



Short Communication

Ultrasonographic Investigation of Monochorionic Diamniotic Monozygotic Twins in a Cow

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Abstract | Trans rectal ultrasonography of a 7 year old crossbred Jersey cow was done at weekly interval from 21 to 63 days post artificial insemination. Monochorionic diamniotic monozygotic twins were confirmed on the basis of different amniotic sacs and corpus luteum on one ovary. Color Doppler study was done to assess the vascularity and functional activity of corpus luteum present on the left ovary. Ultrasonography was employed at weekly interval to judge the viability of embryo (up to 42 days), fetus (after 42 days) and late embryonic mortality, if any. Sexing of the twins was done on 56th and 70th day post artificial insemination and two male twins were confirmed on the basis of genital tubercle, median raphe, scrotal and penis impression. With the aid of ultrasonography and color Doppler technique, it is possible to determine the twins' zygosity and viability.

Editor | Muhammad Abubakar, National Veterinary Laboratories, Park Road, Islamabad, Pakistan.

Received | August 31, 2018; **Accepted** | November 19, 2018; **Published** | December 12, 2018

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Citation | Sharma, A., M. Mahajan, M. Singh and P. Kumar. 2018. Ultrasonographic investigation of monochorionic diamniotic monozygotic twins in a cow. *Veterinary Sciences: Research and Reviews*, 4(2): 62-71.

DOI | <http://dx.doi.org/10.17582/journal.vsr/2018/4.2.62.71>

Keywords | Crossbred Jersey cow, Color Doppler, Monozygotic, Twins, Ultrasonography

Introduction

Cattle are a monotocous species; however, the reproductive process in cattle sometimes results in the birth of twins. Twinning can be classified into two types: monozygotic and dizygotic. Dizygotic twins are mainly characterized by presence of two CLs, either on one or both the ovaries. Dichorionic diamniotic twins are usually present in different chorionic and amniotic bag which has to be diagnosed via ultrasonography. However, the most threatful condition is the presence of twins in same chorionic and amniotic bag (Monochorionic monoamniotic twins) and more often; it leads to the termination

of pregnancy/abortion/late embryonic mortality (Naikoo et al., 2013). In cattle, abattoir findings from reproductive tracts in which the ovaries had only one corpus luteum serve mainly as the evidence for monozygotic twinning (Fricke, 2001). Increase in incidence of twinning in dairy cattle population has brought attention to this phenomenon because of its negative economic impact on dairy farms (Kinsel et al., 1998). The use of ultrasound in the study of genital tract of cows is an advanced technology that changes our knowledge in the field of reproductive biology (Naikoo et al., 2013). Therefore, ultrasonography can play an important role in identifying the zygosity in cattle.

Materials and Methods

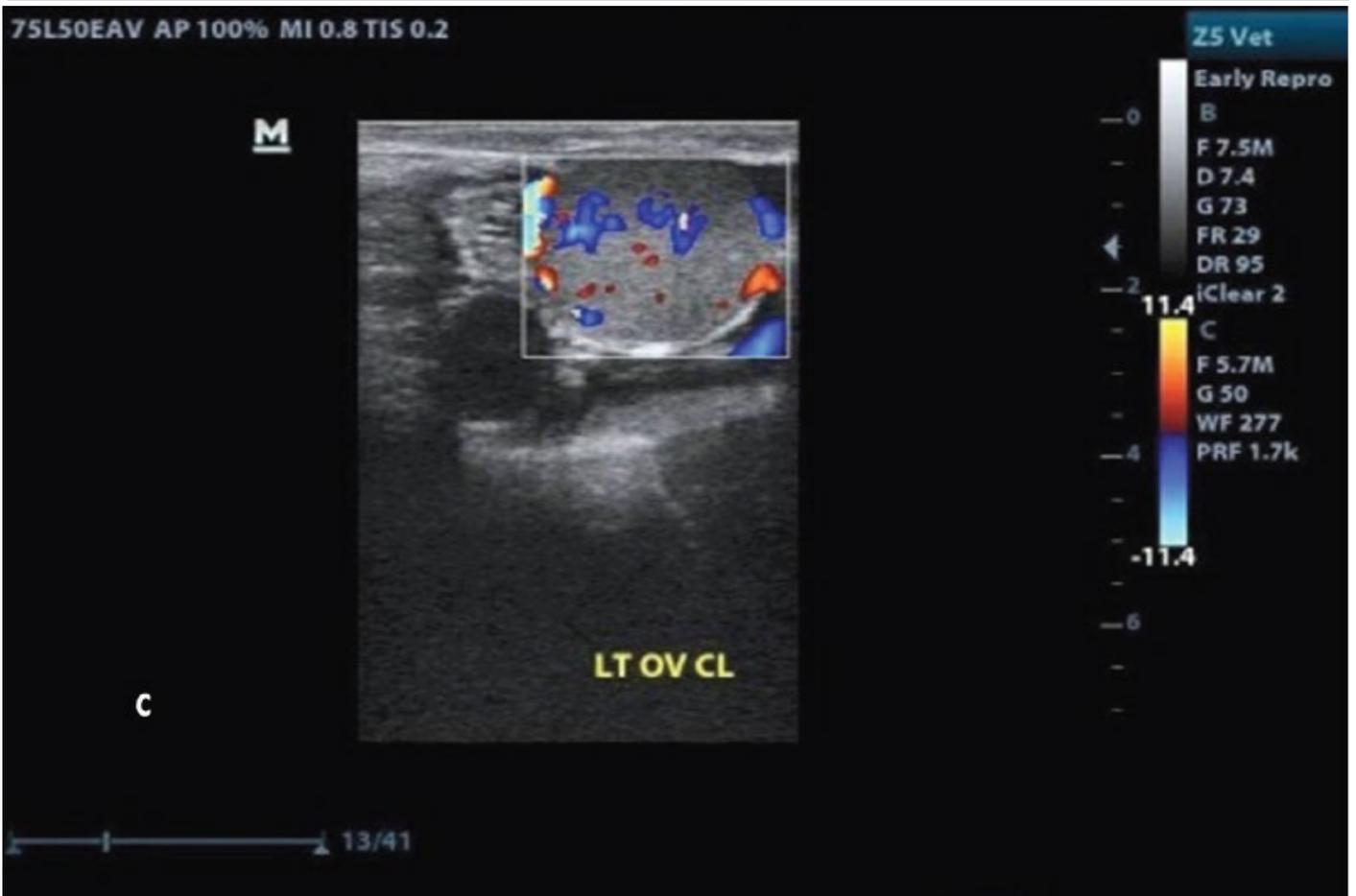
A 7 year old crossbred Jersey cow reared in a loose housing system under standard management conditions, fed a total mixed ration (once daily, *ad libitum*), mineral mixture (50 g approx. daily) and had unrestricted access to water. Transrectal ultrasonography of the cow was started at 21 days' post insemination and continued till 70 days of pregnancy at a weekly interval. For the ultrasound examination, the cow was restrained in a squeeze chute. The rectal transducer was coated with gel and inserted into the rectum dorsal to the cervix. The uterine body and both uterine horns were scanned systematically from posterior to anterior with small rotations of the probe from left to right.

