Veterinary Medical Journal -Giza (VMJG), Vol. 60 (1), 57-66, June 2014
http://www.vetmedjcu.com/
ISSN 1110-1423

Detection of Corpora Lutea with Ultrasonography or Laparotomy in Local Iraqi Ewes

H.M. AL-Rawi
College of Veterinary Medicine, University of Al-Anbar, Falluja-Iraq
Email:dr_hanialrawi@yahoo.com
Received on December10, 2013 and accepted on January 5, 2014

Abstract

This study was aimed to compare between the ultrasonography and surgical method to detect the number of corpora lutea in ewes. Ten non-pregnant local Iraqi ewes were used in this study. The ewes were treated with progesterone by using intra-vaginal sponges impregnated with 20 mg chronolone (Fluorgesterone Acetate) for 13 days; the ewes were injected with 400 IU of ECG (Folligon) IM48hr before sponge withdrawal and injected with 300 IU of HCG (Chorulon) IM subsequently at the time of sponges removal. The number of corpora lutea in each ovary were monitored by ultrasonographic examination 5 days after the end of treatment with progesterone, also the ewes were examined by laparotomy 10days after sponge withdrawal for the number of corpora lutea in each ovary and compared with the number of corpora lutea which monitored by ultrasonography.

The predictive value of positive test, predictive value of negative test, sensitivity, specificity and accuracy are made to evaluate the results. The results of this study showed that the predictive value of positive test, predictive value of negative test, sensitivity, specificity and accuracy to estimate the number of corpora lutea by ultrasonography are 100%, 82.8%, 100%, 50% and 100% respectively. From the above results it was concluded that the ultrasonography can be used for detection of corpora lutea numbers in ewes a short time after ovulation.

Keywords: Ewes, Corpora lutea, Laparotomy, ultrasonography

Introduction

Real-time ultrasonography has become essential diagnostic tools as well as research tool in veterinary and animal sciences because it provides information about the reproductive organs (Ginther, 1991). Ultrasound techniques are becoming an important tools in animal reproduction,

offering both a mean of diagnosis and useful therapeutic. Real-time ultrasonography scanning permits the study of ovarian structures in small ruminants and, as a result, the monitoring of their evolution by successive observations. As a non-invasive method, it presents great advantages when compared with slaughtering (AL-Dabbas et al., 2008; Mahdi and Khallilil, 2008), laparoscopy (Gonzalez et al., 2004) orlaparotomy (Bartlewski et al., 2003; Mayorga et al., 2011). This technique is less stressful, administration of anaesthetics and sedative agents are not necessary and successive observations can be performed without causing adverse effects and the complete scanning of ovarian structures is possible. However, high levels of training are necessary for the ultrasonographic technique to be compatible with good livestock practice and animal welfare (Simoes et al., 2005).

It has been reported in several studies in sheep to determine the accuracy of RTU for detection the ovulation rate (Basaran, 1999; Steckler et al., 2008; Letelier et al., 2009), the presence of follicles and time of ovulation (Steckler et al., 2007). More recently, application of RTU technique to evaluate the number of corpora lutea related to the phase of estrus cycle (Bartlewski et al., 1999; Gonzalez et al., 2000).

The accuracy of trans-rectal RTU was evaluated by comparison with laparoscopy or Laparotomy (Steckler et al., 2007). The aim of this study was to evaluate the accuracy of trans-rectal ultrasound scanning to estimate the number of corpora lutea on day five after ovulation and to compare this method with Laparotomy.

Material and methods

This study was conducted in Animal Farm, College of Veterinary Medicine, Anbar University from 2nd January up to the end of February 2012.

