Diagnosis of Reproductive Disorders through Transrectal Ultrasonogram in Cows at Rajshahi District of Bangladesh

Md. Niyamat Ullah[1], Moizur Rahman [1,] Md. Reazul Islam[1], Md. Rayhan Islam[1], Soniya Akter Nishi[2], Subarna Rani Kundu [3], Bidyut Matubber [4] and Md. Jalal Uddin Sarder[1]

[1]Department of Veterinary and Animal Sciences, University of Rajshahi, Rajshahi-6205, Bangladesh
[2]Faculty of Veterinary and Animal Sciences, Gono Bishwabidyalay, Dhaka, Bangladesh
[3]Department of Anatomy and Histology, Khulna Agricultural University, Khulna-9100, Bangladesh
[4]Department of Microbiology and Public Health, Khulna Agricultural University, Khulna-9100, Bangladesh

ABSTRACT

In the present study, ultrasonography was used to diagnose different pathological conditions of bovine genital tract and to monitor the treatment outcome for the improvement of reproductive health management. Out of 45 reproductive diseased cows were selected from different area of Rajshahi district for the treatment of various reproductive problems and pregnancy diagnosis were examined by trasrectal B-mode ultrasonography in conjunction with routine clinical examination. The treated cows that resumption of estrus cycle was bred and pregnancy was confirmed by using ultrasonography 30 days after breeding. The common reproductive problems diagnosed were Endometritis 22.22% (10/45), Metritis 8.89% (4/45), Pyometra 11.11% (5/45), Follicular cyst 8.89% (4/45), Luteal cyst 4.44% (2/45), Poor heat detection 6.67% (3/45), Anestrus 31.11% (14/45), Repeat breeding 6.67% (3/45). After given proper treatments, 79.41% (27/34) cows showed cyclicity. Cyclic cows were bred became conceived 74.07% (20/27).

Key words: Ultrasonogram, Disorders, Pregnancy, Anestrus, Dairy cows, GnRH, $PGF_{2\alpha}$ and artificial insemination (AI).

Introduction

Worldwide dairy herd fertility has been stated to decline drastically during the last few decades leading to significantly increased calving intervals due to gynecological problems of cows. In the bovine practice, ultrasonography has become an important diagnostic tool for evaluating the female reproductive tracts, where it possible to view the entire reproductive system in a non-invasive manner (Carriere et al., 2002). Interest in ultrasonography among veterinarians and animal scientists began to grow in the current time, following reports on the usefulness of the techniques in studying the reproductive organs of cow (Chaffaux et al., 1982; Reeves et al., 1984; Pierson et al., 1988). Ultrasonography can be used efficiently for diagnosing reproductive disorders and the response to treatment thereafter (Kumar and Purohit, 2009). The aims of the treatment of reproductive diseases are the reverse inflammatory changes that impair fertility, whilst enhancing uterine ovarian defense and repair. The noninvasive nature of ultrasonography makes it an excellent clinical and research

tool in the bovine reproduction (Carriere *et al.,* 2002; Kumar and Purohit, 2009). Ultrasound technology was demonstrated to be an effective method of choice to evaluate reproductive cycle in zebu cattle (Akter *et al.,* 2010). Ovarian cyclicity as well as evaluation of ovarian follicles and corpus luteum, changes in uterus and cervix was examined in Bangladesh zebu cows by this technique with the purpose to improve reproductive efficiency (Akter *et al.,* 2010). In different studies in Bangladesh, postpartum anestrus cows and buffaloes were diagnosed and treated effectively where ultrasonography was used as diagnostic tool (Rahman, 2010; Shohag, 2011). In spite of its immense use in supplementing diagnosis during physiological status, its use in delineating different pathological conditions of the bovine genital tract were hardly described. The use of transrectal ultrasonography to evaluate reproduction in cows has enhanced our understanding of the ovarian and uterine processes during the estrus cycle and pregnancy in order to improve reproductive performance and increase genetic improvement. Even though the application of ultrasound in diagnosis and treatment of reproductive diseases in smallholder dairy farms has proved effective, the use of ultrasound as a management tool in Bangladesh is not widely distributed. Only limited works are published on uses of this technique. Therefore, the present study was performed for the management of reproductive disorders in cows by using transrectal ultrasonography with the following objectives-

Objectives

I. To evaluate the ultrasonographic appearance of different pathological conditions of bovine genital tract for more accurate diagnosis of several reproductive disorders.

