UNIVERSITI PUTRA MALAYSIA

ULTRASONOGRAPHIC IMAGING STUDY ON ABDOMINAL ORGANS OF GOAT

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ULTRASONOGRAPHIC IMAGING STUDY ON ABDOMINAL ORGANS OF GOAT

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CERTIFICATION

It is hereby certified that we have read this project paper entitled 'Ultrasonographic Imaging Study on Abdominal Organs of Goat', by Siti Noraziran binti Muhamad and in my opinion it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course of VPD 4999- Final Year Project.

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DEDICATIONS

I dedicated this thesis with appreciation and love to:

My parents and husband

Muhamad bin Yusof

Zaiton binti Omar

Tun Mohd Alamin bin Tun Abdul Manan

My Supervisor and Co-supervisor

Prof. Dr. Abd.Wahid.Haron

Dr. Siti Zubaidah Ramanoon

Laboratory staff of

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My siblings

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Siti Zul Norain

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Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada VPD4999-Projek Ilmiah Tahun Akhir

KAJIAN PENGIMEJAN ULTRABUNYI TERHADAP ORGAN-ORGAN ABDOMEN DALAM KAMBING

Oleh

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2016

Penyelia: Prof. Dr Abd Wahid Haron

Kajian ini merumuskan penemuan imej ultrabunyi terhadap organ-organ abdomen kambing. Lima ekor kambing betina yang kelihatan sihat dipilih untuk kajian ini. Kesemua haiwan tidak dibius dan dikawal dalam posisi berdiri dan kawasan badan yang ingin diperiksa dicukur bulunya sebelum pemeriksaan dijalankan. Rumen, retikulum, omasum, abomasum, hati, hempedu, limpa dan ginjal diperiksa menggunakan pengimbas ultrabunyi (Sonoscape) yang disambung kepada prob dengan frekuensi 4.0-6.0MHz. Pemeriksaan dijalankan menggunakan dua jenis prob iaitu prob linear dan cembung. Keputusan yang diperolehi menunjukkan rumen dan limpa diperiksa pada bahagian kiri manakala organ-organ lain diperiksa di sebelah kanan badan. Dinding rumen diperiksa pada bahagian lambung kiri dan limpa diperiksa pada ruang interkosta yang ke-11 di mana salur darah limpa amat jarang untuk dilihat. Retikulum diperiksa pada kawasan

bawah ruang interkosa yang ke-6, manakala abomasum pula diperiksa pada kawasan bawah ruang interkosta yang ke-7. Omasum pula diperiksa pada ruang interkosta yang ke-8 dan hati diperiksa bermula daripada ruang interkosta yang ke-7 sehingga ruang interkosta yang ke-12, vena portal dan vena hepatik juga dapat dilihat. Ginjal diperiksa pada bahagian belakang tulang rusuk yang terakhir dan hempedu diperiksa pada ruang interkosta yang ke-10. Kesimpulannya, pemeriksaan ultrabunyi adalah lebih mudah untuk diaplikasikan di dalam perubatan ruminan kecil sebagai salah satu kaedah untuk mendiagnosis penyakit dan juga untuk pemeriksaan organ-organ dalaman.

Kata kunci: Ultrabunyi, Ruang interkosta, Prob, Kambing betina, Organ-organ

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of requirement for the course of VPD 4999- Project

ULTRASONOGRAPHIC IMAGING STUDY ON THE ABDOMINAL ORGANS OF GOAT

By

SITI NORAZIRAN BINTI MUHAMAD

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Supervisor: Prof. Dr. Abdul Wahid Haron

This study summarizes the ultrasonographic findings of the abdominal organs of goat. Five apparently healthy does were selected in this study. All animals were non-sedated, restrained in standing position and examination area was clipped and shaved prior investigation. Rumen, reticulum, omasum, abomasum, liver, gall bladder, spleen and kidney were examined using SonoScape ultrasound scanner attached to a probe with frequency between 4.0-7.0 MHz. Examination was done using both, linear and convex transabdominal probe. From the result, rumen and spleen were examined on the left side while the other organs were examined on the right side. Rumen wall was examined and identified at the left flank area while spleen was examined at the 11^{th} intercostal space (ICS) and the splenic vessel is rarely can be seen. For the reticulum, its wall was examined at the ventral abdomen at the 6^{th} ICS just caudal to the xiphoid and the abomasum wall was examined at the ventral part of the 7^{th} ICS while for the omasum, it

was examined at the 8th ICS. Liver was examined from the 7th -12th intercostal spaces (ICSs) with hepatic and portal vein can be examined. Kidney was examined just caudal to the last rib while gall bladder was examined on the right side at 10th ICS. In conclusion, ultrasound examination is more convenient to be used in small ruminant medicine as an aid in the diseases diagnosis as well as evaluation of the internal organs.