Ten local Awassi ewes aged 1-5 years were used in this study. All ewes were isolated from males for 30 days and then trans-rectal and trans-abdominal ultrasonographical scanning are applied to sure that the ewes are not pregnant. The ewes were treated with intra-vaginal sponges impregnated with 20 mg chronolone (Fluorgesterone Acetate) for 13 days, the ewes were injected with 400 IU ECG (Folligon) IM 48hr before sponge withdrawal and injected with 300 IU HCG (Chorulon) IM subsequently at the time of sponges removal. Ultrasound scanner (My Lab Five VET

esaote) equipped with 5-7.5 MHz linear-arrayintra-rectal transducer was used to monitor the number of corpora lutea in each ovary 5 days after the end of sponges withdrawal. Ewes were restrained and the fecal matter was manually evacuated. After that, a liberal amount of carboxyl cellulose gel was applied on the transducer as lubricant before insertion into the rectum and the probe was preceded inside the rectum until images of the urinary bladder and the uterine horns were observed on the screen. The anechoic fluid filled bladder was used as a landmark during ewes ultrasound examination.

After that the probe was rotated 45-90° counter clockwise and clockwise to locate the right and left ovary, respectively, as reported by Buckrell (1988) and Ginther and Kot (1994). The corpora lutea was displayed as gray (hypoechoic) are surrounded by relatively hyperechoic tissue that may or may not enclose anechoichypoechoic central cavity (Pierson and Ginther, 1987). The urinary bladder is readily visualized as non-echogenic structure of a size that depends on the volume of urine that it contains. The ovaries are almond-shaped and once the ovaries are located, the best image was frozen to detect the number of corpora lutea in each ovary. laparotomy was done in a standing position, at the upper region of left flank using subcutaneous lidocaine2% local anesthesia for each ewes 10 days after sponges withdrawal for detection the number of corpora lutea in each ovary and compared with the number of corpora lutea which monitored by ultrasonography(Figures1 and 2).

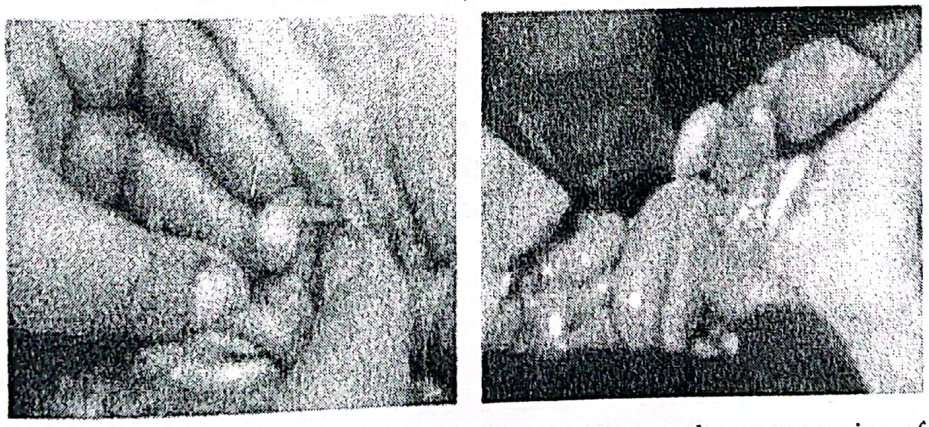

Figure 1. Laparotomy was done in a standing position, at the upper region of left flank for detection the number of corpora lutea in each ovary.

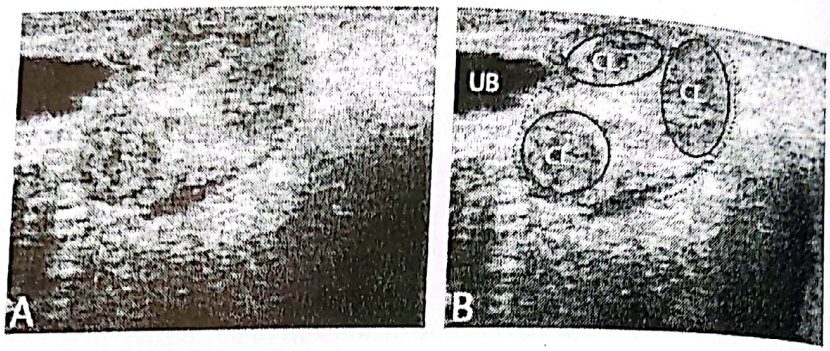

Figure 2. A, B. Ultrasonogram of an ovary marked with a dotted line and three corpora lutea marked with lines, **CL;** corpora lutea, **UB;** urinary bladder.

