Iraqi Journal of Veterinary Sciences

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Radiographic and ultrasonic study of pelvic bones in awassi ewes and local she goat and relationship with age of sexual maturity

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Article information

Article history:
Received August 16, 2021
Accepted October 29, 2021
Available online June 2, 2022

Keywords:
Pelvic bone
Radiography
Ultrasound
Ewe lambs
Female goat lambs

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Abstract

The goal of this study is to find out the age of sexual maturity in Awassi sheep and native black she goats by examining pelvic bone development which is obtained from measuring the transverse and vertical diameters of the pelvic bone in the two species using portable X-ray machines American origin.in addition, the length and width of the ovaries were measured with an ultrasound rectal probe. To achieve the goal of this study, six Awassi sheep and the same number of local goats were used. Radiographs were taken of each animal in the ventro-dorsal position, then the mean and standard error of each measurement in the two species were extracted. The rectal probe of the ultrasound machine was also used by inserting it into the rectum, taking vertical and transverse ovarian measurements, and then extracting the mean of each measurement along with the standard error. The mean transverse and vertical diameter measurements at the first instances of sexual maturity in Awassi sheep were 7.70±0.09 cm and 10.61±0.03 cm, respectively, and the mean ovarian length and width were 1.20±0 .08, 0.80±0.06 cm respectively. While the average distance to the transverse pelvic inlet and the pelvic inlet vertically in local black goats at age of sexual maturity were 7.15±0.06 cm and 10.55±0.10 cm, respectively, and the average length and width of the ovary was 1.66±0.03, 1.24±0.02 cm respectively. The results in both species showed that the age of sexual maturity is earlier in Awassi sheep than in local black goats.

DOI: 10.33899/ijvs.2021.131175.1925,

Introduction

V2.2 Veterinary Ultrasound CD66V Digital radiography, this proposal in the field of veterinary anatomy and embryology may be a step on the way to developing other disciplinary areas in the veterinary profession (1). A pelvic scale was used to evaluate the size of the pelvic canal and compare it with the size of the fetus, and there are several types of measurement methods, the most important of which is radiography, which is the most common method (2-4). When using radiography to measure the size and diameter of the pelvic bone in a number of sheep breeds in South Africa, and through the study, the cross-sectional diameter and the associated diameter of the entrance to the pelvis were calculated. Radiometric measurements of the pelvic bone in ewes were taken and compared with measuring the size of the pelvis after slaughtering. The results of the measurements for both methods were accurate (r>0.87), regardless of the breed. Thus, it is possible to rely on measuring the dimensions of the pelvis in ewes through radiography (5) study of a technique for radiographic pelvimetry in the ewe, where the radiography was done in the ventral-dorsal position and the lateral position, and the distance between the animal and the x-ray device was target- film distance 1.83 meters in order to reduce inflation in the diameters of the tub to less

than 8 times in most cases Kodak high-speed tapes were used. Wool was cut from the ewes used for measurement. They were also prevented from eating for 18 hours before radiography to decrease the risk of regurgitation during anesthesia, and the use of the anesthetic sodium Pentobarbitone by slow injection into the jugular vein, and ventral-dorsal and lateral snapshots were taken for each animal. The iliac bone, the space between the Lateral Ischial Tuberosities (LIT), and the measurement of the posterior promontories of the ischium (PPI). The results for a number of ewes were as follows, the mean transverse diameter was 89.6 millimeters, the average vertical diameter was 101.2 millimeters, and the average vertical diameter was 101.2 millimeters. The LIT was 138.7 millimeters and the average PPI was 66.0 millimeters (6). The trans rectal ultrasound is considered to be a crucial tests-criteria for observing the growing of different ovarian follicles besides the growth of fetus at initial stages of gestation (7,8). With the transrectum probe of an ultrasound machine for adult ewes and female goats, so that the ovaries take an ellipsoidal in shape, with major and minor axes of 15 and 10 mm, respectively, be contingent on the period. Ovarian structures determination be determined by the skill and familiarity of technical person. The comparative accurateness between two approaches may be vary by more than 20% (9). The examining embraced 28 heads of female goats by using ultrasound imaging, that the accurateness of ultrasound investigation in the fields of teaching anatomy at the international level, we have adhered modern methods that is used internationally for this purpose, such as X-ray to point the sexual maturity as well as ovulation in the goats is 100%. This aims to determine the necessity as well as the accurateness of ultrasound inspection for goats to guesstimate the ovulation and the sexual maturity (10).

Materials and methods

In this study used 6 Awassi ewes and 6 female goat lambs with information of date of birth which was recorded in special records, and followed up the animals until they reached the age of 12 weeks, where began to measure them by radiography. The x-rays were performed in the ventral-dorsal position, and the distance between the animal and the X-ray machine was a target-film distance of 1.83 meters to reduce inflation in the pelvic diameters to less than 8 times in most cases (6). High speed kodak tapes were used, we performed x-rays using the American original portable x-ray machine. We converted the measurement unit that appears on the computer of the portable x-ray device from the unit of measure mm to the unit of measure cm.

