



UNIVERSITI PUTRA MALAYSIA

***ASSESSMENT OF THE EASE OF INSERTION, RETENTION RATE,
EASE OF REMOVAL AND PIG BEHAVIOUR TO A NOVEL
INTRAVAGINAL INSERT FOR PIGS***

JONG KWANG YAN

FPV 2016 102

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FACULTY OF VETERINARY MEDICINE

UNIVERSITI PUTRA MALAYSIA

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ASSESSMENT OF THE EASE OF INSERTION, RETENTION RATE,
EASE OF REMOVAL AND PIG BEHAVIOUR TO A NOVEL
INTRAVAGINAL INSERT FOR PIGS

JONG KWANG YAN

A project paper submitted to the

Faculty of Veterinary Medicine, Universiti Putra Malaysia

In partial fulfilment of the requirement for the

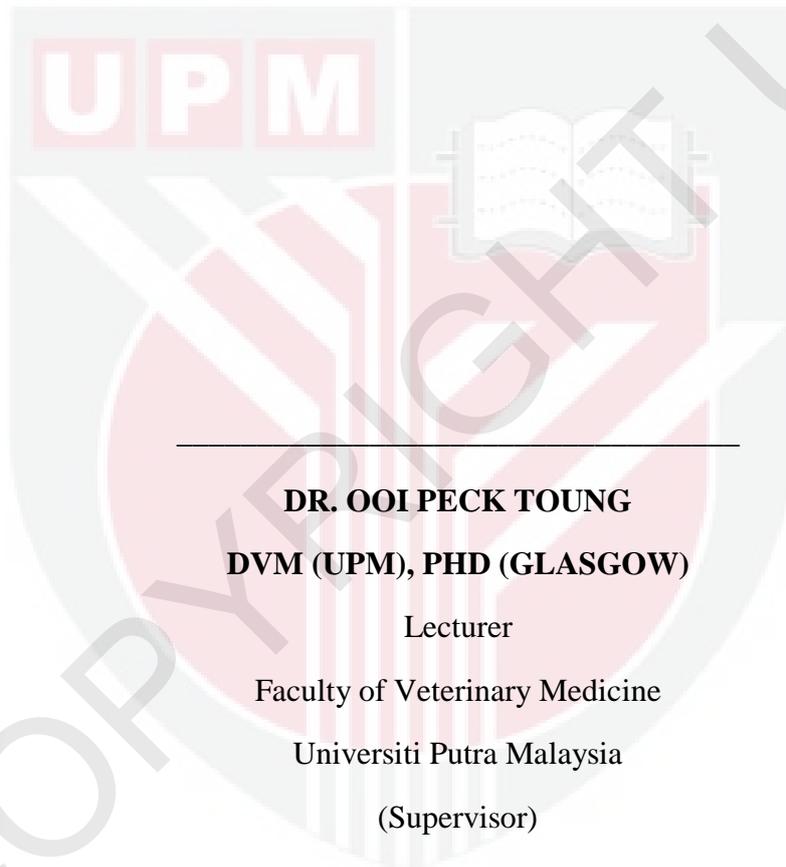
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Universiti Putra Malaysia

Serdang, Selangor Darul Ehsan

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It is hereby certified that we have read this project paper entitled “Assessment of the Ease of Insertion, Retention Rate, Ease of Removal and Pig Behaviour to A Novel Intravaginal Insert for Pigs”, by Jong Kwang Yan and in my opinion it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the course VPD4999 – Final Year Project.