II. To estimate the proportion of reproductive disorders of cows in Rajshahi region.

Materials and methods

The aim of present study was to develop the diagnosis of cow's reproductive disorders and monitor the treatment efficacy to increase the production of cows in livestock sector in Bangladesh. Cows presented in Rajshahi region with the history of different reproductive disorders and for diagnosis of pregnancy were included in the study.

Study area

The dairy cows were selected from different places at Rajshahi district (Nava cattle farm- Mehendrea, Meherchandi, Chakpara, Khorkhori, Narkalbaria of Rajshahi district). The study was carried out at Department of Veterinary and Animal Sciences, University of Rajshahi, Bangladesh and small holder's dairy farm in Rajshahi Region.

Experimental animals (sub-fertile cow's selection)

In the study, 45 sub-fertile dairy cows were selected randomly for diagnosis of pregnancy and reproductive disorders. Fifteen cows were selected from Nava cattle farm, 10 cattle selected from Best dairy farm, 05 cows selected from Meherchandi, 10 cows selected from Narikalbaria. Clinical signs and farmers complaints are noted down. Transrectal ultrasonogarphy of ovaries and uterus of individual cows were done for confirmative diagnosis of several disorders. Different pathological condition of the cow's reproductive system was described according to the echogenicity of ultrasonogram.

Interpretation of ultrasonic images

The description of ultrasound images was done based on an evaluation of the shape, size and position of the structure being studied as well as its echogenicity, which depended on the amplitude of the echoes receive. An echogenic structure reflected the majority of sound waves back to the probe and thus appeared from white to different shades of grey on the screen. An aechogenic structure did not produce echoes. Instead, it transmitted the waves on to more deeply situated tissues. Follicular fluid was anechogenic structures, which appeared black on the screen. The terms hypoechogenic and hypercehogenic indicated respectively a decrease and increase in relative echogenicity in comparison with the surrounding tissues, whereas the term isoechogenic was used to describe similar echogenicity with the surrounding tissues.

Statistical Analysis

The raw data was sorted and computed and statistically analyzed to calculate the effect of breed, age, parity, body weight, body condition of cows, cattle shed, fodder supply, housing system, feed quality, rearing system, preventive measures, treatment protocol, farming types, location of farm, experience of farmers, training received by farmers and farm size on reproductive disorders as well as prevalence of this problems while the clinical management evaluated against the reproductive disorders of cows. The data were entered into Microsoft Excel Worksheet 2011 and descriptive statistics were performed to determine the proportions of reproductive disorders in cows.

Scanning techniques of bovine reproductive tracts:

Photograph 1: Setup of ultrasonogram machine   **Photograph 2: Application of sonographic gel on probe**

Photograph 3: Handling technique of probe   **Photograph 4: Evacuation of feces from rectum**   **Photograph 5: Placing the probe on target organ**

Results

A total of 45 cows were surveyed for reproductive disorders in Rajshahi region. Out of 45 clinical cases investigated 10 were endometritis, 4 were metritis, 5 were pyometra, 4 were follicular cyst, 2 were luteal cyst, 14 were anestrus, 3 were Repeat breeding and 3 cows were cycling but farmers assume anestrus because of poor heat detection.