Statistical analysis:

The predictive value of positive test, predictive value of negative test, sensitivity, specificity and accuracy are made to evaluate the results according to Basaran (1999).

Predictive value of positive test (+PV) $= \frac{a}{a+b} \times 100$

Predictive value of negative test (-PV) $= \frac{c}{c+d} \times 100$

Sensitivity (Se) $= \frac{a}{a+d} \times 100$

Specificity (Sp) $= \frac{c}{b+c} \times 100$

Accuracy $= \frac{a+c}{n} \times 100$

a=True positive, b=False positive, c=True negative, d= False negative, n= Total number.

Laparotomy method assumed as the reference method, the probability to detect the exact number of CL counted in each ovary by ultrasound method compared with the data of reference method.

Results

The results of this study are shown in table 1, 2. All the ten cyclic ewes showed oestrus and were detected by ram during the expected dates. Ovaries were observed in the tenth ewes.

A total number of 22 corpora lutea was observed by Real-time ultrasonography at both ovaries, while it was 29 by Laparotomy (Table 1).Corpora lutea were detected on day 3-4 post-breeding (5days after

sponge withdrawal), reached its maximum diameter on day 10.The results shows that the predictive value of positive test, predictive value of negative test, sensitivity, specificity and accuracy to estimate the number of corpora lutea by ultrasonography are 100%, 82.8%, 100%, 50% and 100% respectively.

Table 1. The number of corpora lutea detected by laparotomy and Ultrasonography, A; True positive, B; False positive, C; True negative, and D; False negative.

No. of ewes	No. of corpora lutea				A	B	C	D
	Surgical method laparotomy		Ultrasonographical method					
	R. ovary	L. ovary	R. ovary	L. ovary				
1	3	3	3	3	6	0	0	0
2	2	3	1	2	3	0	0	2
3	2	1	1	1	2	0	0	1
4	0	1	0	1	1	0	1	0
5	3	3	2	2	4	0	0	2
6	2	1	2	1	3	0	0	0
7	0	1	0	1	1	0	1	0
8	1	0	1	0	1	0	1	0
9	0	2	0	0	2	0	1	0
10	1	0	1	0	1	0	1	0
Total	14	15	11	11	24	0	5	5

Table 2. Predictive value of positive test, Predictive value of negative test, Sensitivity, Specificity, Accuracy of ultrasonography and laparotomy for detection of the presence or absence of corpora lutea

	Laparotomy	Ultrasonography
Predictive value of positive test (%)	100	100
Predictive value of negative test (%)	100	82
Sensitivity (%)	100	100
Specificity (%)	100	50
Accuracy (%)	100	100

Discussion

It is impossible to detect ovulation, because in current study the ovaries were monitored only one time by ultrasonography at day 5th after sponge withdrawal. However, ovulation was detected by the presence of corpora lutea. In the current study, corpora lutea were detected on day 3-4 post-breeding (5days after sponge withdrawal), reached its maximum diameter on day 10. Similar observation has been reported by several authors (Gnatek et al., 1989; Kandiel, 2002).

The predictive value of positive test, Sensitivity and Accuracy of ultrasound in detection of CL were 100% as compared with laparotomy. Similar results have been reported by Simoes et al. (2005) in goats.

Ultrasonography is 100% accurate for the detection of the fully functional CL, but less accurate during the growth and regression of CL and when more than one CL is present (Vinoles, 2003; Simoes et al., 2005).Inaccuracies can also occur when CL develop central cavities (Vinoles, 2003).This problem can be avoided by measuring ovulation rate on day 10 of the cycle when most CL cavities will be small (Vinoles, 2003; Simoeset al., 2006).Another source of error occurs when the CL develop a large crown (Ovulatory papillae) that may be mistaken for a second CL, in these cases, a few days later may be necessary if the operator is uncertain about the number of CL a second examination (Vinoles et al., 2010).Some CL were not viewed by laparotomy, this could be attributed to their more internal location in the ovaries, hindering visualization on the ovary surface (Simoes et al., 2005).