The pelvic bone measurements

This is achieved by measuring the transverse pelvis inlet (TPI) from the mid of the pelvic bone. Measure of the vertical pelvis inlet (VPI) between the base of the sacrum and pubic tubercle. X-rays were performed every 15 days until the first signs of maturity appeared.

The usage of ultrasound instrument

The purpose of this method was to: scan ovaries; inspected by use of rectal probe; reviewed weekly; and detect the changes on the surface of ovaries to decide the approximate age of sexual maturity. Ultrasound method was performed through rectal route while the animal in the stand-up position and the probe was rubbed with liquid vaseline to simplify the penetration into rectum, after that, the probe was rotated about 45-90 degree with an anticlockwise and in reverse direction till it directly contact with mucous membrane of rectum to point the locality of right and left ovaries (11). Veterinary ultrasound instrument CD66V (Figure 1) which was fitted out with a full electrometric caliper, where the measurements of the most structures like ovaries and other organs could be measured. The sensor was covered by a rubber tube as shown in figure 2 to have a better control of the inside of the rectum (12). Animals put into a dimmed-light place devoid from direct sunshine in order to enhance the images (13).

Figure 1: Veterinary Ultrasound CD66V ultrasound V2.2.

Figure 2: before and after applying the rubber tube to the probe.

Results

Radiographic of TPI and VPI measurements in ewe lamb from age 12 week to the sexual maturity

The mean of measurements to the sexual maturity, recorded the lowest average measurement of the TPI and VPI measurements in the first measure was 5.28±0.04, 8.36±0.04 cm, respectively, and the ultimate measurement is reached at the age of sexual maturity 7.70±0.09, 10.61±0.03, accordingly (Table 1, Figure 3 and 4).

Table 1: Measure the TPI and VPI measurement in ewe lamb from 12 weak to the sexual maturity (mean±SE)

Measurements	Variables	
	TPI	VPI
First Measurement	5.28±0.04	8.36±0.04
Second Measurement	5.28±0.03	8.67±0.04
Third Measurement	5.89±0.03	8.90±0.04
Fourth Measurement	6.36±0.04	9.16±0.05
Fifth Measurement	6.75±0.06	9.41±0.04
Sixth Measurement	7.15±0.09	9.73±0.03
Age of sexual maturity	7.70±0.09	10.61±0.03

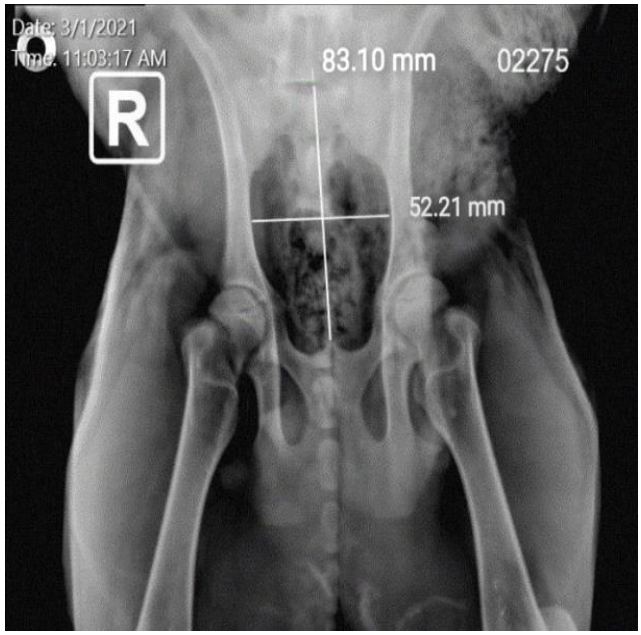

Figure 3: Radiographic photo that represented of TPI and VPI in ewe lambs, VPI= 83.10 mm, TPI=52.21 mm, N0. of animal 02275, R: right side of animal.

Radiology of TPI and VPI measurement in she goat lamb from age 12 weak to the sexual maturity

The mean of the measurements to the sexual maturity, recorded the lowest average of the TPI and VPI measurement in the first measure is 4.61±0.04, 7.55±0.03 cm, respectively, while the supreme is reached at the period of sexual maturity; 7.15±0.06, 10.55±0.10 respectively (Table 2, Fig. 5 and 6).