Table-1. Proportions of reproductive disorders in cows

Reproductive Disorders	No. of Cows examined	Percentage (%)
Endometritis	10	22.22%
Metritis	04	8.89%
Pyometra	05	11.11%
Follicular cyst	04	8.89%
Luteal Cyst	02	4.44%
Poor heat detection	03	6.67%
Anestrus	14	31.11%
Repeat breeding	03	6.67%
Total	45	100%

Ultrasonographic findings and diagnosis of reproductive disorders

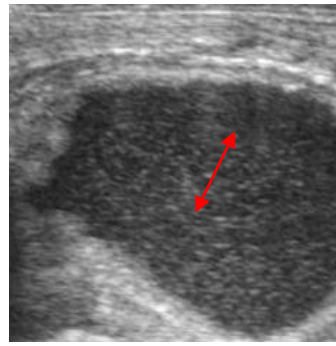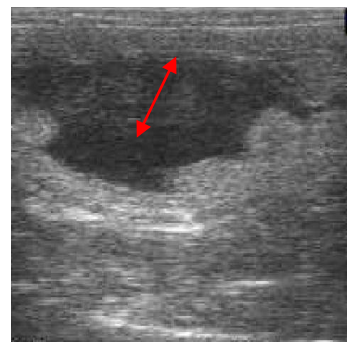Figure 1: Presence of anechogenic fluid

Figure 2: Presence of snowy particle

Figure 03: Presence of enormous amount of anechogenic fluid in uterus
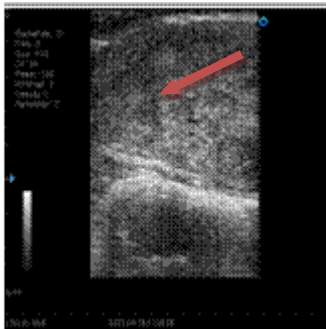
<u>Comments: Endometritis</u>   **<u>Comments: Metritis</u>**

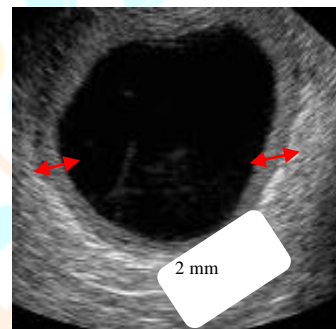Figure 4 Echogenic particles floating on uterus

2 mm
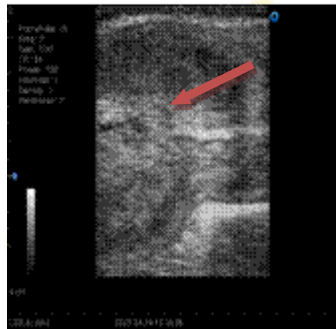
33 mm

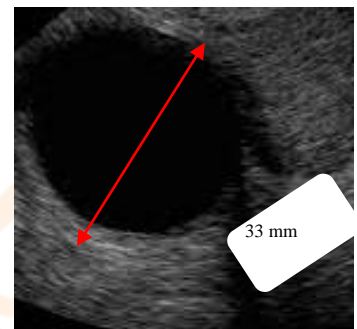Figure 05: Thin wall structure on ovary

Figure 6 : Ovarian follicle size 33 mm
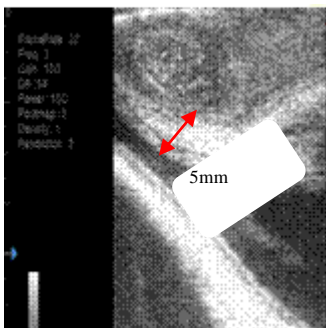
<u>Comments: Pyometra</u>   **<u>Comments: Follicular cyst</u>**
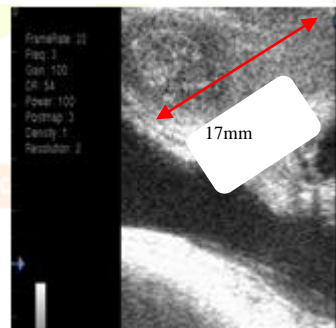

