometritis is also found in Iran, India, Egypt and Iraq in which proportions of buffaloes having the disease are 22.4% - 33.2%, 24.8, 25.0% and 43.3% - 47.9% respectively (Al-Fahad et al., 2004; Al-Fahad, 2000; Alwan et al., 2001; Ghanem et al., 2002; Moghaddam and Mamoei, 2004; Moghami et al., 1996; Sar et al., 1996). The difference in the prevalence of the disease can be due to the difference in breeds, nutrition and management (Azawi et al., 2008a). The traditional practice also has the influence on the incidence of the endometritis. Some farmers insert foreign material into the vagina of buffaloes for the milk letdown. This habit is a predisposing factor for the uterine infection in water buffaloes (Azawi et al., 2008b). Most of cases of endometritis is chronic (76%) while the sub-acute and acute cases account for 18% and 6%, respectively (Azawi et al., 2008b).

Beside metritis and endometritis, there are also other disorders in the uterus of buffaloes. Incidences of hydrometra, pyometra, mucometra, para-metritis, peri-metritis and uterine torsion are usually low (Azawi et al., 2008a; Khan, 1994; Rabbani et al., 2010; Saxena et al., 2006; Sharma et al., 1993). True double cervice is a rare disease (Azawi et al., 2008a). Cervicitis is reported to range from 0.3% in India buffaloes to 25% in repeat breeding Nepal buffaloes (Rao and Sreemannarayana, 2003; Sah and Nakao, 2006).

Disorders in the uterus are frequently observed in water buffaloes. Uterine inflammation usually compromises the function of the uterus. The bacterial contamination of the lumen further causes lesions in the uterus and lengthens the period of uterine involution, thus prolongs the postpartum anestrus and more seriously degrades the reproductive performance which is naturally poor in this animal.

5. CONCLUSIONS

It is concluded that reproductive disorders are very common in the water buffalo. They are the big obstacle of the reproduction in this animal. Highly efficacious treatments of reproductive disorders, and appropriate reproduction and nutrition managements are required to reduce the incidence of those abnormalities, and subsequently improve reproductive performance in the water buffalo.

REFERENCES


Reproductive disorders in the water buffaloes