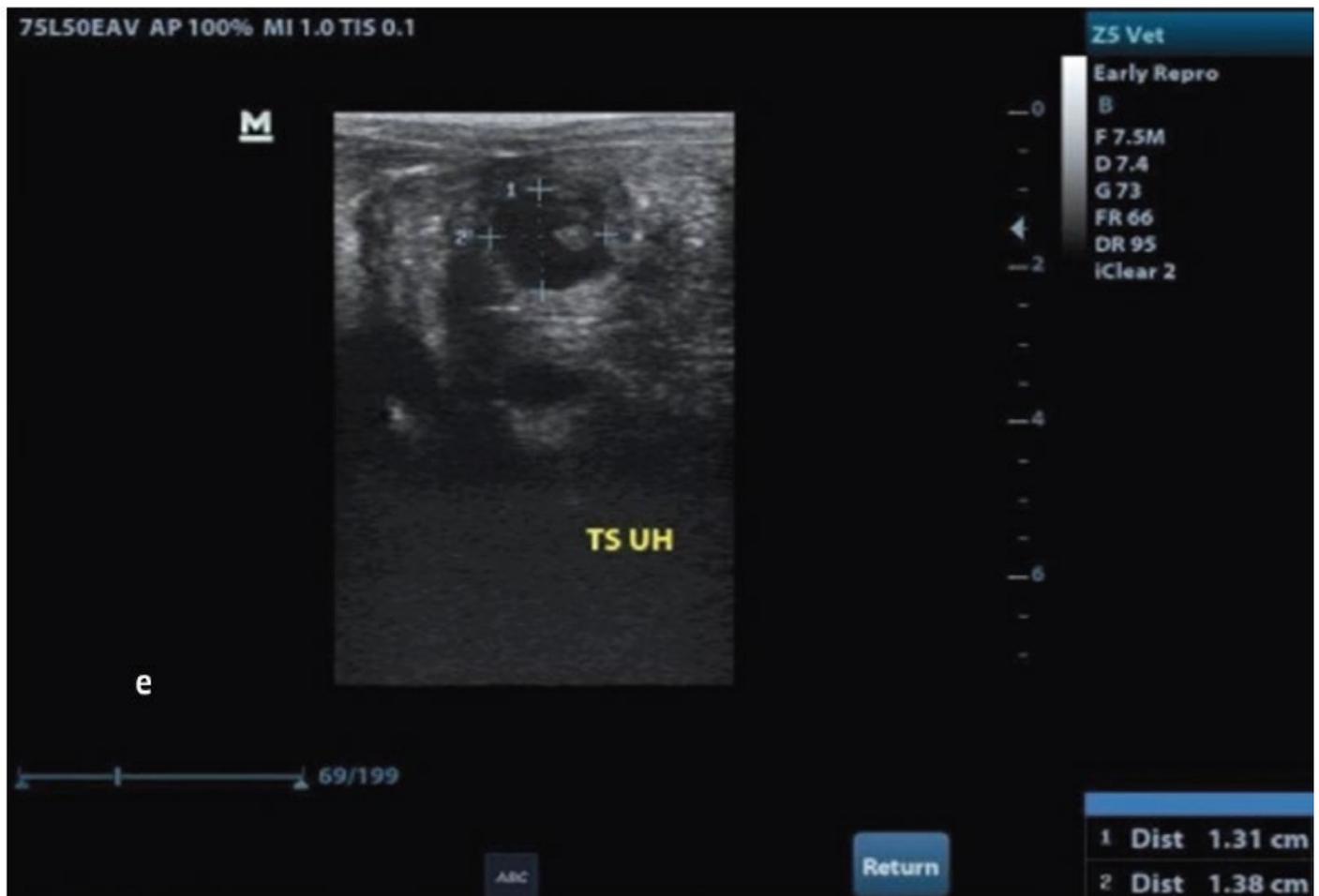
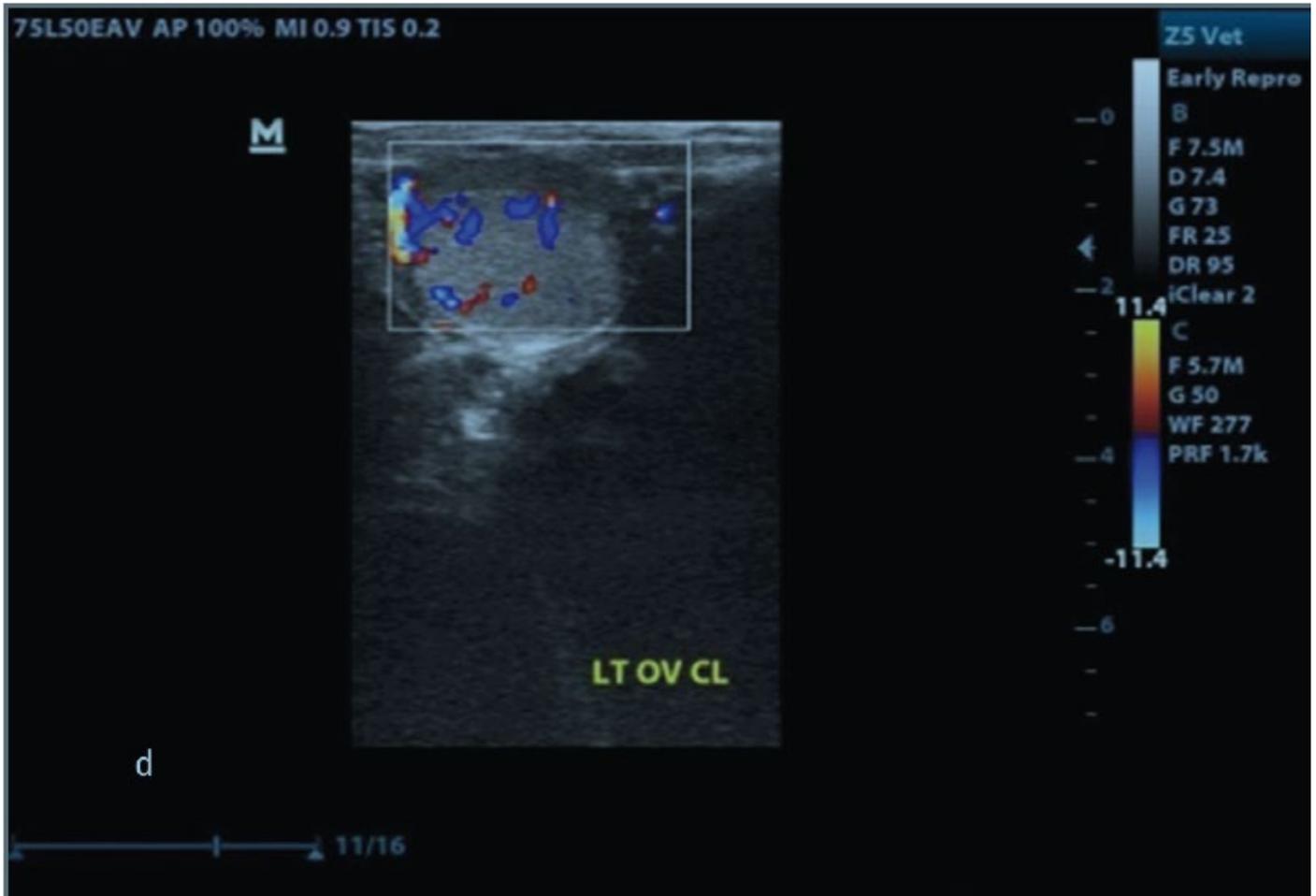
Results and Discussion