5mm

17mm

Figure 7: Thick wall structure on ovary >3 mm

Figure 8: Ovarian follicle size 17 mm

Figure 9: Presence of small ovarian follicle with no CL

<u>Comments :Luteal cyst</u>   **<u>Comments : Anestrus</u>**

Discussion

Most of the reproductive disorders in dairy cows diagnosed by transrectal ultrasonogram at Rajshahi region from Jan 2020 to July 2020 have been studied and discussed below.A total of 45diseased cows were surveyed for reproductive disorders in Rajshahi region. Out of 45clinical cases investigated 10 were endometritis, 4 were metritis, 5 were pyometra, 4 were follicular cyst, 2 were luteal cyst, 14 were anestrus, 3 were Repeat breeding and 3 cows were cycling but farmers assume anestrus because of poor heat detection. Anestrus was the important reproductive disorders in cows of Bangladesh. Many authors have been worked on anestrus problem. Ahmed *et al*. (1989), Shamsuddin *et al*.(2006), Rahman *et al*.(1993) reported that, many cows were suffering from anestrus problem among of all reproductive disorders. An overwhelming proportion of animals that farmers considered anestrus had CL when examined by ultrasonography. These animals were in fact cycling but the farmers failed to detect those estrus. These indicate poor heat detection. When these cows' estrus signs were monitored carefully and bred at estrus, majority of them were responded to treatment and conceived. Kamal *et al*. (2011) found that 11% cows had CL at the time of

examination but farmers presented those animals as not seen in estrus. Shamsudddin*et al.* (2001) reported that the proportion of cows accurately detected in estrus was 30%, another 30% were assumed to be in estrus when they were not (false negative) and rest 40% were not detected when they were in estrus (false positive). The present study reveals that anestrus were 31.11% that related to others authors. Lack of ovarian cyclicity or true anestrus is considered is one of the major problems to efficient cattle production and still one of the prevalent reproductive disorders in dairy cows (Meredith MJ and Madani MOK, 1980). Cows with true anestus may have complete ovarian inactivity with virtually no functional structures on the surface of the both ovaries (Kudlac E, 1965).

Shamsudin *at el.* (2006b) used per rectal palpation and milk progesterone radioimmunoassay for monitoring the reproductive status of cows. Rectal palpation could be accurate methods for diagnosing pregnancy but relatively poor methods for resolving ovarian follicular distinction (Pieterse *et al.,* 1990a). On the other hand, ultrasonic imaging is a highly accurate and rapid method for assessing ovarian structures as well as detecting ovarian cyclicity (Griffin and Ginther, 1992; Kamal *et al.,* 2011). Hormonal examination to know the cyclicity is accurate but expensive and slow. Moreover, its need a specialized laboratory and the test cannot be performed on farm (Noakes, 1999; Jainudden and Hafez, 2000). But there is ultrasound machine to be used in veterinary practice that is easily transportable to farms. So, ultrasonograpghy is a reliable method for diagnosing reproductive disorders of cows.

Ovarian cysts diagnosed in this research work mostly follicular cyst. Many researchers has shown that the prevalence of ovarian cyst in dairy cows of Bangladesh were relatively low. But Kamal *et al.* (2011) reported a prevalence of 4% cystic ovarian disease in crossbred dairy cows in Bangladesh. In this research work the proportion of ovarian cyst was 13.33% among the reproductive disordered recorded that were higher than others authors. Accuracy of diagnosing cysts and treatment outcomes increased when transrectal ultrasonography was used. Farin *et al.* (1990) has previously recorded sensitivity and specificity 43.3% and 64.7% respectively, for the diagnosis of ovarian cysts by rectal palpation. The sensitivity and specificity were 86.7% and 82.3% respectively when ultrasonography was used. The sensitivity and specificity of ultrasonography in diagnosis ovarian structures was 95% and 100% respectively. (Ribadu *et al.* 1994)

