

## Ultrasonography of the Kidney and Urinary Bladder in Male Korean Native Goat

Myung-Cheol Kim D.V.M., Ph.D, Moo-Hyung Jun D.V.M., Ph.D.

College of Veterinary Medicine, Chungnam National University

### Abstract

The purpose of this study was to make fundamental ultrasonographic observations of kidney and urinary bladder in Korean native goat.

The position, dimensions, and structure of the kidneys and bladders in 7 male Korean native goats were determined by use of ultrasonography. A 3.5-MHz linear transducer was used. All examinations were performed on goats in lateral recumbency under sedation. The left kidney was 4.2 to 5.9 cm long, 2.5 to 3.6 cm wide, and 2.4 to 3.2 cm deep. Diameter of the parenchyma and renal sinus of the left kidney ranged between 0.7 and 1.3 cm and 0.7 and 1.4 cm, respectively. Circumferences of the medullary pyramids varied between 1.3 and 1.9 cm. Similar ultrasonic measurements were obtained for the right kidney. The diameter of the urinary bladder varied between 2.1 and 5.4 cm in the goats.

It was concluded that the ultrasonographic findings described in this study can be used as references for diagnosis of morphologic changes in the kidney and urinary bladder of Korean native goat.

### Introduction

In clinical medicine, the ultrasonographic imaging of the kidney is of major importance in the diagnosis of renal disease. Ultrasonography has been used to diagnose renal calculi, cysts, renal neoplasia, hydronephrosis, cystitis, bladder diverticula, and obstruction of the urinary tract.<sup>8,10)</sup> Ultrasonographically determined anatomic features of the kidney have been described in horses<sup>9)</sup>, cattle<sup>5)</sup>, dogs<sup>7,10)</sup>, cats<sup>13)</sup>, and sheep<sup>6)</sup>.

To our knowledge, the ultrasonographic anatomic features of the urinary tract of goat have not been described. The purpose of the study reported here was to make fundamental data of normal ultrasonography for kidney and urinary bladder in male Korean native goat.

### Materials and Methods

Seven, healthy, male, Korean native goats were studied. Goats were between 2 and 4 years old (mean, 2.6 years), and weighed between 18 and 23 kg (mean, 21.4 kg).

Ultrasonographic examinations were performed on sedated Korean native goats. A real-time scanner Medison Co., Korea with a 3.5-MHz linear transducer was used. Examinations were performed in lateral recumbency for kidney, and in dorsal recumbency for bladder. Contact gel was applied to the transducer and it was placed over the right paralumbar fossa for kidney or caudal ventral abdomen for bladder, from which the wool had been clipped. To visualize the right kidney, the transducer was placed behind the last rib high

on the paralumbar fossa. To visualize the left kidney, the transducer was placed over the middle of the paralumbar fossa.

Ultrasonographic measurements included length of the kidney (the distance between the cranial and caudal renal poles, measured in the longitudinal plane); depth of the kidney (the distance between the ventral and dorsal face, measured in the transverse plane at the level of the renal hilus); width of the kidney (the distance between the lateral and medial margins of the kidney, measured in the transverse plane at the level of the renal hilus); diameter of the renal parenchyma and renal hilus (measured from dorsal to ventral in the transverse plane at the level of the renal hilus); and circumference of the 3 largest medullary pyramids.

To ensure that the structures in the ultrasonograms had been correctly identified, the kidneys from a slaughtered goat were collected. The kidneys were then cut in this 4 planes, and the cut surface were compared with the ultrasonograms.

### Results and Discussion

Ultrasound can be useful for the observation of

tomography for heart<sup>1-3,11,12</sup> and liver<sup>4,14</sup>, presence of luminal contents, motion of moving organ, morphology of neoplasm and its relationship with surrounding tissues, pregnant uterus, and differentiation of viability and sex of fetus.

Mean, SD and ranges of the measurement are shown in Table 1. There was little difference between the variables measured for the right kidney and those for the left. As shown in Figure 1, The centrally located, hyperechogenic renal sinus was easily distinguished from the surrounding hypoechogenic renal cortex and medulla. As shown in Figure 2, the cortex and medulla could only be differentiated in the lateral longitudinal view of the kidney. Figure 3 shows renal hilus in the transverse image of the kidney. Figure 4 shows transverse section of the urinary bladder.

