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Ultrasonographic diagnosis of pregnancy and estimation of fetal numbers in ewes

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ABSTRACT

Ultrasound scanning is one of the methods to diagnose pregnancy and it also helps in identifying twin bearing ewes, which requires special care during the last stages of pregnancy. Thirty-six ewes were examined by rectal probe and 493 ewes were examined with trans-abdominal probe. Sequential scanning with rectal probe from 3–6 weeks of pregnancy revealed very clear fetal movements and heart beat at fifth week. Using trans-abdominal probe 451 ewes out of 493 ewes scanned were diagnosed as pregnant with 23 of them showing twin pregnancy. Accuracy of identifying pregnant ewes at 60–75 days of pregnancy was 98.00% with 2.00% false positive cases. The accuracy of identifying twin was 69.97% and was more in Nilagiri ewes. No twin was diagnosed in Dorset Nilagiri cross ewes. Those ewes which were diagnosed to have twins were given additional concentrate feeding and all of them survived and gave birth to twin except one which had still born twin lambs.

Key words: Ovine, Pregnancy diagnosis, Twins, Survivability, Ultrasonography

Identification of barren ewes is one among many husbandry practices adopted to increase productivity. Early pregnancy diagnosis ensures early culling or rebreeding of barren ewes and it reduces the feed cost involved, reduces the reproductive losses in the form of abortions and still birth by providing special care to pregnant ewes (Goel and Agarwal 1992). Ovine pregnancy can be diagnosed by ultrasonography as early as 21 to 24 days of gestation (Anwar *et al.* 2008). However, the accuracy reported in several studies is variable. The variable results obtained in the above studies might be due to the effect of breed, age of the ewes, whether the ewes were fasted prior to scanning or not, handling of ewes and the experience of the operator (Buckrell *et al.* 1986, Buckrell 1988, Gearhart *et al.* 1988, Garcia *et al.* 1993, and Bretzlaff and Romano 2001). Estimation of fetal numbers using ultrasonography helps in taking decisions such as increasing feeding of the twin/ multiple bearing ewes and allotting more care to such animals. Survival rate of twins are often markedly lower than singles (Mutiga and Mukasa-Mugerwa 1992). However, the survivability of lambs with better birth weight were more whether they are twins or single (Crocker *et al.* 2005). Identifying ewes bearing twins at an earlier stage of gestation, helps in better managemental condition of the dam that leads to better birth weight and survival of lambs. Present study was proposed to determine the earliest stage of gestation at which pregnancy could be detected through ultrasonography in ewes and to estimate the fetal numbers and provide better managemental conditions for ewes bearing twins and multiples and study their survival rate.

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MATERIALS AND METHODS

The ewes available at Sheep Breeding Research Station, Sandynallah, The Nilgiris District, Tamil Nadu were utilized for the study. The ewes in this station were bred during 2 breeding seasons. The Main breeding season is from September to November and the lean breeding season is from March to May. The ewes and rams are maintained separately and during the breeding season the ewes were teased daily with apronized teaser rams to identify estrum. The ewes found to be in estrum were hand mated and were kept in separate batches till lambing. The study was carried out in ewes (493 ewes) bred during the main breeding season (Sep- Nov 2010).

Early pregnancy diagnosis using rectal transducer: Ewes (36) bred during the main breeding season (Sep- Nov 2010) were scanned during the 21rd, 28th and 35th days after breeding using a B mode real time ultrasound scanner equipped with a 5 and 7.5 MHz linear array transducer. The ewes were scanned in standing position. The rectum was cleared of faeces when necessary and lubricated transducer was introduced gently into the rectum till the urinary bladder could be seen and then it was rotated 90° clockwise and 180° anticlockwise to scan the entire reproductive tract.

Flock pregnancy diagnosis and identifying twin bearing ewe: Using rectal transducer was time consuming and

involves more man power and tiresome to the animals. Hence all ewes (493 ewes) bred during the main breeding season (Sep- Nov 2010) were scanned on 60–75 days after breeding with a 3.5 MHz abdominal probe. Scanning was performed in the fleece less right inguinal region of the ewes. The right hind leg was folded up at the time of scanning for proper placement of the probe. The area was cleaned before scanning. Ultrasound gel was applied each time the probe is used for scanning. The ewes were declared pregnant by imaging the placentomes, vertebral columns, heart beat. Presence of 2 vertebral columns, heart beats in a single screen were indicative that the ewe carries twin or more fetuses.

Statistical analysis: The accuracy or efficiency of pregnancy diagnosis was determined by comparing the pregnancy status with lambing. The results of ultrasound scanning were compared with actual lambing using Chi-square test of Association. Fischer Exact Test was utilized to analyze twinning based on scanning. The effect of breed on lambing, twinning based on actual lambing were analyzed using Chi-square test of Association.

