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Technical note

Evaluation of gross anatomical features of cervix of tropical sheep using cervical silicone moulds

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Abstract

The lambing rate obtained following cervical artificial insemination (AI) with frozen semen in sheep is low mainly due to the inability of frozen-thawed sperm to traverse the tortuous nature of the cervical canal. Although acceptable fertility has been attained by circumventing the cervical barrier through laparoscope aided intrauterine AI, the emphasis is currently given on the development of alternate non-invasive transcervical AI procedures. The complex anatomy of the cervix does not facilitate easy transcervical passage for an insemination catheter. The aim of the present study was: (i) to examine the gross anatomy of the cervix in slaughtered ewe lambs and adult ewes of the native Malpura and Kheri breeds raised under semi-arid tropical environment; and (ii) to cast silicone moulds of the reproductive tracts for measuring the dimensions of the cervix. Eighty reproductive tracts were excised immediately from carcass of Malpura and Kheri ewes and the external os of each one was classified depending on their appearance as duckbill, spiral, rosette or flap. The cervical canal of each tract was filled with a silicone sealant for casting the mould. Fifty complete silicone moulds were obtained representing 25 from ewe lambs and 25 from adult ewes. The mean lengths of the cervical mould of ewe lambs and adult ewes were 3.8 ± 0.12 and 5.3 ± 0.15 cm, respectively. The average number of funnel shaped folds in the cervical mould of ewe lambs and adult ewes were 3.2 ± 0.19 and 3.4 ± 0.22. However, the second and third-folds from the os were observed to be accentric in both ewe lambs and adult ewes. The information generated in this study would be useful for increasing the success rate of penetration in ewes exhibiting estrus in order to improve the lambing rate of tropical ewes following transcervical AI.

Keywords: Sheep; Cervix; Anatomy; Dimensions; Silicone moulds

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1. Introduction

Inspite of success on freezing of ram spermatozoa (Salamon and Maxwell, 1995a, 2000), the lambing rate obtained after cervical artificial insemination (AI) using frozen-thawed ram semen has been disappointing (Windsor et al., 1994; Salamon and Maxwell, 1995b; Maxwell and Watson, 1996). The major factors limiting the fertility after cervical AI are the inability of the frozen-thawed spermatozoa to transit the cervical barrier and the complex anatomy of the ewe cervix (Eppleston and Maxwell, 1993). The lambing rate following circumventing the cervical barrier through laparoscope aided intrauterine AI with frozen semen has resulted in acceptable lambing rates (Salamon and Maxwell, 2000). The cost, skill and invasive nature of the technique limit its widespread use (Naqvi et al., 1997). Transcervical AI of sheep offers an alternatively, low cost, viable and non-invasive approach to by-pass the cervix for deep deposition of frozen-thawed semen in the cervix or uterus (Naqvi et al., 1998a, 2001) that can overcome the problem of low lambing rate following cervical AI. The complex anatomical features of the sheep cervix do not facilitate easy penetration of the insemination catheter (Halbert et al., 1990a). It is important to understand the anatomy of cervix and cervical canal of sheep in order to improve the technique of transcervical AI (Bunch and Ellsworth, 1981; More, 1984; Halbert et al., 1990b). Halbert et al. (1990a) studied the anatomy of cervix of crossbreds raised in temperate environment of Canada and reported that the length of cervical canal was 6–7 cm and that cervix had four–five asymmetrical accentric funnel shaped folds. There exists a large difference in the morphology and anatomical features among different breeds of sheep (Halbert et al., 1990a). However, there are no reports on the anatomical features of sheep breeds raised in the semi-arid tropical environment. The Malpura breed, weighing 28–30 kg, is a native to semi-arid region and is known for coarse wool and mutton production (Acharya, 1982). The body weight of adult Kheri ewes also raised under the same climate is 28–29 kg and is characterized by semi-coarse wool (Naqvi et al., 1998b). The aim of the present study was to examine the anatomical features of the cervix and to measure the length of cervical canal using silicone moulds prepared from reproductive tracts of Malpura and Kheri ewes.

2. Material and methods

2.1. Location of study

The study was conducted at the Institute's sheep farm at Avikanagar located at longitude of 75°28′E, latitude of 26°26′N and an altitude of 320 m above mean sea level in a semi-arid tropical tract of country. The climate of this region is essentially tropical. The rainfall is erratic and mainly concentrated during July–August. The precipitation ranges from 400 to 700 mm per annum. The mean monthly maximum and minimum temperatures range from 23.5 to 41.2 °C and 9.2 to 31.5 °C, respectively. The maximum temperature during summer may reach 49 °C.