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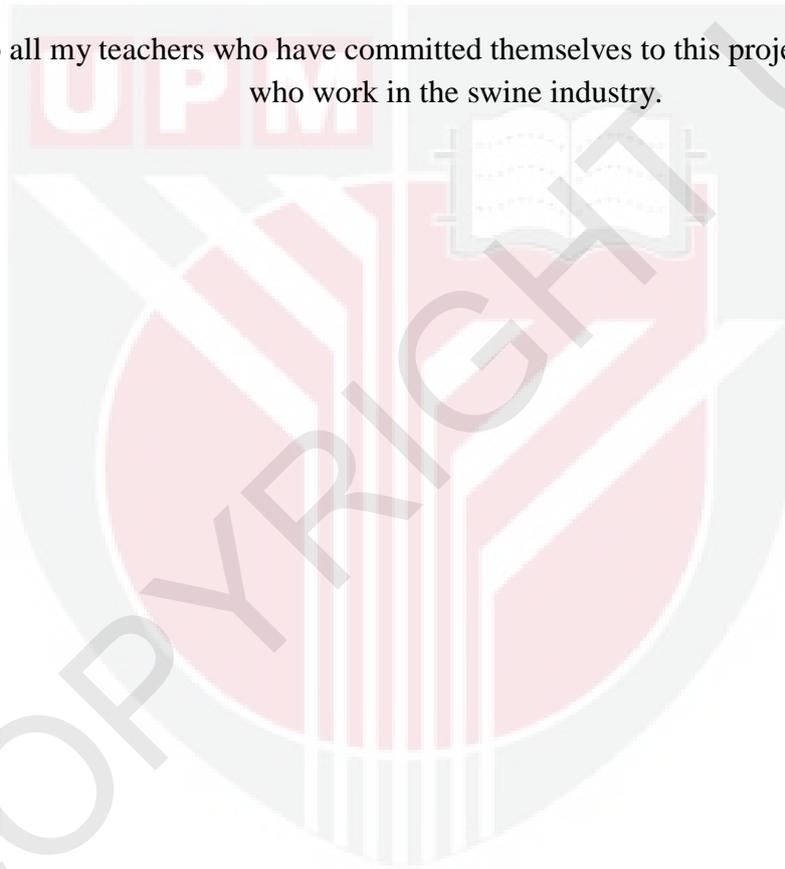
DEDICATIONS

To:

My dearest family,

Friends,

And to all my teachers who have committed themselves to this project and everyone who work in the swine industry.



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Million thanks to my project supervisor, Dr Ooi Peck Toung for his time, wisdom, expertise and guidance that he granted me throughout the duration of this project. His experience and knowledge in the pig industry had been a great motivation for me to involve myself in the industry.

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LIST OF ABBREVIATIONS

%	Percent
°C	Degree Celcius
BCS	Body condition score
Dr	Doctor
FSH	Follicle stimulating hormone
GnRH	Gonadotropin releasing hormone
hCG	Human chorionic gonadotropin
IACUC	Institutional Animal Care and Use Committee
LH	Luteinising hormone
LL	Long length, large base
LS	Long length, small base
LYD	Landrace-Yorkshire-Duroc
ML	Medium length, large base
MS	Medium length, small base
PGF2- α	Prostaglandin F2 alpha
PMSG	Pregnant mare serum gonadotropin
Prof	Professor
SL	Short length, large base
SS	Short length, small base
USA	United States of America

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar, Universiti Putra Malaysia untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek Ilmiah Tahun Akhir.

PENILAIAN KESENANGAN PEMASUKAN, KADAR PENGEKALAN, KESENANGAN MENGALIHKAN DAN KELAKUAN KHINZIR TERHADAP ALAT INTRA-FARAJ BAHARU UNTUK KHINZIR

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2016

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Reproduksi merupakan aspek penting dalam industri ternakan khinzir. Ia merupakan salah satu faktor yang menentukan jumlah khinzir yang boleh dijual oleh penternak. Oleh sebab Malaysia mempunyai industri ternakan khinzir yang signifikan, kemahiran reproduksi khinzir yang berkesan adalah penting kepada para penternak. Kajian ini menilai kegunaan alat intra-faraj baharu yang mengandungi progesteron dalam mencapai penyelarasan estrus pada khinzir dara betina. Kajian ini melibatkan sebuah ladang contoh yang terletak di Bidor, Perak. Enam khinzir dara betina yang berumur 8 bulan dipilih untuk kajian ini. Haiwan-haiwan ini dibahagikan kepada 3 kategori iaitu sayap bersaiz pendek dengan pangkal bersaiz kecil (SS) dan