RESULTS AND DISCUSSIONS

Early pregnancy diagnosis using rectal transducer: No clear evidence of pregnancy was observed on 21st day after breeding. In ten ewes, dissimilarity in the size of uterine horn was observed. However the dissimilarity were prominently seen in most of animals (29/36) scanned during the fourth week after breeding. The fetal movements and fetal heart beat were also visible at this stage of pregnancy. The fetal movements and heart beat were more pronounced during fifth week of pregnancy and the accuracy was 100%. Present observations are in close agreement with Alan *et al.* (1994) who reported the accuracy of pregnancy diagnosis on day 25 of gestation as 97.84% in ewes; Martinez *et al.* (1998) who reported the accuracy of pregnancy diagnosis as 100% and Quintela *et al.* (1999) and Medan *et al.* (2004), they reported the accuracy of pregnancy diagnosis as 98 and 100% respectively. Though, scanning of ewes using transrectal ultrasonography offer a safe and accurate means for pregnancy diagnosis, the time and manpower involved and the practical difficulties involved in flock of sheep are more than abdominal probe and hence they can be utilized

Table 1. Scan results of ewes bred during Sep-Nov 2010 breeding season

Breed	Number bred	Pregnant	Conception rate	Twins*	Twinning percentage	Not pregnant
Nilagiri	122	113	92.62	12^{a}	10.62	9
Sandyno	294	269	91.50	11^{b}	4.09	25
Dorset Nilagiri cross	77	69	89.61	0	0.00	8
Total	493	451	91.48	23	5.32	42

* (P<0.05) Different superscripts in a column indicated significant difference.

Table 2. Lambing details in comparison with scan results of ewes bred during Sep-Nov 2010 breeding season

Scan status	At lambing	Nilagiri	Sandyno	Dorset Nilagiri cross	Total
Pregnant found to have single fetus	Single	90	226	58	374
	Twin	1	6	3	10
	Still birth	6	7	1	14
	Abortion	2	7	2	11
	Died	1	7	2	10
	Not pregnant–False positive	1	5	3	9
	Total	101	258	69	428
Pregnant found to have twin fetus	Twin	11	10	0	21
	Triplet	1	0	0	1
	Single	0	0	0	0
	Still birth	0	1	0	1
	Abortion	0	0	0	0
	Died	0	0	0	0
	Total	12	11	0	23
Grand total	113	269	69	451	
Accuracy in identifying pregnant ewes		99.12 (112/113)	98.14 (264/269)	95.65(66/69)	98.00
Total numbers of ewes had twins*		13^{b}	17^{a}	3^{c}	33
Accuracy of identifying twin bearing ewes**		92.31^{a}	64.71^{b}	0.00^{c}	69.70

** (P<0.01) Different superscripts in a row indicate significant difference.** (P<0.05) Different superscripts in a row indicate significant difference.

for research and when the number of ewes are minimal in a farm.

Flock pregnancy diagnosis and identifying twin bearing ewes: All ewes (60–75 days after breeding) were scanned for pregnancy verification using abdominal probe; 451 ewes were found pregnant with 23 of them showing twin pregnancy, and 42 ewes were not pregnant and were transferred to dry batch (Table 1). The ewes carrying twins were kept in separate batch and fed with an additional 100 g of concentrate feed. Pregnant ewes were kept under standard managemental conditions till lambings. At lambing the results of scanning were verified and the details are given Table 2.

There is no significant difference between the number of ewes diagnosed as pregnant by scanning and ewes lambed (χ^2=0.383; P<0.054). The accuracy of identifying pregnant ewes at 60–75 days of pregnancy using ultrasound scanner is accurate in the present study. Accuracy of 98.00% with 2.00% false positive with no false negative cases reported. The results obtained in this study were in agreement with the findings of Anwar *et al.* (2008) in Balkhi sheep (97%) and Ganaie *et al.* (2009) in Corridale rams (100%). Early pregnancy diagnosis in Nilagiri ewes was nearly 100% and was comparatively less in Sandyno and Dorset Nilagiri crosses. Totally 33 ewes gave birth to twin including one triplet. The accuracy of identifying twins using ultrasound scanning (69.70%) was significantly lower when compared at actual lambing (χ^2=0.168; P<0.038). Accuracy of identifying twinning by scanning was higher in Nilagiri ewes (92.31%) than Sandyno ewes (64.71%) compared at lambing (χ^2=0.161; P<0.005). No twins were diagnosed in DN ewes. Similar to the present study Fowler and Wilkins (1984) also observed the difference in accuracy of pregnancy diagnosis among the breeds. Differences in accuracy due to breed of ewe in present study were without obvious explanation, However, the Nilagiri ewes are thin and have less wool cover under the belly and inguinal region when compared to Sandyno and Dorset × Nilagiri crosses. In addition this may also be caused by anatomical features and require further examination.

Accurate diagnosis of foetal number will greatly improve the nutritional management of late gestation ewes. Late gestation nutritional supply in response to foetal demand greatly reduces perinatal lamb mortality by ensuring lamb birth weight and ewe colostrum accumulation (Scott 2012). Ewes which were diagnosed to have twins were separated and were given additional concentrate feeding. All of them survived and gave birth to twin except one which had still born twin lambs. Ten pregnant ewes died before lambing and there was no death of ewes bearing twins and no death due to pregnancy toxaemia was reported during the study period.

In conclusion it was found that on day 28 after breeding the pregnancy can be diagnosed by using rectal probe and for flock pregnancy diagnosis and estimation of fetal number the abdominal probe can be effectively utilized on day 60–75 after breeding. Estimation of fetal numbers greatly reduced the incidence of pregnancy toxaemia and improved the survivability of lambs

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