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FACULDADE DE CIÊNCIAS AGRÁRIAS E VETERINÁRIAS
CÂMPUS DE JABOTICABAL

ULTRASONOGRAPHY B-MODE, ELASTOGRAPHY (ACOUSTIC RADIATION FORCE IMPULSE), COLOR DOPPLER AND HYSTEROSCOPY UTERINE IN POSTPARTUM IN SANTA INES SHEEP

Renata Sitta Gomes Mariano
Médica Veterinária

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Tese apresentada à Faculdade de Ciências Agrárias e Veterinárias – Unesp, Câmpus de Jaboticabal, como parte das exigências para obtenção do título de Doutor em Medicina Veterinária área de Reprodução Animal.

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TÍTULO DA TESE: ULTRASONOGRAPHY B-MODE, ELASTOGRAPHY (ACOUSTIC RADIATION FORCE IMPULSE), COLOR DOPPLER AND HYSTEROSCOPY UTERINE IN POSTPARTUM SANTA INES SHEEP

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Jaboticabal, 03 de dezembro de 2018

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RENATA SITTA GOMES MARIANO – was born in Garça, São Paulo state, Brazil, on May 11th of 1990. In 2008 she joined the Faculty of Veterinary Medicine in Garça, concluding her academic experience on December 2012. In 2013, she began a Master student in Animal Reproduction Science, at Faculty of Agricultural and Veterinary Sciences – FCAV/Unesp in Jaboticabal under Prof. Dr. Wilter Ricardo Russiano Vicente. She concluded her Master's degree and on 2015 she began her PhD at the same university, and field, under Dr. Vicente supervisor. Where in 2017 she moved to the College Station, Texas, United States, to join researches on fetal programming at Texas A&M University during four months in Animal Science department under Dr. Rodolfo C Cardoso.

“I never lose. I either win or I learn.”

(Nelson Mandela)

“Though nobody can go back and make a new beginning, anyone can start over and make a new ending.”

(Chico Xavier)

To my Dad and Mom, with love.

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SUMMARY

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Certificamos que o Protocolo nº 12338/15 do trabalho de pesquisa intitulado **"Ultrassonografia modo B e Doppler uterino de ovelhas em diferentes momentos reprodutivos"**, sob a responsabilidade do Prof. Dr. Wilter Ricardo Russiano Vicente, está de acordo com os Princípios Éticos na Experimentação Animal adotado pelo Conselho Nacional de Controle de Experimentação Animal (CONCEA) e foi aprovado pela COMISSÃO DE ÉTICA NO USO DE ANIMAIS (CEUA), em reunião ordinária de 06 de julho de 2015.

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ULTRASONOGRAPHY B-MODE, ELASTOGRAPHY (ACOUSTIC RADIATION FORCE IMPULSE), COLOR DOPPLER AND HYSTEROSCOPY UTERINE IN POSTPARTUM IN SANTA INES SHEEP

ABSTRACT – The aim of this study was to evaluate the uterine characteristics of Santa Inês sheep during the postpartum period, using mode B-mode ultrasonography, elastography ARFI (acoustic radiation force impulse), Doppler and hysteroscopy, with emphasis on the early diagnosis of reproductive alterations, evaluation of development and regression during this period**.** Twenty Santa Inês sheep were used and designated after clinical and obstetric evaluation. B-mode, Doppler and elastography ARFI evaluations were performed by transabdominal approach using the Siemens S2000 ultrasound system, with a multi-frequency and convex transducer of 5.0 to 8.0 MHz. Ultrasonography of the uterine structure was performed at immediate postpartum (M0) and sequentially every 48 hours, during 30 days, totaling 16 experimental samples.
Ultrasonography characteristics of the uterus (echogenicity, echotexture, and biometry), vascular parameters (color Doppler) and stiffness aspects (qualitative and quantitative elastography) of the uterine structures were evaluated during the postpartum. Hysteroscopy evaluation of the uterine involution of the sheep was performed as follows: immediate moment after lambing (M0) and sequentially every 6 hours, until the moment where the endoscopic access to the uterus through the cervix was no longer possible. Uterine biopsy was performed at the same moments. The experimental design will be completely randomized, with a significance level of 5% for tests performed.

Keywords: ovine, ultrasound, puerperium, uterus.

LIST OF ABBREVIATIONS

ARFI – Acoustic radiation force impulse

SD – standard deviation

% - percentage;

Kg – kilogram;

h – hour;

M0 – immediate postpartum moment

n – sample size

pp – days postpartum

SWV – Shear wave velocity

LIST OF TABLES

Chapter 2

Chapter 3

LIST OF FIGURES

Chapter 2

Chapter 3

CHAPTER 1 – GENERAL CONSIDERATIONS

1. Introduction

Puerperium is the period after completion of parturition and it occurs in a decreasing logarithmic scale, especially during the first week after lambing. After parturition, the uterus undergoes marked remodeling during involution; however, little is known about the hormonal, cellular and molecular mechanisms that regulate this process. Considering the requirement to establish early diagnostic methods for the evaluation of puerperal changes in sheep, monitoring of this period may be essential to avoid a decline in reproductive efficiency. There are conflicting reports regarding uterine involution in ewes, which may reflect differences in breeds and management. An understanding of the postpartum recovery process of the reproductive tract in the ewe is of increasing importance in production systems where more than pregnancy per year is desirable.

It was hypothesized that the use of imaging techniques allows the monitoring of uterine involution and physiological changes during the postpartum period in ewes.

In this study we review the puerperal period, the mechanisms underlying the ensuing of normal ovine reproduction, and the ultrasound assessment to evaluate this period in ewe as an experimental model or for application in veterinary medicine.

3. Conclusion

The use of ultrasonography complement the monitoring of uterine involution in ewe, since uterine structures cannot be assessed by rectal or abdominal palpation in this species. This is a promissory tool to distinguish the pathological from the normal puerperium and thereby avoid unnecessary invasive procedures. Thus, the early diagnosis of intercurrences could improving the survival rate of obstetric patients and reproductive life, as well reducing the occurrence of infertile animals due to pathological postpartum. It is also important the knowledge obtained from ultrasonography examinations can help us better understanding the physiology of the postpartum period.

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