besar (SL), sayap bersaiz sederhana dengan pangkal bersaiz kecil (MS) dan besar (ML), dan sayap bersaiz panjang dengan pangkal bersaiz kecil (LS) dan besar (LL). Kesenangan pemasukan dan pengeluaran alat, kadar pengejalan alat dan kelakuan khinzir direkodkan. Alat SL dan LL gagal dimasukkan kerana pangkal besar. Alat LS dikeluarkan pada hari kelima kerana menyebabkan ketidakselesaian. Alat SS, MS dan ML berjaya dikeluarkan pada hari ke-tigabelas. Kesimpulannya, alat ini berjaya mencapai matlamatnya untuk penyelarasan estrus tetapi memerlukan kajian lanjut untuk menentukan bahan dan saiz yang sesuai.

Kata kunci: Alat Intra-faraj Baharu, Khinzir Dara Betina, Penyelarasan Estrus, Progesteron, Reproduksi khinzir,

ABSTRACT

Abstract of a project paper submitted to the Faculty of Veterinary Medicine, Universiti Putra Malaysia in partial fulfilment of the requirement for the course VPD 4999 – Final Year Project.

ASSESSMENT OF THE EASE OF INSERTION, RETENTION RATE, EASE OF REMOVAL AND PIG BEHAVIOUR TO A NOVEL INTRAVAGINAL INSERT FOR PIGS

By

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2016

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Prof. Dr. Michael Rathbone

Reproduction is an important aspect of the swine livestock industry. It is one of the parameters that decides the amount of pigs that can be sold by pig farms. As Malaysia has a significant swine industry, having an effective reproduction is essential to the pig producers. This study evaluates the use of novel progesterone loaded intravaginal inserts to achieve oestrus synchronisation in gilts. It involves a model pig farm located in Bidor, Perak. Six gilts aged 8-months-old were used in

this study. They were divided into three categories which were – short length size with small base (SS) and large base (SL), medium wing size with small base (MS) and large base (ML), and long length size with small base (LS) and large base (LL). The ease of insertion and removal of the device, the retention rate and pig behaviour were recorded. Devices SL and LL were not successfully inserted due to the large base. Device LS was removed 5 days after insertion as it caused discomfort. Devices SS, MS and ML were successfully removed on day 13th. In conclusion, the device achieved its aim of oestrus synchronisation but requires further studies to determine the appropriate materials and size.

Keywords: Gilts, Novel Intravaginal Device, Oestrus Synchronisation, Progesterone, Swine Reproduction

1.0 INTRODUCTION

Swine is a type of food producing animal that contributes to the economy. According to Holden and Ensminger (2005), besides providing profitable returns to the farmer, swine also produce food, convert inedible feeds into valuable products, enhance soil fertility, serve as a companion for feed grain production, provide unique products such as heart valves, for pharmaceuticals, and also used as nutritional and medical research animals to study human health issues.

The production of pork from the swine industry requires systematic management from the producer. One of the main components of achieving maximum production is the wise management of swine reproduction. For the commercial breed of swine such as Landrace, Yorkshire and Duroc, their reproduction rate is very important to the producer. Under normal conditions, gilts reach puberty at the age of 6 to 7-months-old. The oestrous cycle starts when puberty is reached. It is exhibited year-round that average 21 days. Since the oestrous cycle has started, breeding can be carried out. Once bred, the gestation length is 114 days, which equals to 3 months, 3 weeks and 3 days. The lactation length of 21 to 28 days depends on the management system of the producer. Normally it would take at least 5-7 days for the sows to be bred again. This makes the total cycle in the range of 150 days. Hence, the ideal reproduction rate for a sow is 2.4 times per year (Pond and Mersmann, 2001; Holden and Ensminger, 2005). To achieve this target required good husbandry management and careful planning.

