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Original article

Anatomy of the cervix in farahani breed ewes and lambs

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ABSTRACT

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The sheep cervix has numerous and divers rings that reduce lambing rates after artificial insemination in sheep. There is high diversity between sheep breeds in cervix structure. In this study we considered the anatomy and the biometrical properties of the sheep cervix in Farahani breed. For this purpose two series of reproductive tracts include to 24 lambs and 26 adult ewes were collected from Arak abattoir and were moved to the lab. A morphometric measurement of cervix (length, weight and diameter) for adult ewes was 54.8, 7.2 gr and 9.76(mm) and for lambs was 37.4, 3.31 gr and 7.72 (mm). There are significant different between adult ewes and lambs in these traits. In the lambs length, weight and diameter of cervix was affected by the morphology of the cervical external os whereas in adult ewes, length and diameter of cervix was not affected by the morphology of the cervical external os.

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1. Introduction

Artificial insemination (AI) has the potential for a significant impact on the sheep breeding industry. 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) 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). The cervix is the most caudal portion of the uterus and its constricted lumen is surrounded by a thick musculo-connective tissue wall (Mor , 1984). Kaabi et al. (2006) noticed that younger ewes have more cervical rings than older ewes, suggesting the morphology of the cervix depends on the age of the ewe. The ovine cervix is a long, fibrous tubular organ composed predominantly of connective tissue with an outer serosal layer and inner luminal epithelium. (Dun R. 1995, Fukui Y, Roberts E. 1978).

The mean length of the cervical canal has been described as, 6.5, 5.5 and 6.7 cm (Fukui Y, Roberts E. 1978, More, 1984; Halbert et al., 1990b) respectively and the length ranges from 5.7 to 10 cm (Abusineina ME. 1969) illustrating the high variability between individuals. In the ewe, the cervical lumen has a convoluted and tortuous structure that looks like a corkscrew consisting of internal cervical rings (Halbert et al., 1990; Naqvi et al., 2005; Kaabi et al., 2006)

The aim of the present study was to examine the anatomical features of the cervix and to measure the length of cervical canal from reproductive tracts of Farahani ewes and lambs.

2. Materials and methods

2.1. Animals

Two series of sheep cervices from Farahani breed (Iranian Fat-tailed sheep) were examined. The first was a series of 26 cervices from adult ewes obtained from an abattoir in Arak. The second was a series of 24 cervices obtained from lambs.

2.2. Measurements

Following collection the tracts were transported on ice to the laboratory where they were examined within 2–7 h of slaughter. The tracts were prepared by excising the majority of ligamentous tissue (Fig. 1) and then separated cranially at the body of the uterus and caudally at the vestibule. Five types of external os were identified (Fig. 2) 1. The Duckbill: two opposing folds of cervical tissue protruding into the vagina with a central horizontal slit like external os. 2. The flap 3. The Rose: a cluster of cervical folds protruding into the anterior vagina obscuring the external os. 4. The spiral. 5. The tree folded, unshaped and one-fold of cervical tissue

2.3. Statistical analysis

Descriptive statistics on cervix length were derived from pooled data. For analytical statistics, the data from the two series of observations were analysed by SAS (9.1 version)

A regression analysis was used to examine the relationship between cervical length and the number of cervical rings.

3. Results

3.1. Anatomical findings

In the investigation of cervical external os in lambs showed that there are four shapes include Spiral, unshaped, three folded and flap. Six types of external os were identified In ewe: Spiral, Duckbill, Rose, unshaped, one folded, flap. Cervical biometric traits (size, weight and length) between lambs and adults had significant differences ($P > 0.05$), the ewes had high score in all traits compared with lambs (Table 1). Table 2 and 3 show the effect of shape cervical external os on biometric traits (size, weight and length) in ewes and lambs. In the lambs were observed the except number of fold, the character of the cervical external os had significant effect on diameter, weight and length. In the mean time lambs, three folded and flap form had more effect on biometric traits (size, weight and length) from another shapes.

In adult sheep's , the impact of the cervical external os, except in cervical weight on other traits (diameter, length and fold) were not significant. The frequency of the cervical external os in lambs were 56.25% (unshaped), 18.75% (flap), 12.5% (spiral) and 12.5% (three folded).

The abundance in adults was 36.8% (unfold), 15.78% (spiral), 15.78% (fold) and Duckbill, roses and flap forms each other's has 10.5%.

Table 1

Effect of age on Cervical biometric traits (size, weight and length) between lambs and ewes.

