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DETERMINATION OF THE RELATIONSHIP BETWEEN ULTRASONOGRAPHIC MEASUREMENTS OF LONGISSIMUS DORSI, BACKFAT AND BODY WALL THICKNESS WITH BODY WEIGHT AND TESTICULAR MORPHOMETRY IN BREEDING BUCKS

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CERTIFICATION

It is hereby certified that we have read this project paper entitled "Determination of the Relationship Between Ultrasonographic Measurements of Longissimus Dorsi, Backfat and Body Wall Thickness with Body Weight and Testicular Morphometry in Breeding Bucks", by Boey Jin Wern and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD 4999 – Project

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DEDICATIONS

This write-up is dedicated to:

My family,

Father

Mother

Brothers

Friends

Ee Leng

All my lecturers and faculty staff who have committed themselves towards the noble cause of education

And all the animals that were involved in this study

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar, Universiti Putra Malaysia untuk memenuhi sebahagian daripada keperluan VPD4999 – Projek Tahun Akhir.

HUBUNGKAIT ANTARA UKURAN KETEBALAN LONGISIMUS DORSI, LEMAK BELAKANG DAN DINDING BADAN SECARA ULTRASONOGRAFI DENGAN BERAT BADAN DAN MORFOMETRI TESTIS KAMBING JANTAN BAKA

Oleh

Boey Jin Wern

2016

Penyelia: Dr. Mark Hiew Wen Han

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Hubungan antara ukuran ultrasonografi ketebalan otot longissimus dorsi, lemak belakang dan dinding badan berbanding berat badan dan morfometri testis telah dikaji di dalam 16 ekor kambing jantan baka yang terdiri daripada baka Boer, baka daging kacukan dan baka tenusu kacukan. Setiap haiwan berumur lebih daripada 2 tahun.. Ukuran ultrasound untuk ketebalan lemak dan otot telah diambil di antara vertebra

toraks ke-12 dan ke-13, di antara vertebra lumbar ke-3 dan ke-4 dan di antara tulang rusuk ke-12 dan ke-13 12.7 cm dari tulang belakang untuk mengukur ketebalan dinding badan. Angkup *Vernier* telah digunakan untuk mengukur kepanjangan (L, cm), kelebaran (W, cm) dan ketinggian (H, cm) testis. Ukurlilit skrotum telah diukur dengan menggunakan pita plastic yang kenyal. Kepejalan testis ditentukan melalui palpasi. Image J (versi 1.49) digunakan untuk mengukur imej ultrasound dengan tepat. Isipadu testis telah dikira menggunakan formula: *Isipadu = 0.5233 x L x W x H*. Dari ini, keluaran sperma harian (DSO; 10^9 / hari) dapat dianggarkan dengana formula *DSO = (0.024 x isipadu testis) - 1.26*, di mana jumlah isipadu testis terdiri daripada jumlah isipadu testis kiri dan kanan. Korelasi Pearson (SPSS 23) menunjukkan bahawa ketebalan lemak di bahagian *thoracic* berkait rapat dengan isipadu testis kanan (0.497, P = 0.05). Ketebalan lemak toraksjuga berkait rapat dengan panjang testis kanan (P = 0.031). Berdasarkan analisis keseluruhan, berat badan, ketebalan otot dan lemak badan tidak mempengaruhi morfometri testis. Oleh itu, ukuran ini hanya boleh digunakan untuk menilai kualiti karkas dan bukan kesuburan haiwan. Hasil kajian ini juga menunjukkan bahawa berat badan adalah berkait rapat dengan ukurlilit toraks (0.824, P < 0.05) serta ketebalan otot longissimus dorsi kiri (0.722, P = 0.02) dan kanan (0.543, P = 0.03) di bahagian toraks.

Kata Kunci: ultrasound, longissimus dorsi, ketebalan lemak belakang, ketebalan dinding badan, morfometri testis dan ukurlilit skrotum

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine, Universiti Putra Malaysia in partial fulfilment of the course VPD4999 – Final Year Project.