In order to achieve the reproduction rate of 2.4 times per year, controlled reproduction has to be included in the management system. Aspects of controlled

reproduction in pigs include control of oestrus, fixed-time artificial insemination, control of farrowing, increasing farrowing frequency, increasing litter size, embryo transfer and breeding pigs at a younger age (Gordon, 1997). The development of effective hormonal procedures for oestrus control would enable producers to plan all aspects of their breeding programmes on a time basis, with all matings or inseminations of a particular group of pigs being concentrated into a few days (Gordon, 1997). According to Holden and Ensminger (2005), synchronisation of sows is a relatively simple matter compared to gilts. When litters are weaned from a group of sows at the same time, a large percentage of sows will come into heat within 4 to 7 days post weaning. For gilts to synchronise naturally, oestrus is difficult to achieve in high proportions. Moving gilts from a finishing barn, transporting them to a new site, or exposing them to a mature boar will stimulate the oestrous cycle but with variable results.

Therefore, an effective oestrus synchronisation method is required for gilts. In this study, a novel intravaginal device loaded with progesterone was tested on selected gilts to determine its suitability for oestrus synchronisation. This is to examine that whether the device is suitable to be used effectively as an oestrus synchronisation method. The ease of insertion of device, retention rate of the device, ease of removal of device and pig behaviour when the device was inserted were all assessed during this study.

This study was undertaken to fulfil the objective of determination of the retention rate of a new intravaginal device for pigs. Meanwhile, the following

hypothesis was proposed for this study which was the device was able to be retained in the vaginal cavity of the pig.



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REFERENCES

- Anderson, Lloyd L. (2009) "Reproductive Biology of Pigs," Animal Industry Report: AS 655, ASL R2443. Available at: http://lib.dr.iastate.edu/ans_air/vol655/iss1/66
- Flowers, W. L., Webel, S., & Estienne, M. (2001). Synchronization of estrus in swine. *North Carolina State University, Pork Information Gateway, USA*, 1-8.
- Gordon, I. (1997). *Controlled reproduction in pigs* (Vol. 3). Wallingford, Oxon, UK: CAB International.
- Holden, P. J., & Ensminger, M. E. (2006). *Swine science* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Knox, R. V., Willenburg, K. L., Rodriguez-Zas, S. L., Greger, D. L., Hafs, H. D., & Swanson, M. E. (2011). Synchronization of ovulation and fertility in weaned sows treated with intravaginal triptorelin is influenced by timing of administration and follicle size. *Theriogenology*, 75(2), 308-319.
- Knox, R. V., & Wilson, W. D. (2007). Induction of estrus and control of the estrous cycle in swine. *Current therapy in large animal theriogenology. 2nd ed. Philadelphia: Saunders*, 757-764.
- Managing the Sow and Gilt Estrous Cycle. (n.d.). Retrieved February 06, 2016, from <http://www.thepigsite.com/articles/2090/managing-the-sow-and-gilt-estrous-cycle/>
- MATRIX Swine - About MATRIX. (n.d.). Retrieved February 06, 2016, from <http://www.matrix-swine.com/about.asp>
- Merck Animal Health | Products | P.G. 600 | Overview. (n.d.). Retrieved February 06, 2016, from http://www.merck-animal-health-usa.com/products/130-120700/productdetails_130_121217.aspx

Pond, W. G., & Mersmann, H. J. (2001). *Biology of the domestic pig*. Ithaca, NY: Comstock Pub. Associates, Cornell University Press.

Rothen-Weinhold, A., Gurny, R., & Dahn, M. (2000). Formulation and technology aspects of controlled drug delivery in animals. *Pharmaceutical science & technology today*, 3(7), 222-231.

Rathbone, M. J., & Burns, P. J. (2000). Controlled release drug delivery systems for. *Controlled release veterinary drug delivery: biological and pharmaceutical considerations*, 201.