Endometritis was the most pathological condition in this research work diagnosed by transrectal ultrasonogram. The animal that was suffering from endometritis has shown normal cervico-vaginal discharge. These findings correlated with previous reports (LeBlanc *et al.,* 2002; Kumar and Purohit, 2009). Kamal *et al.* (2011) reported 3% prevalence of endometritis in dairy cows that were at or before 60 days of postpartum. The present study of prevalence of endometritis was 22.22% that might higher than another's research. It may be due to sonographic error or small sample size. Poor follicular growth, absence of CL, inactive ovaries, poor body condition leads most of the cows to become anestrus as evidenced in that present study. The researchers also noticed that postpartum cows with poor body condition score that remained anestrus for about a year, which prolonged the interval from calving to first service and subsequently to the next calving. By the using of ultrasonography, these anestrus cows could be diagnosed early and many of them would conceive which could decreases calving interval and increases productivity that essential key to sustainable dairy farming. The presence of anechogenicfluid in cases of endometritis along with snowy echogenic particles observed during the present research work was similar to previous reports (Lenz *et al.,* 2007; Barluad *et al.,* 2008; Kumar and Purohit, 2009).

In metritis, the sonographic echogenicity similar to endometritis. However, there was enormous amount of anechogenic fluid in the distended uterus along with echogenic particles falling in the line with featured that was reported by others (Fissore *et al.,* 1986; Melendez *et al.,* 2004). The present study reveals that the prevalence of metritis were 8.89%.

In case of pyometra, presence of echogenic pus inside the uterus through ultrasonographically. Most of them cases are presented as pyometra. Diagnosis of pyometra by ultrasonograph had previously been done on the basis of high volume of accumulated echogenic uterine content without foetus or cotyledons, closed cervix and corpus luteum on the ovary (Bondurant, 1999; Sheldon and Dobson, 2004; Sheldon *et al.,* 2006). In addition with therapy the fluid

accumulation, uterine diameter and echogenic particles got reduced in the present research work that was also recorded by Kumar and Purohit (2009).In case of luteal cyst that was ultrasonographically characterized by presence of distinct hypoechigenic wall (3 mm) which was used to differentiate luteal cyst from follicular cysts. The diameter of ovarian cyst varies from 30 mm to 48 mm. The ultrasonoghaphic features of cysts were simple fluid filled (anechogenic) thin walled structures 25 mm reveals the follicular cysts. This theme is related to other authors that findings published elewhere (Ribadu *at el.,* 1994; Kuber and Jalakas, 2002; Naoki, 2007).

Previously, Farin *et al.* (1990) considered sector scanning better for diagnosis of luteal cysts. However, during the present study, ovarian cysts could easily be diagnosed by linear array scanning, which is correlated with other proposal (Ribadu *et al.,* 1994; Kuber and Jalakas, 2002; Naoki, 2007). The diagnosis of single ovarian cysts is always found difficult by rectal palpation alone, but can easily be confirmed by ultrasonography. The utrasonogram also proved to be useful supplement to confirm abnormalities like mummified foetus.

By the influence of ultrasonogram earlier detection of follicular growth and structure it can easily be detected the post-partum events of dairy cows (Shamsuddin *et al.,* 2006b). Out of 6 cases of ovarian cysts evaluated during the present study, 75% were follicular cyst (6/4) and 25% were luteal cysts (2/6). A higher percentage of follicular cyst and lower percentage of luteal cyst were published elsewhere (Durocher *et al.,* 2005; Gaur and Purohit, 2007; Kumar and Purohit, 2009).

Moreover, for sustainable dairy farming from an economic point of view, diagnosing of reproductive disorders in much challenging job. Several techniques are used to diagnose reproductive disorders in cows. All techniques have its own advantages and disadvantages. Some techniques are not suitable to perform on farm in spite of its accuracy. But ultrasonography can be performed on farm with accurate diagnosis and treatment thereafter. Ultrasonography has another beneficial effect that the monitor the reproductive health within very short time in comparison to others techniques. Ultrasonography has no harmful effect and easily portable becomes the first choice of technique to monitor the reproductive health management and sustainable dairy farming in Bangladesh.

Summary

The present study has been attempted to diagnose the reproductive disorders in dairy cows from Jan, 2020 to July, 2020 at different area of Rajshahi region. A total of 45diseased cows were surveyed for reproductive disorders in Rajshahi district. Out of 45clinical cases investigated 10 were endometritis, 4 were metritis, 5 were pyometra, 4 were follicular cyst, 2 were luteal cyst, 14 were anestrus, 3 were Repeat breeding and 3 cows were cycling but farmers assume anestrus because of poor heat detection.

