



# Accuracy of Flock Pregnancy Diagnosis in Local Iraqi Ewes by A-mode Ultrasound Device

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**Abstract:** The present study was conducted to evaluate the accuracy of flock pregnancy diagnosis on 137 day after ram introduction in local Iraqi ewes by A-mode ultrasound device. This field trial were conducted in Anbar province, Iraq during the period from April to November 2019. One hundred and thirteen (113) non pregnant local Iraqi ewes were used with an age ranged between 2-5 years. Mating was carried out with five fertile rams starting from the middle of April. The ewes were examined only once a day 137 after rams introduction by A-mode ultrasound device. Sensitivity, specificity, positive and negative predictive value and accuracy were 100, 98.5, 97.9, 100 and 99.1% respectively. The results study suggest that the A-mode ultrasound device (Renco Preg-tone) is accurate when detecting pregnancy status in sheep at day 137 after ram introduction or 62 - 120 days of gestation.

**Keywords:** Ultrasound, Pregnancy diagnosis, Ewes

Heavy economic losses in milk and lamb production can result from failure in early pregnancy detection due to longer kidding and lambing intervals (Lone et al 2016). Detection of pregnancy during early gestation is advantageous for flock breeding management (Jones et al 2015). Various methods have been used to diagnose pregnancy in sheep. These methods can be classified as less practical such as the management method (non-return to estrus), abdominal palpation and ballottement, palpation of the caudal uterine artery, laparotomy, peritoneoscopy and rosette inhibition test (Karadaev 2015). The most practical methods such as radiography, rectal abdominal palpation, hormonal assays, pregnancy protein assays and ultrasonography. Ultrasonography has been recommended as the best method of pregnancy diagnosis. This might be due to easy use, safety and have no effects on the animal health (Mohammed et al 2020). There are three types of ultrasound devices, A-mode, Doppler and Real time B-mode ultrasonic. All three types can be used to diagnose pregnancy in ewes and does under field conditions (Lone et al 2016). The aim of this study was to evaluate the accuracy of flock pregnancy diagnosis on day 137 after ram introduction in local Iraqi ewes by A-mode ultrasound device.

## MATERIAL AND METHODS

**Animals:** This field trial was conducted in Anbar province, Iraq during April to November 2019. One hundred and thirteen non-pregnant local Iraqi ewes were used with an age between 2-5 years. The animals were housed in semi closed barns and were fed during the period of the experiment with

2% alfalfa hay on body weight basis according on dry matter. The 300g of barley grain per ewe per day were given. The fresh drinking water and a cubic of mineral licks were available ad libitum.

**Flock mating:** Mating was carried out with five fertile rams starting from the middle of April. Rams were separated from the flock after two months.

**Ultrasound examination:** An A-mode ultrasound (Renco Preg-tone<sup>®</sup>, USA) was used for pregnancy diagnosis of ewes. The Preg-tone emits high frequency sound waves from the transducer (probe). The ultrasound waves travel into the body of the ewe and reflect (echo) back from tissue and fluid surfaces to the probe. The reflected sound waves are processed by the instrument to determine if there is amniotic fluid in the uterus. The presence of fluid in the uterus indicates pregnancy. If fluid is detected, a continuous tone is produced (Renco Corporation 2020). Food and water were prevented overnight for 12 hours before scanning early in the morning. Scanning was performed in the fleece less inguinal region of the ewe. Test site is the rear-most right teat up to 7.5cm toward the outside. The ewe was gently restrained by one person in standing position. An ultrasound coupling gel was applied each time to the probe to develop good contact and to remove air between probe and animal skin. The ewes were examined only once a day 137 after rams introduction. Lambing was considered as confirmatory for pregnancy diagnosis.

The sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy were calculated. The Sensitivity (Se) was calculated as  $Se =$

$a/(a+d) \times 100$ . Specificity (Sp) was estimated as;  $Sp = c/(c + b) \times 100$ . The positive predictive value (+PV) would be the probability of the presence of pregnancy in animal diagnosed pregnant i.e.  $a/(a+b) \times 100$ . The negative predictive value (-PV) would then be the probability of absence of pregnancy in animal diagnosed non-pregnant i.e.  $c/(c + d)$ . Over all accuracy would then be the number of correct diagnoses made and it is calculated as  $[a+c/n] \times 100$  (Hanzen et al 2000, Raja-Khalif et al 2014).

## RESULTS AND DISCUSSION

The proportion of pregnant and non-pregnant ewes were 40.7 and 59.3% respectively. The lambing dates and service records revealed that 39.1, 28.3 and 32.6 percent of lambing ewes conceived between 16-30, 32-45 and 50-73 days after rams introduction. According the lambing date and date of ram introduction, pregnancy diagnosis performed at 62 – 120 days of gestation.

Accuracy of flock pregnancy diagnosis in local Iraqi ewes by A-mode ultrasound device at day 137 after ram introduction indicate value of sensitivity(Se.), specificity(Sp.), positive predictive value (+PV), negative predictive value(-PV) and accuracy(Ac.) were 100 , 98.5 , 97.9 , 100 and 99.1% respectively (Table 1). Ganaie et al (2009) had an overall sensitivity, specificity and accuracy of 78.4, 87.5 and 79.5% respectively. Ganaie et al (2010) also observed an accuracy of 56% in days 31-45 gestation, 94% from days 91-105 and 82% from days 136 up until lambing. Gledhill (2016) used the Renco Preg-Alert (A- mode ultrasound device) to pregnancy diagnosis in sheep at 121-135 days of gestation, the sensitivity, specificity and accuracy was 79.5, 100 and 82% respectively. Differences in accuracy percentages may be attributed to the changes in breed type, experience of the person testing or a difference in time spent scanning each ewe.

**Table 1.** Accuracy of flock pregnancy diagnosis in local Iraqi ewes by A-mode ultrasound device at day 137 after ram introduction

Pregnant diagnosed	+PV (%)	Non pregnant diagnosed	-PV (%)	Se. (%)	Sp. (%)	Ac. (%)
a	b	d	c			
	47	66		100	100	98.5
46	1	0	66			99.1

a: Correct positive, Pregnant ewes that were correctly diagnosed; b : Incorrect positive, Pregnant ewes that were incorrectly diagnosed; c : Correct negative, non-pregnant ewes that were correctly diagnosed; d : Incorrect negative, non-pregnant ewes that were incorrectly diagnosed; +PV : Positive predictive value,  $[a/(a+b)] \times 100$ ; -PV: Negative predictive value  $[c/(c+d)] \times 100$ ; Se: Sensitivity  $[a/(a+d)] \times 100$ ; Sp: Specificity  $[c/(c+b)] \times 100$ ; Ac: Accuracy,  $[a+c/n] \times 100$ ; n: total diagnosed ewes.

## CONCLUSION

The A-mode technique is of particular importance in isolated areas where transport or electricity may not be available and can be used under field conditions for pregnancy diagnosis in sheep.

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Received 09 October, 2020; Accepted 30 November, 2020