### References

1. Amory, H., Jakovljevic, S. and Ledoux, P.: Quantitative M-mode and two-dimensional echocardiography in calves. *Vet Rec* (1991), 128: 25-31.
2. Amory, H., Kafidi, N. and Lekeux, P.: Echocardiographic evaluation of cardiac morphologic and functional variables in

**Table 1.** Results of Ultrasonographic Examination of the Urinary Tract in Seven Adult male Korean Native Goats

Variable	Mean	SD	Normal range
<b>Right kidney</b>			
Length	5.1	0.6	4.2 to 5.8
Width	3.0	0.5	2.4 to 3.6
Depth	2.8	0.3	2.5 to 3.2
Diameter of renal parenchyma	1.1	0.2	0.7 to 1.4
Diameter of renal sinus	1.0	0.2	0.6 to 1.3
Circumference of renal medullary pyramids	1.5	0.2	1.3 to 1.8
<b>Left kidney</b>			
Length	5.2	0.6	4.2 to 5.9
Width	3.1	0.4	2.5 to 3.6
Depth	2.8	0.2	2.4 to 3.2
Diameter of renal parenchyma	1.1	0.2	0.7 to 1.3
Diameter of renal sinus	1.1	0.2	0.7 to 1.4
Circumference of medullary pyramids	1.5	0.3	1.3 to 1.9
<b>Urinary bladder</b>			
Diameter	3.8	1.2	2.1 to 5.4

Data are expressed in centimeters.

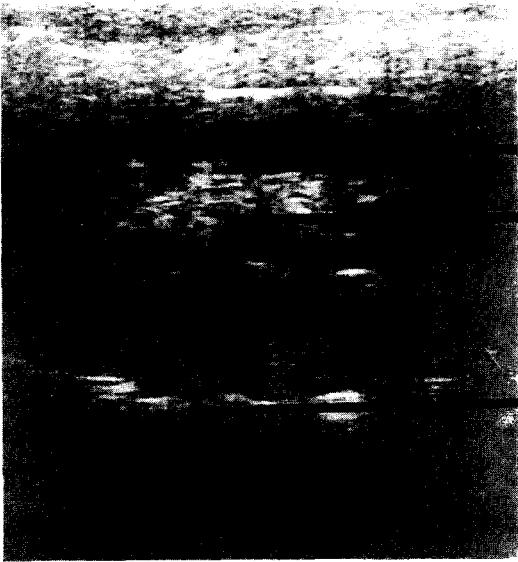


Fig. 1. Ultrasonogram of a medial longitudinal section through the left kidney. Top line = renal parenchyma ; middle line=renal sinus ; bottom line=ruminal wall.



Fig. 2. Ultrasonogram of a lateral longitudinal section through the right kidney. Top line = renal cortex ; middle line=medullary pyramid ; bottom line=renal sinus.

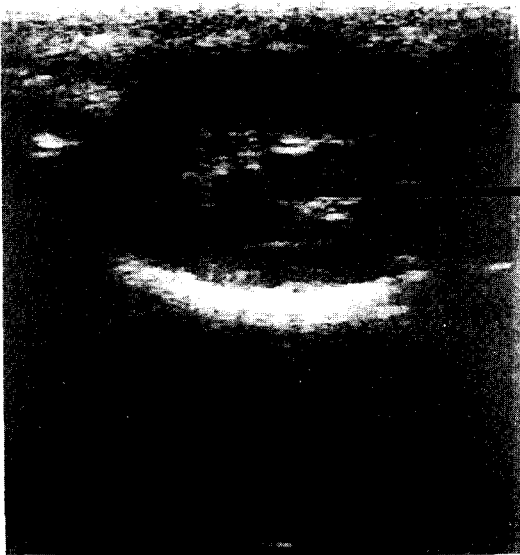


Fig. 3. Ultrasonogram of a transverse section through the left kidney in the region of renal hilus. Top line = renal parenchyma ; bottom line = renal sinus.