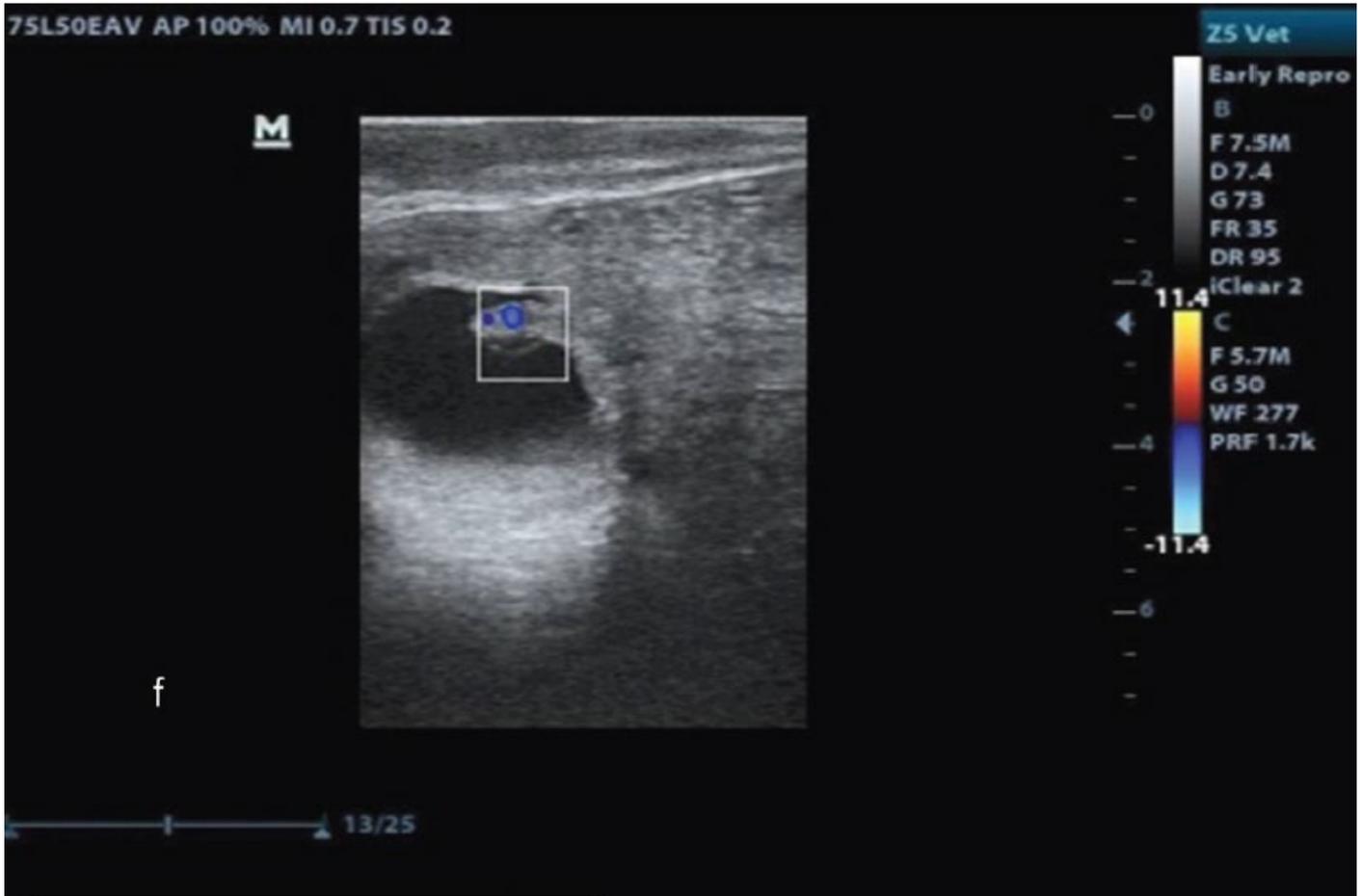
Following from the first examination, corpus luteum (CL) was present on left ovary and its vascularity was confirmed by Color Doppler technique i.e. Day 21, 35, 49, 56 (Figure 1a, b, c, d). Embryo within an amniotic vesicle was evident on second examination. Subsequent examinations revealed monochorionic diamniotic monozygotic twins on day 42, 49, 56 and 70, respectively (Figure 1g). Monozygosity was confirmed on the basis of presence on CL on one ovary. Twins shared a common chorion but they were present in different amniotic sacs, although, the fusion of amniotic sacs was evident (Figure 1h). Twins' viability was judged on the basis of vascularity,