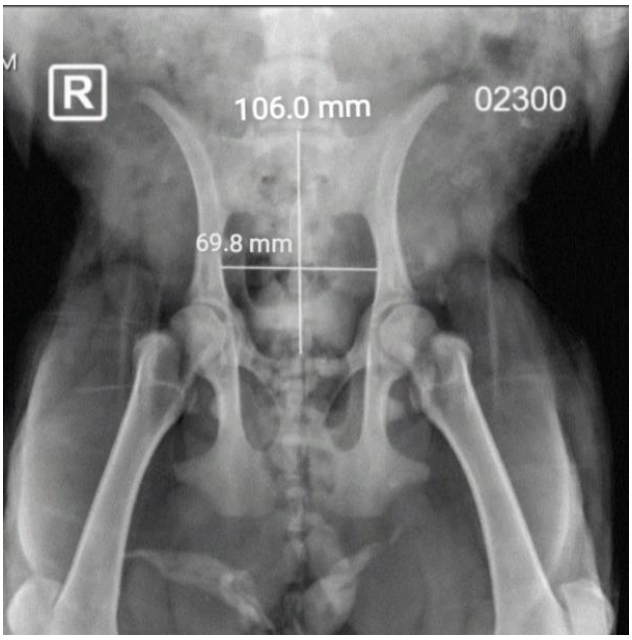

Figure 4: Radiographic photo that represented of TPI and VPI in ewe lambs in appear primary singes of sexual maturity, VPI= 106.0 mm, TPI=69.8 mm, N0. of animal: 02300, R: right side of animal.

Table 2: The TPI and VPI Measurements in she goat lamb from age 12 weak to the sexual maturity (Mean±SE)

Measurements	Variables	
	TPI	VPI
First Measurement	4.61±0.04	7.55±0.03
Second Measurement	4.90±0.03	7.95±0.05
Third Measurement	5.25±0.04	8.40±0.04
Fourth Measurement	5.55±0.03	8.67±0.09
Fifth Measurement	5.75±0.06	8.97±0.07
Sixth Measurement	5.93±0.02	9.36±0.03
Seventh Measurement	6.29±0.05	9.60±0.05
Eighth Measurement	6.67±0.04	10.17±0.07
Age of sexual maturity	7.15±0.06	10.55±0.10

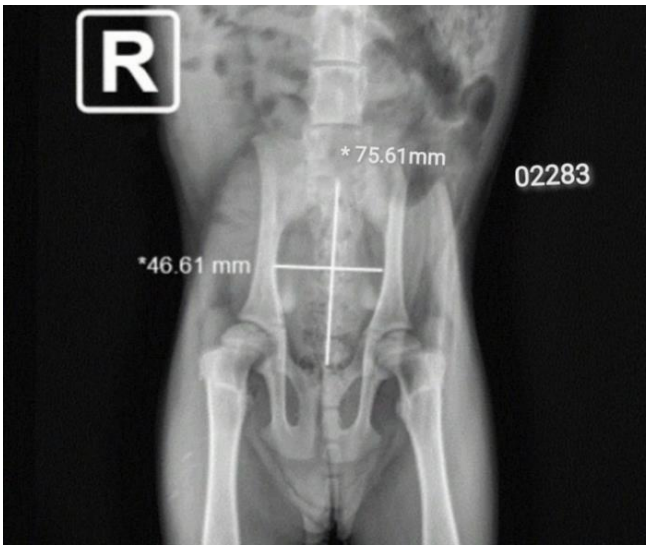

Figure 5: Radiographic photo that represented of TPI and VPI measurement in she goat lambs VPI= 75.61 mm, TPI=46.61mm. No. of animal 02283, R: right side of animal.

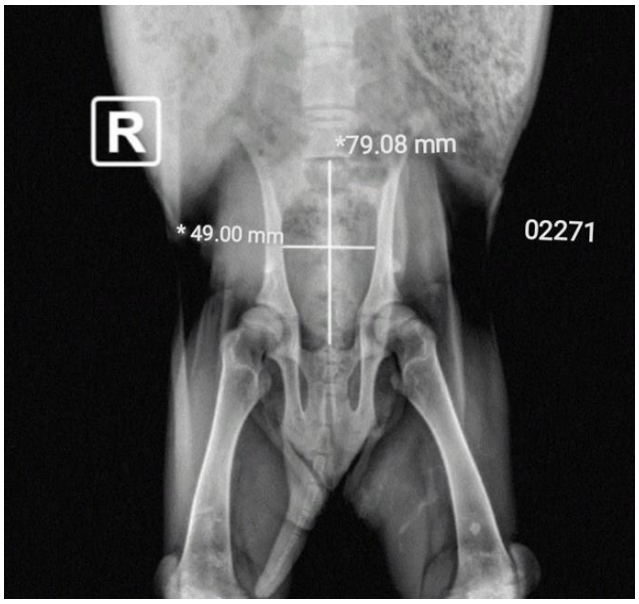

Figure 6: Radiographic photo that represented of TPI and VPI measurement in she goat lambs, VPI= 79.08 mm, TPI=49.00 mm, No. of animal 02271, R: right side of animal.