DETERMINATION OF THE RELATIONSHIP BETWEEN ULTRASONOGRAPHIC MEASUREMENTS OF LONGISSIMUS DORSI, BACKFAT AND BODY WALL THICKNESS WITH BODY WEIGHT AND TESTICULAR MORPHOMETRY IN BREEDING BUCKS

By

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2016

Supervisor: Dr. Mark Hiew Wen Han

Co-supervisor: Assoc. Prof. Dr. Rosnina Hj Yusoff

The relationship between ultrasonographic measurements of the longissimus dorsi muscle, backfat and body wall thickness with body weight and testicular morphometry was studied in 16 breeding bucks consisting of Boer as well as crossbreds for meat and dairy purposes. All animals were at least 2-years-old. Ultrasound

measurements were taken for fat and muscle depths between the 12^{th} and 13^{th} thoracic vertebrae, 3^{rd} and 4^{th}lumbar vertebrae and between 12^{th} and 13^{th} ribs 12.7 cm distal to the dorsal vertebral processes to measure body wall thickness. Vernier caliper was used to measure testicular length (L, cm), width (W, cm) and height (H, cm). Scrotal circumference was measured with a flexible plastic tape. The firmness of the testicles was determined by palpation. Image J (version 1.49) was used to accurately measure the ultrasound images. Testicular volume was calculated using the formula: *Volume= 0.5233 x L x W x H* while the daily sperm output (10^9/day), *DSO = (0.024 x testicular volume) – 1.26*; in which the total testicular volume represents the sum of the right and left testicular volume. Pearson's correlation (SPSS 23) showed that the fat depth of left thoracic area was correlated with the right testicular volume (0.497, P = 0.05). Meanwhile, the fat depth at the right thoracic area was correlated with the right testicular length (P = 0.031). Overall, bodyweight, muscle and fat depths do not have a correlation with testicular morphometry. Therefore, these measurements can only be used to evaluate carcass traits and not fertility. Additionally, body weight was correlated with thoracic circumference (0.824, P < 0.05) as well as left (0.722, P = 0.02) and right (0.543, P = 0.03) longissimus dorsi muscle depth at the area between the 12^{th} and 13^{th} thoracic vertebrae.

Keywords: ultrasound, longissimus dorsi, backfat, body wall thickness, testicular morphometry, scrotal circumference.

1.0 Introduction

Goats play a significant role in the economy and nutrition as well as contribute to the livelihood of rural and urban dwellers (Oluwatomi, 2010) in most developing countries. They also serve as a source of protein and household income for small scale farmers (Peacock *et al*., 2005). Goat meat refers to the meat of the domestic goat (*Capra aegagrus hircus*) and is often called "chevon" when it is from animals of five to eighteen months of age and "cabrito" when it is from young animals. In Malaysia, the word "mutton" is often used to describe both goat and sheepmeat, although technically the term refers only to sheep meat. As such, statistics on goat and sheep meat are often grouped together under the heading of mutton (Kaur, 2010). The self-sufficiency level of mutton in Malaysia was only 10.58% in 2010 (Department of Veterinary Service, 2013) and as such there is a huge potential for growth in the small ruminant industry.

The establishment of a good breeding program in farms is important to ensure sustainable production. One of the most important criteria of a good breeding program is the selection of breeding bucks with adequate and desired carcass traits and this can be achieved by using real-time ultrasound.Ultrasonographic measurements of the longissimus dorsi muscle and subcutaneous fat thickness have been used in cattle as a selection criteria to estimate breeding values (Yokoo, 2008). Ultrasound has also been used for years to measure fat and muscle depths in the swine and cattle industry for the purpose of genetic selection programs to improve carcass quality (Moeller, 2002; Williams, 2002).

Currently, no research has been done to study the relationship between ultrasonographic measurements of longissimus dorsi, backfat and body wall thickness with body weight and testicular morphometry in breeding bucks in Malaysia. Hence, the objective of this study was to determine the correlation between measurements of longissimus dorsi, backfat and body wall thickness with body weight and testicular morphometry. It was hypothesized that there is an association between the measurements of muscle and fat thickness with body weight and testicular morphometry in bucks.

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