umbilical vessels blood flow and heart beat (Figure 1i, j, k, m). Male twins were confirmed on the basis of genital tubercle, median raphe, scrotal and penis impression (Figure 1l, n, o). Twinning is a complex trait with multiple causative factors like multiple ovulation rate, milk production, parity and genetics (Fricke, 2001). A positive association between milk production and conception of twins in dairy cattle has been observed (Kinsel et al., 1998). In addition, milk production near the time of artificial insemination has been usually associated with a greater incidence of double ovulation (Lopez et al., 2004). Application of ultrasonography in bovine reproduction has grown rapidly in the last decade (Kahn, 1990). In applied aspect, it is applicable in early assessment of pregnancy and identifying cows having twins in order to implement various management practices to reduce or eliminate the negative effects of twin birth (Moore et al., 2005). Determining fetal sex and monitoring of fetal viability also offers a great advantage through ultrasonography (Naikoo et al., 2013). So the use of transrectal ultrasound for the assessment of any reproductive abnormalities has helped veterinarians in comparison to rectal palpation. In addition, Color Doppler technique has provided the much needed support to 2D ultrasonography by accurate assessment of vascularity of different reproductive structures. After 8 months and 16 days, male twins were successfully delivered by the cow without any obstetrical intervention. Fertility index of the cow came out good as subsequent calving to conception interval was 98 days.