It was concluded from this study that the real-time ultrasonographic scanning proved to be a highly accurate method for detection the number of CL in local Iraqi ewes. The results of the present study showed that real-time ultrasonography are similarly reliable techniques for CL detection. However, the real-time ultrasonography represents a non-traumatic technique with advantages to animal welfare both in experimental and reproductive evaluation of the ovarian CL.

References

AL-Dabbas, F.M., Hamra,A.H. and Awawdeh, F.T., 2008. The effect of arginine supplementation on some blood parameters, ovulation and concentrations of estrogen and progesterone in female Awassi sheep. Pakistan J. Biol. Sci., 11, 2389-2394.

Bartlewski, P.M., Beard, A.P. and Rawlings, N.C., 1999. An ultrsonographic study of luteal function in breeds of sheep with different ovulation rates. Theriogenology, 52, 115-130.

Bartlewski, P.M., Duggavathi, R., Aravindakshn, J., Barrett, D.M., Ook, S.J. and Rawlings, N.C., 2003. Effect of a 6 day treatment with Medroxyprogesterone Acetate after prostaglandin F2 alpha- Induced luteolysis at midcycle on antral follicles development and ovulation rate in non-prolific Western white- faced ewes. Biol. Reprod., 86, 1403-1412.

Basam, D.A., 1999. Diagnosis of ovulation rate and embyronal, Foetal development by trans-rectal ultrasonography in the white goats. J. Vet. Anim. Sci, 23, 567-573.

Buckrell, B.C., 1988. Application of ultrasonography in reproduction in sheep and goats. Theriogenology, 29, 71-84.

Ginther, O.J., 1991. Ultrasonic Imaging and Animal Reproduction, Cattle Equiservices Publishing, Wisconsin, pp. 232-246.

Ginther, O.J. and Kot, K., 1994. Follicular dynamics during the ovulatory season in goats. Theriogenology, 42, 987-1001.

Ginther, O.J., Kot, K. and Wiltbank, M.C., 1995. Association between emergence of follicular waves and fluctuations in FSH concentrations during the estrus cycle in ewes. Theriogenology, 43, 689-703.

Gnatek, G.G., Smith, L.D., Duby, R.T. and Godkin, J.D., 1989. Maternal recognition of pregnancy in the goat, effects of conceptus removal on inter-estrus intervals and characterization of conceptus protein production during early pregnancy. Biol. Reprod., 41, 655-663.

Gonzalez, A.B., Santiago, J.M., Gomez-Brunet, A. and Lopez-Sebastian, A., 2000. Relationship between Ultrasonographic assessment of the corpus luteum and plasma progesterone concentration during the oestrous cycle in monovular ewes. Reprod. Dom. Anim. 35, 65-68.

Gonzalez, A.B., Souza, C.J.H., Campbell, B.K. and Baird, D.T., 2004. Systemic and intraovarian effect of dominant follicles on ovine follicular growth. Anim. Reprod. Sci. 84, 107-119.

Kandiel, M.M.M., 2002. Ultrasonographic diagnosis of ovarian activity in she-goats. Ph.D. Thesis Fac. Of Vet. Med., Zagazig Egypt.

Letelier, C.A., Contreas, I., Garica, R.A., Ariznavarreta, C., Tresguerres, J.A.F., Fbres, J.M. and Gonzalez, A., 2009. Ovarian follicular dynamics and plasma steroid concentrations are not significantly different in ewes given intravaginal sponges containing either 20 or 40 mg of fluorogestone acetate. Theriogenology, 71, 676-682.

Mahdi, D. and Khallilil, K., 2008. Relationship between follicle growth and circulating gonadotrophin levels during postnatal development of sheep. Anim. Reprod. Sci. 106, 100-112.