Conclusions: Following conclusions were made on the basis of the current results of this study-

- Ultrasonography of the bovine reproductive tract proved effective and efficient techniques for diagnosis of several reproductive disorders in dairy cows.
- Ultrasonography also used to monitor the treatment outcome.

Recommendations: Based on the present study, the following recommendations are forwarded

- Ultrasound uses nonionizing sound wave and has not been associated with carcinogenesis.
- The real-time ultrasonography is useful for the evaluation of physiology as well as anatomy.
- It is portable and relatively inexpensive in compare to other imaging modalities.
- In our veterinary field need to grow expertise on animal sonogram.
- Treatment should be done by skilled veterinarian.
- Government should play an important role to give the ultrasonic facilities in all upazila veterinary hospital that will be beneficial for dairy farmers.

References

Carriere PD, DesCouteaux L and Durocher J.2002. Evaluation echographic du tractus reproducteur et du corps jaune. Medicine Veterinaaire Du Quebec 32:128-131.

Akter Z, Taluker AK, Akter T, Kabir MS, Kamal MM, Bari FY and Shamsuddin M. 2010. Ultrasonographic study of ovarian cyclicity in Zebu cows of Bangladesh. Online Veterinary Joural (Vet Scan), Vol. 5 No. 2, Article 65.

Barlund CS, Carruthers TD, Waldner CL and Palmer CW. 2008. A comparison of diagnostic techniques for postpartum endometritis in dairy cattle. Theriogenology 69: 714-723

Bondurant RH. 1999. Inflammation in the bovine female reproductive tract. Journal of Animal Science 77 (Supp 2); 101-110

Ahmed, Z., Khan, M. A., Khan, M.S. and Ahmed, M.D. 1989. Effects of season on postpartum fertility parameters in Sahiwal Cows. Pakistan Journal of Agricultural Science. 26 (2): 118-124.

Chaffaux S, Valon F and Martinez J. 1982. Evoluation de Image echographique du produit de conception chez la vache. Bulletin de L academic Veterinaire de france 55:213-221.

Carriere PD, DesCouteaux L and Durocher J.2002. Evaluation echographic du tractus reproducteur et du corps jaune. Medicine Veterinaaire Du Quebec 32:128-131.

Durocher J, Descoteaux L and Carriere PD. 2005. Ultrasonography of the reproductive system of the cow. Continuing reduction services of the University of Montreal, St Hyacinthe, Quebec, Canada

Farin PW, Youngquist RS, Parfet JR and Gaverick HA. 1990. Diagnosis of luteal and follicular ovarian cysts in dairy cows by sector scan ultrasonography. Theriogenology 34: 633-642

Fissore RA, Edmondson AJ, Pashen RL and Bondurant RH. 1986. The use of ultrasonography for the study of the bovine reproductive tract. Non pregnant, pregnant and pathological conditions of the uterus. Animal Reproduction Science 12: 167-177

Griffin PG and Ginther OJ. Research applications of ultrasonic imaging in reproductive biology. Journal of Animal Science 1992; 70: 953-972.

Gaur M and Purohit GN.2007. Follicular dynamics in rathi (Bos indicus) cattle, Veterinar Archive 77: 177-186

Jainuddeen, M.R and Hafez, E.S.E. 2000. Reproductive failure in females. In: Hafez ESE and Hafez B edited Reproduction in farm animals (7th edition), Lippincott Williams and Wilkins, Philadelphia, pp. 261-278.

Kumar V and Purohit GN. 2009. Ultrasonographic diagnosis of the bovine genital tract disorders. Online Veterinary Journal (Vet Scan), vol.4, No.2, article 43

Kamal MM, Momont HW, Opsomer G and Shamsuddin M. 2011. The importance of interactions among animal, herd and managerial factors on postpartum anestrus in crossbred dairy cows. Proceedings of Veterinary 2011 Celebration in Bangladesh: 53 (Abstract).