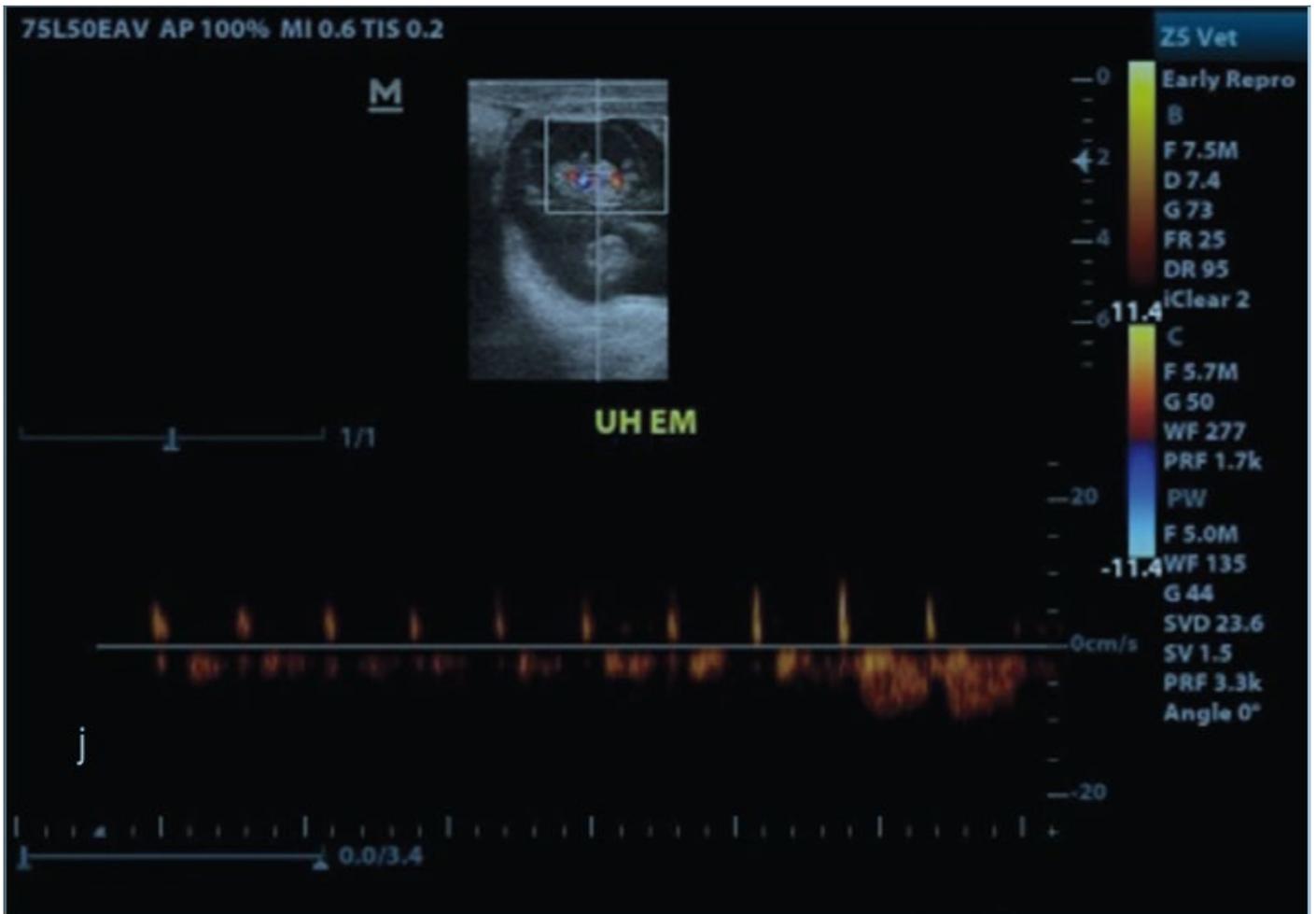


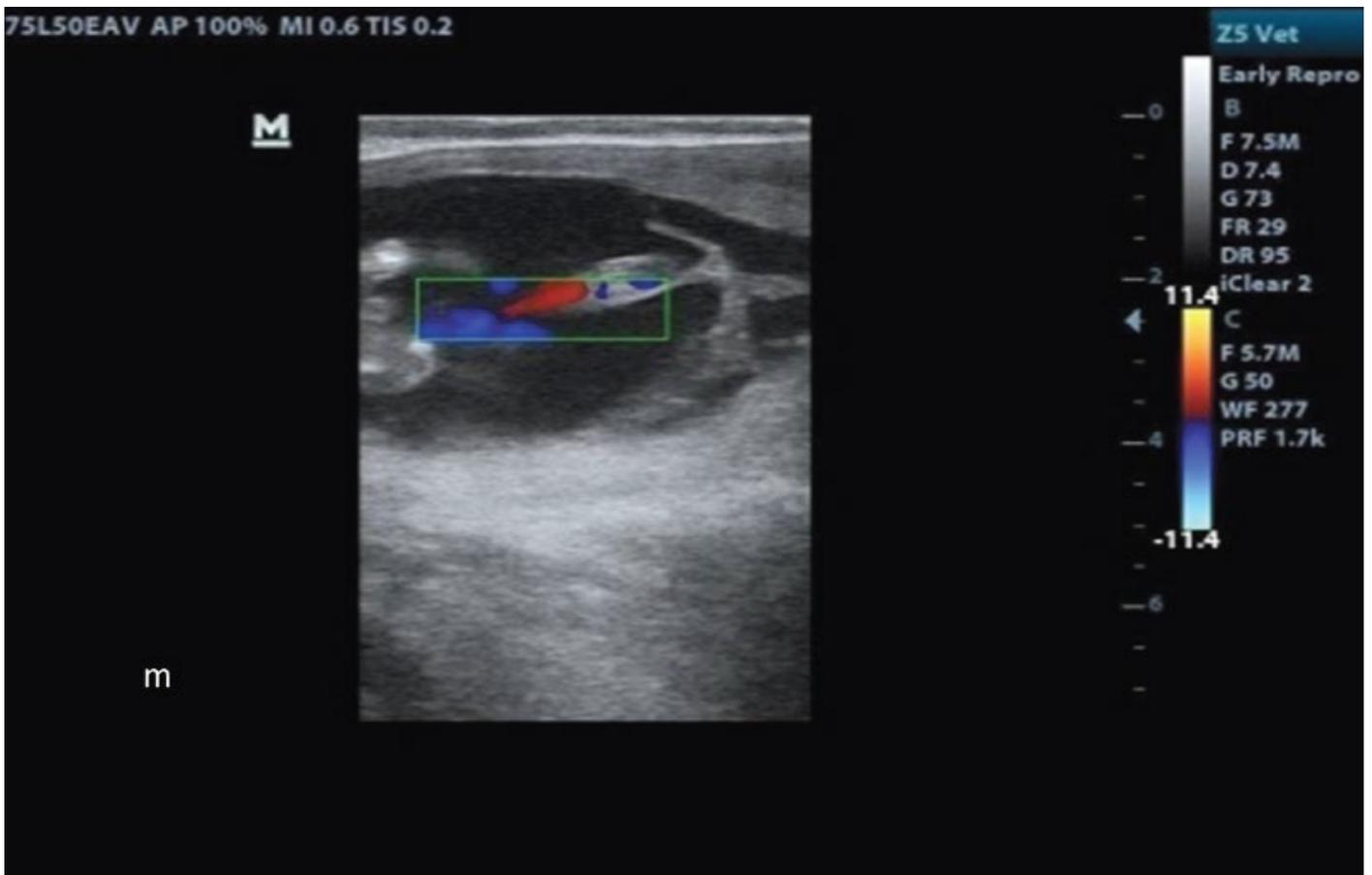