Cervical biometric trait	lambs	ewes
Size(ml)	7/72 ±/5a	9/76±/3b
Weight (gram)	3/31±/52a	7/2±/64b
Length(ml)	37/4±2/1a	54/8±3/32b

Table 2

Effect of cervical external os type on Cervical biometric traits (size, weight, folded and length) in ewes.

	Length(ml)	Weight (gram)	Size(ml)	Number of Folded
Spiral	6/54±1/08 ab	50/2±3/7a	9/13±/4a	5a
Duckbill	10/65±3/04 ab	70/9±8/1a	9/9±2/1a	5/5±/5a
Rose	10/35±/4 ab	63/1±17/9a	11/6±1/6a	4/5±/5a
Unshaped	5/3± 1/1 a	50/8±8/3a	9/7±/6a	5/3±/7a
One folded	11/76±/49b	72/3±2/03a	11/6±/3a	4/3±/8a
Flap	7/29±/5 ab	58/3±2/1a	9/4±1/2a	4/5±/5a

Table 3

Effect of cervical external os type on Cervical biometric traits (size, weight, folded and length) in lambs.

	Length(ml)	Weight (gram)	Size(ml)	Number of Folded
Spiral	2/57±/72a	29/3±9/1a	7/2±1a	6±1a
Unshaped	2/81±/16a	37/4±2/07a	7/8±/7a	7/2±1a
Tree folded	11/45±/99b	63±/7b	13±1b	5/5±/5a
Flap	2/51±/3a	30/6±1/6a	8/4±/9ab	5/6±/33a

4. Discussion

To our knowledge this study is the first report on anatomical structure of cervix of Farahani breed sheep. The anatomy of the sheep cervix is highly variable between animals and may explain the differing success of AI between individuals. Major barrier to the passage of the catheter of artificial insemination within the cervix lumen is folded of them. Arrangement of cervix folded vary in different breeds. The Result showed that the cervical external os have 4 shapes:



Fig. 1. The shape of cervix after cutting ligament in (A) Ewe, (B) lamb.

Spiral, Duckbill, Rosette, and flap. Abbasi et al (2011) showed that in lorri breed lambs Duckbill, Rose wasn't but two type of unshaped and tree folded observed. In adult sheep in addition to previous forms, unfold and one

fold was observed. The difference between breeds could Causes of variation. There are differences between the cervical external os forms in the various studies In this study unshaped, flap and spiral type had the highest prevalence In study of Naqvi et al (2005) spiral (40%), flap (26%) and Duckbill (30%) types had the hig highest prevalence. The most predominant shape of cervical os in Farahani ewes and lamb was unshaped that was different from other



Fig. 2. The classification of the appearance of the external os. (a)Spiral, (b) Rose, (c) Tree folded, (d) Unshaped, and (e) duckbill.

Sheep breeds, where the most predominant shapes were flap and rose (Halbert et al., 1990), flap (Souza, 1993; Kershaw et al., 2005) or spiral (Naqvi et al., 2005).

Breed differences can be the main reasons for this variation. In this study there was significant difference among Length, diameter and weight between lambs and adult sheep's the result is consistent with Abbasi et al (2011). finding.

Also the average cervical biometric traits (Length, diameter and weight) observed in the present study was shorter than that reported for Lori breed sheep (Abbasi et al 2011). Kershaw et al (2005) stated that in the large sheep breeds during pregnancy, the length of cervical increases. Naqvi et al (2005), reported the mean cervical length in lambs and adult sheep, were 38 and 53 mm, respectively. Halbert et al (1990) showed that the cervical length of 67 mm in adult sheep. We found that the cervical external os had no significant effect on the number of folded that was matched with Abbasi et al (2011) result. In this study the average number of folded in adults and lambs was 4.85 and 5.7 respectively. The Abbasi et al (2011) reported the number folded of adults in lambs were 5.73 and 5 respectively. Halbert et al (1990) were found average of folded 4.9 in their study. The maximum and minimum weight of adult sheep cervical were on one folded and unshaped respectively. In lambs the maximum weights of cervical were on tree folded. The differences observed in the length of cervix among age groups were also observed between ewe lambs and adult ewes by Navqi et al. (2005) and Kaabi et al. (2006). In other sheep breeds, less cervical rings were observed with means varying from 3.4 to 4.9 rings (Halbert et al., 1990; Souza, 1993; Kershaw et al., 2005; Naqvi et al., 2005) but with a maximum of 7 rings. Cervical ring diameter was lower than that reported by Souza (1993) for Corriedale and Ideal sheep.

5. Conclusion

In conclusion this study and other similar investigation could be a guide for future study to choose suitable gun for successful artificial insemination in Farahani breeds.

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