Kudlac, E. 1965. Causes of anoestrus and stimulation of oestrus in heifers by extrapituitary gonadotrophins. Sb. Vys. Sk. Zemed, Brno, Ser. B. 13: 483-492. (Veterinary Bulletin. 36:2854).

Kubar H and Jalakas M. 2002. Pathological changes in the reproductive organs jof cows and heifers culled because of infertility. Journal of Veterinary Medical Association-Physiology, Pathology and Clinical Medicine 49: 365-372

Leblanc SJ, Duffield TF, Laslie KE, Batemann KG, Keefe GP and Walton JS. 2002. Defining and diagnosing postpartum clinical endometritis and its impact on reproductive performance of dairy cows. Journal of Dairy Science 85: 2223-2236

Lenz M, Drillich M and Heuwiser W. 2007. Evaluation of the diagnosis of subclinical endometritis in dairy cattle using ultrasound. Berl Munch Tiera. Woch, 120: 237-244

Meredith MJ and Madani MOK. 1980. The detection of pregnancy in sheep by A-mode ultrasound. British Veterinary Journal. 136: 325-330.

Melendez P, MChale J, Bartolome J, Archbald LF and Donovan GA. 2004. Uterine involution and fertility of Holstein cows subsequent to early postpartum $PGF_{2}\alpha$ treatment for acute puerperal metritis. Journal of Dairy Science 7: 3238-3246

Naokes DE.1999. Pregnancy and its diagnosis. In veterinary reproduction and obstetrics. Aurther CH, Naodkes DE, Pearson H and Parkinson TJ (Eds).WB saunders companu limited, London, Philadelphia, Toronto, Sydney, Tokyo: 63-109

Naoki SB. 2007. Follicular cysts in dairy cows. Journal of Animal Science. 78: 1-6.

Pierson RA and Ginther OJ. 1988. Ultrasonic imaging of the ovaries and uterus in cattle. Theriogenology 29: 21–37.

Pieterse MC, Taverne MAM, Kruip ThAM and Willemse AH. 1990a. Detection of corpora lutea and follicles in cows: A comparison of transvaginal ultrasonography and rectal palpation. Veterinay Records 126: 552–554.

Reeves JJ, Rantanen NW and Hauser M. 1984. Transrectal real-time ultrasound scanning of the cow reproductive tract. Theriogenology 21: 485-494.

Rahman MM. 2010. Management and effective treatment of postpartum anestrus cows guided by ultrasonography. MS thesis, Dept. of Surgery and Obstetrics, Faculty of Veterinary Science, BAU, Mymensingh.

Ribadu AY, Ward WR and Dobson H. 1994. Comparative evaluation of ovarian structures in cattle by palpation per rectum, ultrasonography and plasma progesterone concentration. Vetrinary Records. 135: 452-457

Rahman, M.F., Islam, N., Hossain, M.A., Prodhan, M.A.M. and Rahman, A. 1993. Reproductive patterns of different breeds of cows in Bangladesh. Bangladesh Journal of Livestock Research. 1: 19-24.

Shohag MAS. 2011. Application of ultrasonography to investigate postpartum anestrus in water buffaloes. MS thesis. Department of Surgery and Obstetrics, Faculty of Veterinary Science, BAU, Mymensingh.

Shamsuddin M, Bhyiyan MMU, Chanda PK, Alam MGS and Galloway D. 2006b. Radioimmunoassay of milk progesterone as atool for fertility control in smallholder dairy farms. Tropical Animal Health and Production 38: 85-92.

Shamsuddin M, Bhyityan MMU, Sikder TK, Sugulle AH, Chanda PK, Alam MGS and Galloway D. 2001. Constraints limiting the efficiency of artificial insemination of cattle in Bagladesh, in radioimmunoassay and related techniques to improve artificial insemination programmers for cattle reared under sub-tropical conditions, IAEA-TECDOC-1220. IAEA, Vienna: 9-27.

Sheldon IM, Lewis GS, Leblanc S and Gilbert RO. 2006. Defining postpartum uterine disease in cattle. Theriogenology 65: 1516-1530