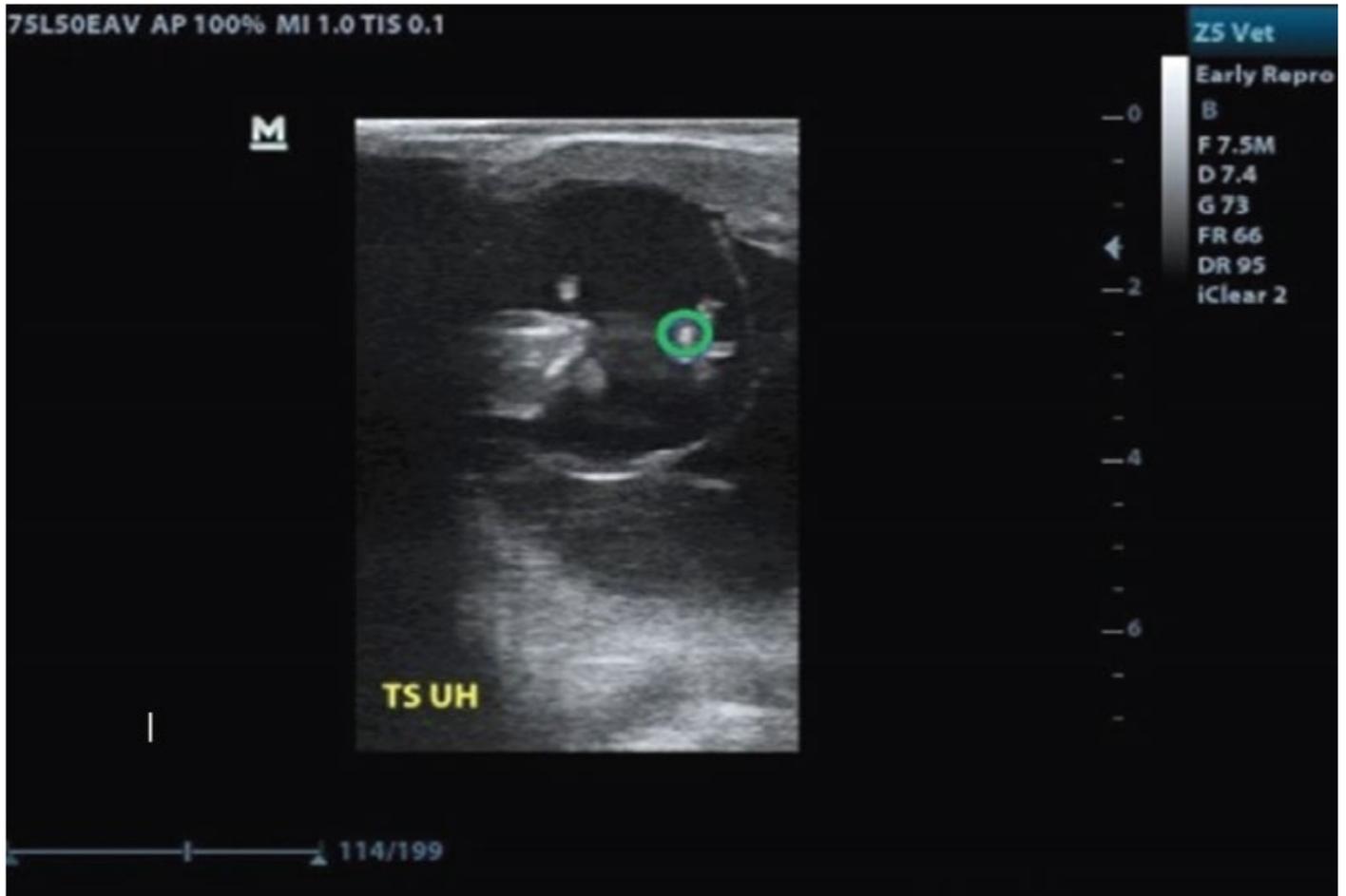












