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Prediction of Gestational Age in Osmanabadi Goats by Ultrasonic Measurement of Crown-Rump Length

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Abstract

The objective of this study was to predict gestational age of Osmanabadi goats by real-time ultrasonography using measurements of Crown Rump Length (CRL). CRL was measured in 15 Osmanabadi goats, by transabdominal ultrasonography carried out on days 35, 42, 49, 56, 63 and 70 of gestation, those became pregnant after oestrus detection and natural mating following oestrus synchronization in 30 does using double $PGF_2\alpha$ injections 11 days apart. Gestational age was calculated by using gestational equations derived from the linear regression analysis. Results clearly demonstrated that biometric parameter CRL was significantly ($P< 0.01$) correlated with gestational age ($r= 0.988$) and was a reliable index to predict gestational age in Osmanabadi goats.

Key Words : Crown-Rump Length (CRL), Ultrasonography and Osmanabadi goats

Introduction

Small ruminant sector plays an important role in the national economy of India. This enterprise is associated with social and cultural fabric of millions of poor farmers. Small ruminant especially goats received more importance mainly on account of their short generation period, higher rates of prolificacy and the ease with which they can be marketed. Osmanabadi goat is one of the indigenous breeds found in Maharashtra and is well known for its reproductive capacity and milk yield. The development of a method to accurately estimate the stage of pregnancy when precise mating dates are not available would assist in maximizing survival rates of offspring (Greenwood *et al.*, 2002). Real-time ultrasound evaluation of small ruminants offers an unparallel range of information regarding pregnancy status, number of fetuses and gestational age (Haibel, 1990). For over 20 years ultrasound has provided a unique modality for evaluation of pregnancy and establishing gestational age. Transabdominal real-time ultrasound has produced exquisite details of the fetus and is a method of documenting fetal motion and viability. Crown-rump length (CRL) is the measurement of the length of embryo and foetus from the top of the head (crown) to the bottom of the buttocks (rump) that is commonly used to estimate fetal age. Gestational age has been estimated during the 2nd and 3rd trimester by ultrasonic fetometry in many species of domestic and non-domestic mammals (Khan, 1992). The objective of the present study was to determine the relationship of the gestational age with the measurements of the CRL using ultrasound

techniques and to establish this new technique in veterinary field in the country.

Materials and Methods

Animals :

Thirty Osmanabadi does between 7 to 36 months of age housed and managed at the Sheep and Goat breeding farm, Nagpur Veterinary College, MAFSU, Nagpur were subjected to double dose of PGF_2 alpha (Cloprostenol sodium @ 1 ml s/c) on day 0 and 11 of oestrous cycle. Twenty does responded to the oestrus synchronization protocol and oestrus was carefully observed. Each doe was naturally mated twice in the first and second day of oestrus, thus the first day of oestrus was designated as day 0 of gestation. Out of these 20 does, 15 pregnant does having similar weight and mated on the same day were involved in the study.

Transabdominal Ultrasonography :

Animals were fasted for 12 h prior to the scanning to avoid accumulation of gases in the gastro intenstinal tract which precludes displaying images of high quality. Sufficient drinking water was provided before ultrasonographic examination. A copious amount of gel was applied to the clipped area (150 to 200 cm^2) on the right flank, 5 cm in front of rear leg and 2.5 cm above the teat. CRL was measured by using 3.5 MHz transabdominal convex transducer (ALOKA SSD 500).

Crown-Rump Length (CRL):

The scanning was carried out on day 35, 42, 49, 56, 63 and 70 of gestation. The measurements were taken from the crown (most upper part of the skull) to the buttocks (end of the sacrum) when the foetus was fully extended (Abdelghafar *et al.,* 2007).

Statistical Analysis:

The data was subjected to linear regression analysis and correlation. The relationship between estimated gestational age and of the ultrasonic parameter (CRL) were plotted as linear regressions and expressed as straight line equation using SPSS version 15 (Abdelghafar *et al.,* 2011), while the gestational age (in weeks) being the dependent variable (y) and the fetal parameter CRL measurement (in mm) was considered the independent variable (x). The results were considered significant, if $p<0.01$.

Results and Discussion

The mean measured crown rump length (CRL) in Osmanabadi goats at day 35, 42, 49, 56, 63 and 70 of gestation were found to be 27.82 ± 0.86, 45.49 ±1.53, 66.27 ±1.19, 83.09 ±1.05, 99.61 ±1.07 and 117.85 ± 1.55 mm respectively. Gestational equation established for CRL through linear regression analysis is as follows (Fig. 1).

CRL(y) = 0.379x + 24.84; where, x= Gestational age in days

The gestational age was calculated using the derived linear regression equation using CRL. The mean calculated gestational age at day 35, 42, 49, 56, 63 and 70 of gestation were found to be 35.38 ±0.32, 42.08 ±0.58, 49.95 ±0.45, 56.33 ±0.39, 62.59 ±0.40 and 69.50 ±0.58 respectively. Results of the present study clearly demonstrated that CRL is a reliable parameter to predict gestational age in Osmanabadi goats which has been reported by several authors previously (Amer, 2010; Metodiev *et al.,* 2012). In the present study the CRL had highly significant ($p<0.1$) positive correlation with gestational age (r=0.988). High correlation (0.94) was reported between days 25-70 in the Egyptian Balady goats (Karen *et al.,* 2009) and between days 19-40 in Anglo-Nubian goats (Martinez *et al.,* 1998). The difference in the correlation of present study and other authors could be due to long intervals between consecutive scanning, i.e. 7 days in the present study versus 3 days in the previous studies and also might be due to breed differences. CRL was measured from day 25 onwards in a Mouflon and a high correlation was found between the gestational age and