Keywords **:** Ultrasound, Intercostal space, Probe, Does, Organs

1.0 INTRODUCTION

Ultrasound imaging method is well established in both, human and veterinary medicine as a valuable imaging modality either in normal or clinical studies or cases (Yamaga & Too, 1983). In small ruminants, ultrasonographic examination has been routinely conducted. It was established as a rapid non-invasive technique to obtain information on the normal abdominal organs and an increasing number of abdominal disorders. Ultrasonography provides anatomical information that is not easily obtainable by other means (Goddard,1995). It is occasionally carried out in sheep and goats because of low financial value of these animals. This technique is safe for the assessment of structures and tissue consistency in various organs. However, there is some limitations of this method as it cannot penetrate lung tissue, gas-filled bowel and also bone tissue (Yamaga & Too, 1983)

Ultrasound has been considered as an excellent diagnostic tool for the investigation of the abdominal organs that include liver, gall bladder, spleen and the forestomach structure as well. Indeed, this technique is non-invasive and there are no known side effects that had been reported and it provides images in real time and does not require sedation (Braun, 2009). This technique had been used successfully to evaluate the rumen, reticulum, omasum and abomasum and some portions of the intestines. It provides important

information to clinicians thus avoiding the need of invasive diagnostic procedures (Streeter & Step, 2007; Braun *et al*, 2011). Abdominal ultrasonography enables an examination on the normal anatomical position of the internal organ as well as the evaluation of the organs. It is a safe method with no biological hazard was reported for the patient itself and also for the sonographer. In clinical studies or diagnosis, ultrasonography imaging enables a serial examination to monitor the progression of the condition and the patient's response towards treatment given (Kofler & Hittmair, 2006).

In this study, the examination was carried out using B-mode ultrasonography only with frequency ranging from 4-7MHz. Two types of probes were used which are the linear and also the convex transducer.

1.1 OBJECTIVES

The objectives of this study were:

i. To examine the structure and location of the abdominal organs which are the liver, gall bladder, spleen, kidney, rumen, reticulum, omasum and abomasum of goat using ultrasound scanning method.

ii. To provide information on the normal structure or appearance of each organs.

1.2 HYPOTHESIS

Ultrasonographic imaging technique is a useful modality for the determination of the normal structure and location of the organs as well as the abnormalities of abdominal organs in goats**.**

8.0 REFERENCES

Alsafy, M. A. M., El-Gendy, S. A. A., El-Kammar, M. H., & Ismaiel, M. (2013). Contrast Radiographic, Ultrasonographic and Computed Tomographic Imaging Studies on the Abdominal Organs and Fatty Liver Infiltration of Zaraibi Goat. *Journal of Medical Sciences*, *13*(5), 316-326.

Braun, U., & Krüger, S. (2013). Ultrasonography of the spleen, liver, gallbladder, caudal vena cava and portal vein in healthy calves from birth to 104 days of age. *Acta Veterinaria Scandinavica*, *55*-68.

Hopkins Sr, C. E., Hamm Jr, T. E., & Leppart, G. L. (1972). *Atlas of Goat Anatomy. Part II. Serial Cross Sections. Edgewood Arsenal Report* (Vol. 4626).

Kandeel, A. E., Omar, M. S. A., Mekkawy, N. H., El-Seddawy, F. D., & Gomaa, M. (2009). Anatomical and ultrasonographic study of the stomach and liver in sheep and goats. *Iraqi Journal of Veterinary Sciences*, 23(2), 181-191.

Kotb, A. G., El-Razik, W. M. A., El-Nagar, E. M., & Gouda, S. M. (2015). Ultrasonography and ultrasonographic guided biopsy of the liver in pregnancy toxemic does. *Advances in Animal Veterinary Science*, *3*(8), 466-472.

Mohammed, N. M. O. (2012). Ultrasonographic and laparoscopic studies on the abdomen in sheep and goats. *A Ph.D Thesis, Cairo University.*

Morgado, A. A., Sucupira, M. C. A., Nunes, G. R., & Hagen, S. C. F. (2015). Foreign body-induced changes in the reticular contraction pattern of sheep observed with M-mode ultrasonography. *Open veterinary journal*, *5*(1), 34-37

Yoshinori Y,Kimehiko T. (1984). Diagnostic ultrasound imaging in domestic animals: Fundamental studies on abdominal organs and fetuses. *Japanese Journal of Veterinary Science*, *46*(2), 203-212.

Braun U, Hausammann K.(1992). Ultrasonographic examination of the liver in sheep. *Journal of Veterinary Research* 53:198-202

Abu Zaid, R.M.M, (1995). Radio and sonographic anatomical studies on the goat. A *Ph.D. Thesis, Faculty of Veterinary medicine, Suez Canal University.*

Braun, U., & Blessing, S. (2006). Ultrasonographic examination of the omasum in 30 healthy cows. *Veterinary Record: Journal of the British Veterinary Association, 159(24).*

Mohamed, T., & Oikawa, S. (2007). Ultrasonographic characteristics of abdominal and thoracic abscesses in cattle and buffaloes. *Journal of Veterinary Medicine Series A*, 54(9), 512-517.

Tschuor, A., & Clauss, M. (2008). Investigations on the stratification of forestomach contents in ruminants: an ultrasonographic approach. *European Journal of Wildlife Research*, *54*(4), 627-633.