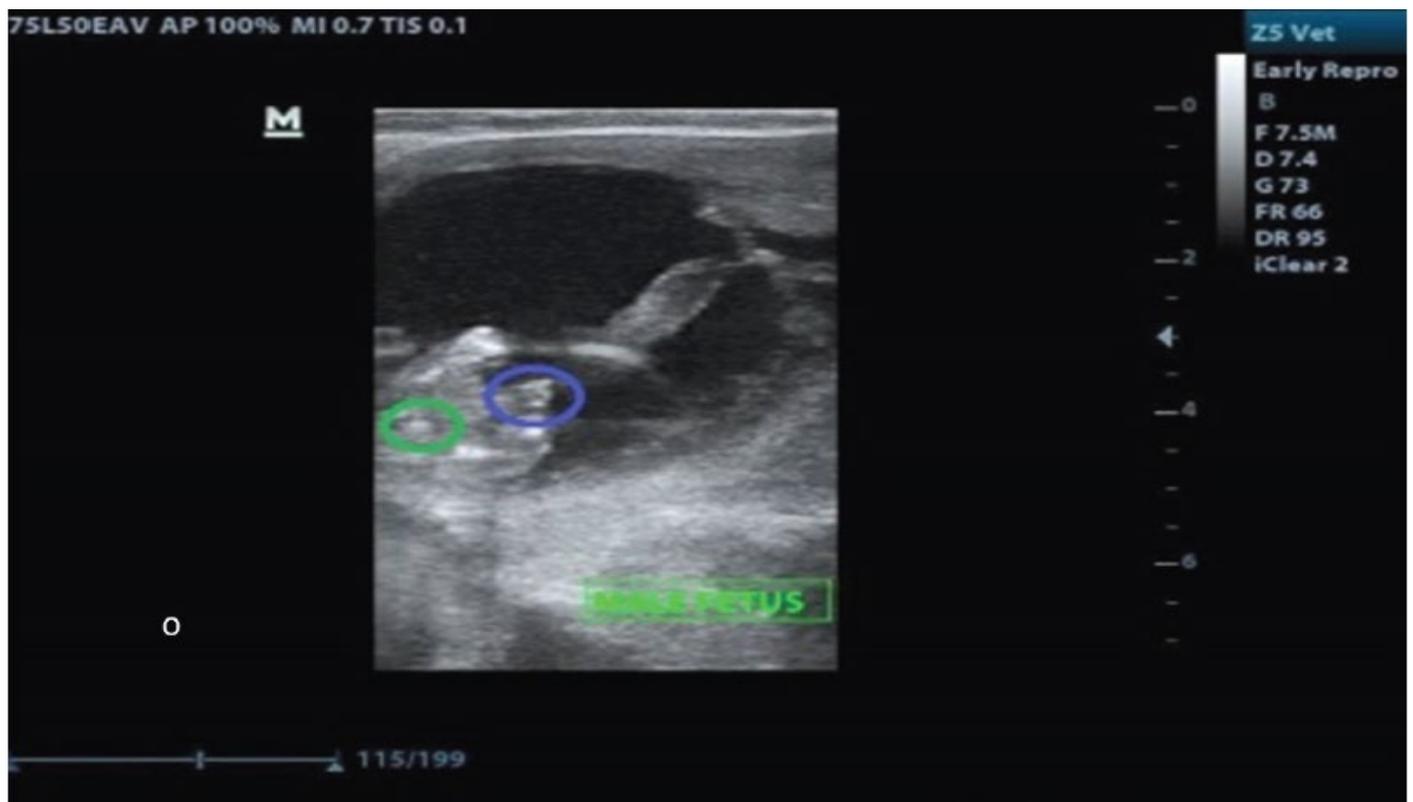
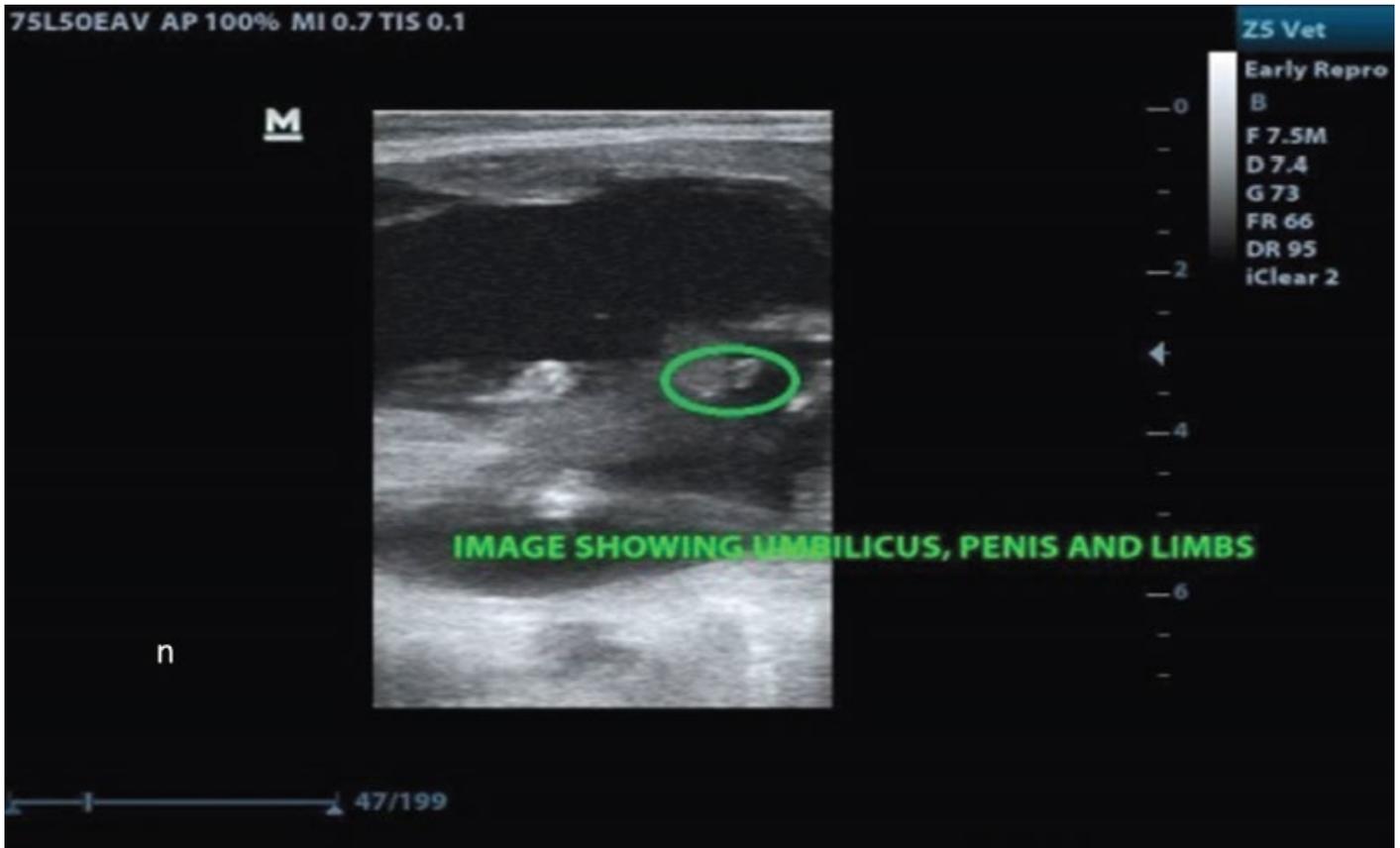


