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BETWEEN HORNED AND POLLED, IS THERE A KARYOTYPIC DIFFERENCE IN SHEEP?

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BETWEEN HORNED AND POLLED, IS THERE A KARYOTYPIC DIFFERENCE IN SHEEP?

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CERTIFICATION

It is hereby certified that I have read this project paper entitled “Between horned and polled, is there a karyotypic difference in sheep?” byNurul Liyana Binti Jamaluddin and in my opinionis satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4999- Final Year Project.

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DEDICATIONS

This project paper is dedicated to my family:

Mother

Father

Siblings

and Friends

Thank you for all the support throughout this journey

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

PHA	: Phytohaemagglutinin
PWM	: Pokeweed mitogen
ICNDA	:International Cytogenetic Nomenclature of Domestic Animal
2n	: Diploid number
NF	:Fundamental number
DVS	: Department of Veterinary Services
DNA	:Deoxyribonucleic acid
Rpm	: Revolutions per minute
KCL	: Potassium chloride

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 - Projek Ilmiah Tahun Akhir

ANTARA BERTANDUK DAN TIDAK BERTANDUK, ADAKAH TERDAPAT PERBEZAAN KARIOTIP PADA BIRI-BIRI?

Oleh

Nurul Liyana Binti Jamaluddin

Mac 2017

Penyelia: Prof Dr. Rosnina Hj. Yusoff

Analisis kariotip telah dijalankan ke atas dua baka biri-biri, Merino (bertanduk) dan Dorper (tidak bertanduk) untuk membandingkan ciri-ciri kromosom mereka. Limfosit diekstrak darpada sampel darah dan dikulturkan dalam media RPMI 1640, yang ditambah dengan serum anak lembu dan penisilin-streptomisin. Kultur pendua telah dihasilkan, menggunakan mitogen, phitohemaglutinin (PHA) dan pokeweed (PWM) untuk merangsang pertumbuhan limfosit. Kultur yang yang telah menggunakan PWM menghasilkan penyebaran metafasa yang lebih berkualiti

dan lebih banyak berbanding kultur PHA. Kariotip telah dibina berasaskan prosedur oleh *International Cytogenetic Nomenclature of Domestic Animal* (ICNDA). Biri-biri domestik mempunyai nombor diploid (2n) 54kromosom. Morfologi kromosom Merino dan Dorper tidak dapat dibezakan melalui kariotip konvensional. Kedua-dua jantan dan betina mempunyai kariotip yang terdiri daripada tiga pasang autosom submetasentrik dan 23 pasang autosome akrosentrik. Kromosom X dikenalpasti sebagai akrosentrik terbesar manakala kromosom Y dikenalpasti sebagai kromosom paling kecil. Nombor asas (NF) untuk kedua-dua baka biri-biri jantan dan betina ialah 60.

Kata kunci: Biri-biri, Merino, Dorper, bertanduk, tidak bertanduk

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of course VPD4999 – Project.

BETWEEN HORNED AND POLLED, IS THERE A KARYOTYPIC DIFFERENCE IN SHEEP?

By

Nurul Liyana Binti Jamaluddin

March 2017

Supervisor: Assoc. Prof Dr. Rosnina Hj. Yusoff

A karyotypic analysis was carried out on two breeds of sheep,Merino (horned) and Dorper (polled) to compare their chromosome features. Lymphocytes were extracted from blood samples and cultured in RPMI 1640 as a culture medium, supplemented with foetal bovine serum and penicillin-streptomycin. The cultures were made in duplicates, using phytohemagglutinin (PHA) and pokeweed (PWM) mitogens to stimulate lymphocytes growth. Cultures with PWM produce better quality and quantity of metaphase spreads compared with PHA. Karyotypes were constructed in accordance with the standard procedure of International Cytogenetic Nomenclature of Domestic Animal (ICNDA). The domestic sheep has a diploid number (2n)of 54. The chromosomes morphology of Merino and Dorper are

indistinguishable based on their conventional karyotypes established. Both males and females have karyotypes of three pairs of submetacentric and 23 pairs of acrocentric autosomes. The X chromosome is identified as the largest acrocentric while the Y chromosome is identified as the smallest chromosome. The fundamental number (NF) for the male sheep is 60 and the female is also 60.

Keywords: Sheep, karyotype, Merino, Dorper, horned, polled.

1.0 INTRODUCTION

1.1 Background

The domestic sheep, *Ovis aries* was first dometicated over 10,000 years ago for agricultural purposes(Haenlein, 2007). Undomesticated sheep typically have horns and horns are used by males to compete for mate during breeding season whereas in females the horns are used to compete for food during peri-parturient period (Coltman & Pemberton, 2004). The occurence of polled sheep is increasing as domestication continues; this is because the horned trait is not desirable for farmers and thus, selective breeding is practiced. In some sheep breeds, both sexes are either horned (e.g. Merino) or polled (e.g. Dorper) while in some breeds only the rams have horns (e.g. Rambouillet). Also, there are breeds that have both horned and polled strains. A comparison of the chromosome features of horned breeds like the Merino with those of Dorper (polled) which is overtly normal has not been carried out to date. Therefore, this study is carried out to compare the differences in the total number of chromosomes (diploid number, 2n), fundamental number (NF) and morphology of the chromosomes betweenhorned Merinos andpolled Dorpers.

1.2 Justification

To map out the karyotype to see the morphological differences in chromosomes between the horned and polled species of sheep.

1.3 Hypothesis

H_o: There are no differences between the karyotypes of Merino and Dorper.

H_A: There are differences between the karyotypes of Merino and Dorper.

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