Discussion

In the last decade, researchers study the measurements of the pelvic bones using x-rays in different strains of adult female sheep of less than 4 years of age, including the Marino, Dormer and African Marino, and the results for the VPI of the Marino sheep breed were 11.76 cm, and the TPI was 8.88. Cm, while the VPI of the Dormer sheep breed was 11.66 cm, the TPI is 10.60 cm, and the VPI of the African Marino sheep breed was 12.51 cm, and the TPI was 10.71. Also, Haughey *et al.* (14) described the average of TPI and VPI of ewes from the adult Dorset breed was 9.3 and 10.0 cm, respectively, while the average of TPI and VPI of ewes from the adult Marino breeds were 8.4 and 11.3 cm, respectively. The results in this study differed with the researchers mentioned above in the average transverse pelvic inlet TPI and the vertical pelvis inlet VPI was some similar to the results of the current study. The reasons for the difference are due to the difference in the breeds of ewes and domestic goats with the other mentioned breeds, as well as the difference in age. The method of taking radiography of the pelvic bone in sheep is similar to Haughey *et al.* (14), where the animal was placed in a dorsal ventral position inside a special room used for radiography, and the measurement was taken using an electronic scale connected to a special computer used to take bone measurements. That transrectal ultrasound technology is one of the most important examinations that aim to monitor the growth of ovarian follicles and measure their diameter (15,16). What happens in the ovary every week until the appearance of the follicles, whose first appearance is considered to be the first estrous cycle of weaning, where we recorded the age of sexual maturity for weaning sheep and goats, so the results of this research match those of the researchers. The researcher Islam *et al.* (17) indicated that the length of the ovary in goats is approximately 1.1 cm and its width is 0.7 cm, and this differs from what the results in this study showed, where the length of the ovary in weaning sheep was approximately 0.04±1.53 cm for the first estrous cycle, and its width was 1.18±0.07 cm (18).

Conclusion

The true distance to the vertical and transverse pelvic entrance increases by radiography as the animal approaches the age of sexual maturity. Upon reaching the age of first sexual maturity, the length and width of the ovaries increase in ewes and goats.

Acknowledgment

The authors would like to express thanks to college of veterinary medicine, university of Mosul to support current study.

Conflict of interest

The authors declare that conflict of interest exists.

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دراسة شعاعية وفوق الصوتية لعظام الحوض في النعاج العواسية واناث الماعز الاسود المحلي وعلاقتها مع عمر البلوغ الجنسي

احمد انمار الحنوش و عدنان علي حسو

فرع التشريح، كلية الطب البيطري، جامعة الموصل، الموصل، العراق

الخلاصة

هدف الدراسة معرفة عمر البلوغ الجنسي في النعاج العواسية واناث الماعز الاسود المحلي من خلال دراسة تطور عظم الحوض حيث تم قياس القطر المستعرض والعمودي لعظم الحوض في كلا الحيوانين باستخدام جهاز الأشعة السينية المحمولة أمريكي المنشأ كذلك تم استخدام ومسبار المستقيم للموجات فوق الصوتية في قياس طول وعرض المبايض. استخدم لهذا الغرض عدد ٦ حيوانات من فطائم النعاج العواسية ونفس العدد من فطائم الماعز المحلي. اخذت لقطات الاشعة لكل حيوان بوضع بطني ظهري بعد ذلك تم استخراج معدل القياسات وكذلك الخطاء القياسي لكل قياس في كلا الحيوانين، كذلك استخدم مسبار المستقيم لجهاز الموجات فوق الصوتية عن طريق ادخاله في المستقيم واخذ قياسات المبيض العمودية والمستعرضة ومن ثم استخراج معدل كل قياس وكذلك الخطاء القياسي. كان متوسط قياس القطر المستعرض والعمودي مع اول حالات البلوغ الجنسي في فطائم النعاج العواسية ٧,٧٠±٠,٠٩ سم ، ١٠,٦١±٠,٠٣ سم على التوالي ومتوسط طول وعرض المبيض ١,٢٠±٠,٠٨ ، ٠,٨٠±٠,٠٦ سم على التوالي، بينما كان متوسط المسافة لمدخل الحوض المستعرض ومدخل الحوض العمودي في فطائم الماعز الاسود المحلي مع سن البلوغ الجنسي الاول ٧,١٥±٠,٠٦ سم، ١٠,٥٥±٠,١٠ سم على التوالي، ومتوسط طول وعرض المبيض ١,٦٦±٠,٠٣ ، ١,٢٤±٠,٠٢ سم على التوالي. اظهرت نتائجنا على كلا الحيوان ان عمر البلوغ الجنسي في النعاج العواسية كان متقدما على عمر البلوغ الجنسي في الماعز الاسود المحلي.