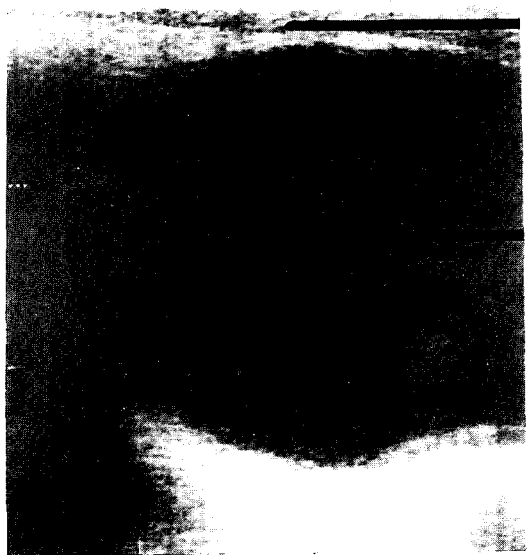


Fig. 4. Ultrasonogram of a transverse section through the urinary bladder. Top line = abdominal wall ; bottom line=urinary bladder.

- double-musclcd calves. Am. J. Vet. Res.(1992)53(9) : 1540~1547.
3. Amory, H. and Lekeux, P. : Effects of growth on functional and morphological echocardiographic variables in Friesian calves. Vet. Rec. (1991)128 : 349~354.
  4. Braun, U. : Ultrasonographic examination of the liver in cows. Am. J. Res.(1990)51(10) : 1522~1526.
  5. Braun, U. : Ultrasonographic examination of the right kidney in cows. Am. J. Vet. Res.(1991)52 : 1933~1939.
  6. Braun, U., Schefer, U. and Gerber, D. : Ultrasonography of the urinary tract of female sheep. Am. J. Vet. Res.(1992)53(10) : 1734~1739.
  7. Hager, D.A., Nyland, T.G. and Fisher, P. : Ultrasound-guided biopsy of the canine liver, kidney and prostate. Vet. Radiol. (1985)26 : 82~88.
  8. Kaplan, P.M., Murtaugh, R.J. and Ross, J.N. : Ultrasound in emergency veterinary medicine. Seminars in Veterinary Medicine and Surgery(Small Animals) (1988)3 : 245~254.
  9. Kipler, M.L., Traub-Dargatz, J.L. and Wrigley, R.H. : Renal ultrasonography in horses. Compend. Contin. Educ. Pract. Vet. et. (1990) 12 : 993~999.
  10. Konde, L.J., Wrigley, R.H., Park, R.D. and Lebel, J.L. : Ultrasonographic anatomy of the normal canine kidney. Vet. Radiol.(1984) 25 : 173~178.
  11. Rantanen, N.W. and Ewing, R.L. : Principles of ultrasound application in animals. Vet. Radiol.(1981)22 : 196~203.
  12. Thomas, W.P. : Two-dimensional, real time echocardiography in the dog. Technique and anatomic validation. Vet. Radiol. (1984)25 : 50~64.
  13. Walter, P.A., Johnston, G.R., Feeney, D.A. and O'Brien, T.D. : Renal ultrasonography in healthy cats. Am. J. Vet. Res. (1987)48 : 600~607.
  14. Wrigly, R.H. : Radiographic and ultrasonographic diagnosis of liver diseases in dogs and cats. Vet. Clin. Nor. Am. Small Animal Prac.(1985)15 : 21~38.

## 웅성 한국재래산양에서 신장 및 방광의 초음파검사법

김 명 철 · 전 무 형

충남대학교 수의과대학

### 초 록

한국재래산양에서의 신장 및 방광의 기초적인 초음파검사법 관찰을 하기 위하여 본 연구를 수행하였다. 초음파검사법에 의하여 7두의 웅성 한국재래산양을 대상으로 하여 신장 및 방광의 위치, 크기 및 구조를 관찰하였다. 모든 검사는 진정후의 횡와자세상태의 산양에서 수행하였다. 左腎은 4.2~5.9cm의 길이, 2.5~3.6cm의 폭 및 2.4~3.2cm의 깊이를 나타내었다. 左腎의 髓質 및 腎洞의 직경은 각각 0.7~1.3cm 및 0.7~1.4cm의 범위내에 있었다. 신추체의 원주는 1.3~1.9cm의 범위내에 있었다. 右腎에서는 유사한 초음파측정치를 나타내었다. 산양에서 방광의 직경은 2.1~5.4cm의 범위내에 있었다.

본 연구에서 기술된 초음파검사법 소견은 한국재래산양에서의 신장 및 방광의 형태학적 변화에 대한 참고자료로서 활용될 수 있을 것으로 사료된다.