Figure 1: Transrectal ultrasonographic images of Corpus luteum and twins' vascularity, viability and sex (a-d) Color Doppler image of CL on day 21, 35, 49, 56. (e-f) Embryo within amniotic vesicle and heart located via Color Doppler on day 28. (g) Monochorionic diamniotic monozygotic twins on day 42. (h) Fusion of amniotic sacs seen on day 70. (i-j) Viability status and heartbeat of fetus on day 49. (k) Umbilical artery (red color) on day 49. (l) Genital tubercle of male fetus (green circle) on day 56. (m) Umbilical artery (red color) and umbilical vein (blue color) on day 70 (n-o) Median raphe, penis and scrotum impression (green circle) and tail (blue color) of both the fetus on day 70. **Red color:** Blood flow towards the transducer; **Blue color:** Blood flow away from the transducer.

Conclusion and Recommendations

Ultrasonography is the best non-invasive method to study the characteristics of embryo/fetus and twins (if present) from day 28 post AI. So, ultrasound should not be seen as a secondary management tool, but it should be used in the routine examinations of dairy herd and in the field of veterinary sciences.

Color Doppler is another advancement which helps in detecting the viability of embryo at different stages to rule out the late embryonic mortality.

Authors Contribution

Dr Mohit Mahajan and Dr Pravesh Kumar helped in carrying out the ultrasonographic examination. Dr Madhumeet Singh made a contribution by helping me writing the manuscript.

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