Mayorga, I., Mara, L., Sanna, D., Stelletta, C., Morgante, M., Casu, S. and Dattena, M.,2011. Good quality sheep embryos produced by superovulation treatment without the use of progesterone devices. Theriogenology, 75, 1661-1668.

Pierson, R.A. and Ginther, O.J., 1987. Reliability of diagnostic ultrasonography for identification and measurement of follicles and detection of the corpus luteum in heifers. Theriogenology, 28, 929.

Simoes, J., Almeida, J.C., Valentim, R., Baril, G., Azevedo, J., Fontes, P. and Mascarenhas, R., 2006. Follicular dynamics in Serrana goats. Anim. Reprod. Sci. 95, 16-26.

Simoes, J., Potes, J., Azevedo, J., Almeida, J.C., Fontes, P., Baril, G. and Mascarenhas, R., 2005. Morphometry of ovarian structures by transrectal ultrasonography in Serrana goats. Anim. Reprod. Sci., 85, 263-273.

Steckler, T., James, S.L., Wen Ye, E., Inskeep, E.K. and Padmanabhan, V., 2008. Development Programming,Exogenous Gonadotropin Treatment Rescues Ovulatory Function But Does Not Completely Normalize Ovarian Function in Sheep Treated Prenatally with Testosterone. Biol. Reprod. 79, 686-695.

Steckler, T., Manikkan, M., Inskeep, E.K. and Padmanabhan, V., 2007. Follicular persistence in prenatal testosterone-treated sheep is not programmed by androgenic actions of testosterone. Endocrinology, 148, 3532-3540.

Vinoles, C., 2003. Effect of nutrition on follicle development and ovulation rate in the ewe. Department of Clinical Chemistry. Uppsala ISSN, 1401-6257. ISBN; 91-576-6650-4 Ph.D. Swedish University of Agriculture Sciences .PhD, 120.

Vinoles, C., Gonzalez, A., Graeme, B.M., Zlatar,F.S.and Sale, S., 2010. Sheep and Goat. In, Practical Atlas of Ruminant and Camelid Reproductive Ultrasonography. Edited by Lue Des Coteaux; Jill Colloton and Giovanni Gnemmi. WILEY BLACKWEL.

الكشف عن الأجسام الصفراء مع التصوير بالموجات فوق الصوتية أو في البطن للنعاج العراقية المحلية

هاني الراوي

كلية الطبالبيطري جامعةالانبار، الفلوجة، العراق

تهدف هذه الدراسة المقارنة بين الموجات فوق الصوتية والطريقة الجراحية للكشف عن عدد الأجسام الصفراء في النعاج. واستخدمت النعاج المحلية في العراق غيرالحوامل في هذه الدراسة. تم علاج النعاج مع البروجسترون بإستخدام الإسفنج المشرب بـ 20 ملغ chronolone (FluorgesteroneAcetate) داخل المهبل لمدة 13 يومًا، تم حقن النعاج بـ400 وحدة دولية (Folligon)قبل انسحاب الإسفنج وحقن 300 وحدة دولية من (Chorulon)في وقت إزالة الإسفنج. تم رصد عدد من الأجسام الصفراء في كل مبيض عن طريق الفحص بالأشعة فوق الصوتية بعد 5 أيام من العلاج، كما تم فحص النعاج بعشرة أيام من سحب الإسفنج لعدد الأجسام الصفراء في كل المبيضين مقارنتها بعدد الأجسام الصفراء التي رصدت بواسطة الموجات فوق الصوتية.

أظهرت نتائج هذه الدراسة أن القيمة التنبؤية لاختبار إيجابي، والقيمة التنبؤية لاختبار سلبي، والحساسية، والنوعية والدقة لتقدير عدد الأجسام الصفراء بالموجات فوق الصوتية هي 100٪، 82.8٪، 100٪، 50٪ و 100٪ على التوالي. من المبين أعلاه النتائج تم التوصل إلى أن الموجات فوق الصوتية يمكن أن تستخدم للكشف عن الاجسام الصفراء في مجاميع النعاج في وقت قصير بعد الإباضة.