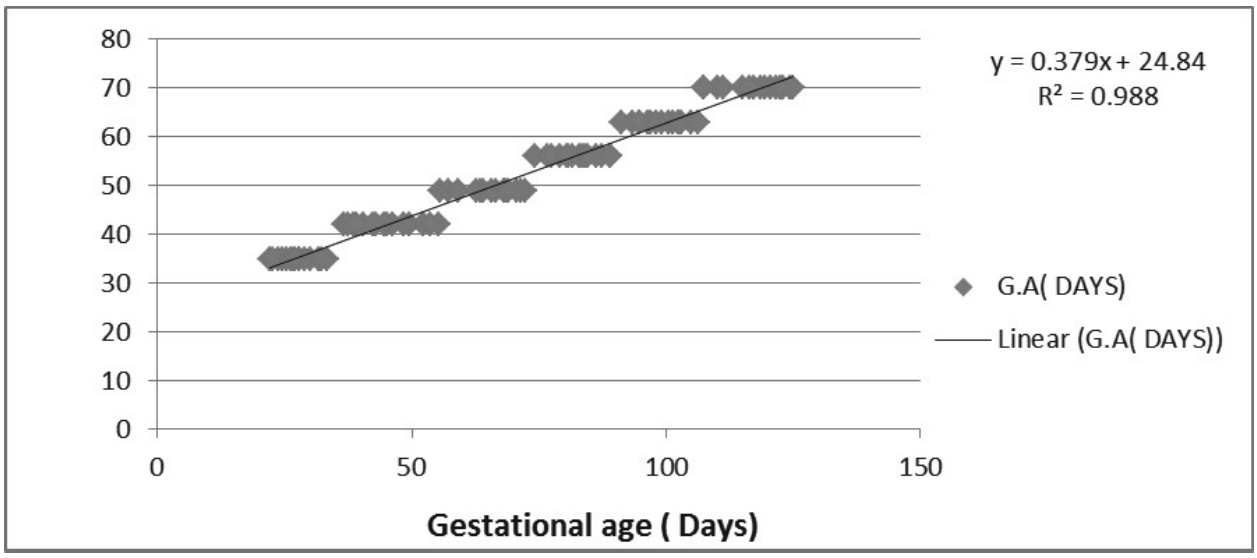

Fig. 1: The relationship between CRL (mm) and Gestational Age (Days)

crown rump length (Santiago-Morenio *et al.,* 2005). Correlation between CRL of foetus and gestational age measured by ultrasonography was high after day 30 to 40 post-breeding (Singh *et al*., 2004), which is in close agreement with our study. The calculated gestational age was in close proximity with the actual gestational age of the does which clearly indicate that CRL length can be effectively used to predict the expected date of delivery (EDD) in does. The gestational length in the present study was found to be 145±10 days and all animals were maintained in good condition. Repeated exposure of fetuses to ultrasonic waves did not cause any abnormalities in the offspring and all fetuses were born apparently healthy. The safety of ultrasound has also been reported in sheep (Padilla-Rivas *et al.,* 2005).

Real time ultrasonography was found to be a convenient, safe and reliable means of pregnancy detection. It is the only method for determining fetal numbers, sex and prediction of gestational age. Sonographic fetometry in Osmanabadi goats during the 1st and 2nd trimester is efficient for evaluation of fetal development and prediction of calving date. In conclusion, fetometry by real-time ultrasonography was proved to be an efficient and reliable method for predicting gestational age in Osmanabadi goats utilizing CRL.

Conflict of Interest: All authors declare no conflict of interest.

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SVSBT-ISSAR(GUJ)-ASCAD National Seminar-2016

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INVITATION

With great pleasure, we announce that the Society for Veterinary Sciences and Biotechnology (SVSBT) is going to organize its IV ***Annual Convention and National Seminar on "Biotechnological Approaches in Management of Health and Reproductive Disorders in Livestock for Sustainable Production"*** during ***16-17 December 2016 at College of Veterinary Science & AH, Anand Agricultural University, Anand-388 001, Gujarat*** in collaboration with the Indian Society for Study of Animal Reproduction (ISSAR), Gujarat Chapter and the Department of Animal Husbandry, Govt. of Gujarat, Gandhinagar under the aegis of Assistance to State for Control of Animal Diseases (ASCAD). The abstracts of research papers and lead papers in the theme areas are invited by 30th November 2016 by the Organizing Committee through e-mail to svsbtascadseminar2016@gmail.**com**; or ajdhami@aau.in for inclusion in the Souvenir/Compendium to be released on the occasion. The themes of the seminar are:

- Augmenting bovine reproduction through ARTs Or biotechnological tools
- Management of peripartum disorders (including obstetrical complications)
- Advanced diagnostic tools for general & reproductive health
- Challenges in breeding services inputs with reference to field fertility
- Andrology and frozen semen technology
- Infertility in domestic & wild animals.

The Awards for Best paper published in the Indian Journal of Veterinary Sciences & Biotechnology, 2015-16, Volume 11(1-4) by the life member of SVSBT, as well as the Best Paper Presentation, Overall and by the Young Scientist below 35 yrs of age, in each technical session including poster sessions will be honoured to the deserving scientist. For Further details of Registration, Stay, Advertisement Please Contact

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