UNIVERSITI PUTRA MALAYSIA

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FP 2009 19

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DOCTOR OF PHILOSOPHY
UNIVERSITI PUTRA MALAYSIA

2009

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By

ABDULLAH ALI ABDULLAH AL-NOKHAIF

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,

in fulfilment of the Requiement for the Degree of Doctor of Philosophy

July 2009

DEDICATION

In the Name of Allah, the Most Gracious, the Most Merciful

(وما توفيقي الا بالله رب العالمين)

All praise to Almighty Allah, the Merciful and the Benevolent. Had it not been due to His will and favour, the completion of this study would not have been possible.

Thank You Allah

With a Full Heart and Devoted Mouth.

Next …

To my co-supervisor,

Assoc. Prof. Dr. Jothi Malar Panandan.

Your guides, help & support are highly appreciated.

Truly, you have earned my unqualified respect and admiration.

Thank You

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

GROWTH PERFORMANCE OF THAMARI SHEEP IN YEMEN

ABDULLAH ALI ABDULLAH AL-NOKHAIF

July 2009

Chairman: Associate Professor Ismail bin Idris, PhD

Faculty: Agriculture

The production potential of the Thamari sheep as well as other native breeds in Yemen had not been well characterized and documented. A field study was conducted to demonstrate the importance of rearing sheep by farmers in Yemen, and an on station studys were conducted to evaluate the performance of the popular native Thamari sheep.

The results obtained from the questionnaire survey which was carried out in 20 villages at the intermountain plains of Yemen during the first half of 2005 showed that 95% of the farmers who had cultivated land also had livestock. Sheep was the most important kind of livestock reared and for multi purpose use: as meat supplier for home consumption (100%), for producing milk (84%) and as a casual source of income for farmers (95%). Sheep was also used by farmers as exchange for goods or services (9%), and was given as gift (42%). All households surveyed kept sheep; they also reared cattle (90%), donkey, goat and camel.

Data analyzed on the Thamari sheep performance consisted of 1966 records of 600 breeding ewes and 1434 lambs of 27 sires used for breeding during 12 breeding seasons over 6 years. The flock was under a restricted breeding system of two mating per year. The results showed that fertility, prolificacy and fecundity were 79%, 91% 72%, respectively, and the weight of ewe at mating was the only source of variation that significantly ($p<0.01$) affected these traits. Litter size at birth and weaning were 1.07, 0.94 lambs/ewe, respectively, and were significantly ($p<0.05$) affected by ewe genotype and postpartum weight of ewe. Sire also had significant ($p<0.05$) effect on litter size at birth. Litter birth weight (3.0 kg) was significantly ($p<0.01$) affected by year, sire, parity, litter sex composition, postpartum weight of ewe and by litter size at birth x sire interaction. Litter weaning weight and litter pre-weaning average daily gain were 16.02 kg and 145 g/d, respectively, and were significantly ($p<0.01$) affected by year and season of mating, sire, litter sex combination, litter size at birth, litter birth weight and postpartum weight of ewe, and by litter size at birth x sire interaction. Mortality of lamb at birth (3.0%) was significantly ($p<0.01$) affected by ewe genotype, while the pre-weaning mortality (4.4%) was affected by ewe genotype and birth type. Body weight of lambs at six month was 18.8 kg and was significantly ($p<0.01$) affected by year of birth, sex, birth type, birth weight of lamb, postpartum weight of ewe, sire and sex x birth type interaction ($p<0.05$). Heritability estimates for birth weight, weaning weight and pre-weaning average daily gain of Thamari lambs were 0.23 ± 0.08, 0.03 ± 0.04 and 0.02 ± 0.04, respectively.

In conclusion, it is obvious that sheep are the most important kind of livestock reared by farmers and for multipurpose. Several productive traits in the Thamari sheep were found

lower than average values reported in the literatures for other breeds. These could be improved by increasing number of lambs born per ewe and growth performance of lambs, which may be achieved by using an optimum mating system in parallel with improved management and feeding. Sire and ewe genotypes as well as weight of the ewe at mating and lambing were found to be the most important sources of variation affecting several productive traits in the Thamari sheep. Therefore, the contribution of the significant factors to the total phenotypic variation of the Thamari sheep performance should be eliminated before applying selection and estimating genetic parameters.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PEMBIAKAN PRESTASI BEBIRI THAMARI DI YEMEN

ABDULLAH ALI ABDULLAH AL-NOKHAIF

July 2009

Pengerusi: Profesor Madya Ismail bin Idris, PhD

Fakulti: Pertanian

Potensi pengeluaran bebiri Thamari serta lain-lain baka tempatan di Yemen belum pernah didokumen dan dicirikan. Kajian di lapagan dan di pusat penyelidikan telah dilakukan untuk menunjukkan kepentingan menternak bebiri Thamari oleh penternak dan untuk menilai prestasinya.

Keputusan yang diperolehi daripada soal selidik kajian yang telah dilakukan di 20 perkampongan di dataran tanah tinggi Yemen pada separuh pertama tahun 2005 telah menunjukkan 95% daripada petani yang bercucuk tanam juga memelihara ternakan. Bebiri merupakan ternakan terpenting yang dipelihara oleh petani dan ia disimpan untuk berbagai tujuan: seperti penghasilan daging bagi keperluan rumahtangga (100%), penghasilan susu (84%) dan sebagai sumber pendapatan (95%). Bebiri juga digunakan oleh penternak sebagai pertukaran untuk barangan atau perkhidmatan (9%) dan juga diberi sebagai hadiah (42%). Semua keluarga yang dikaji memelihara bebiri; mereka juga memelihara lembu (90%), kaldai, kambing dan unta.

Data prestasi bebiri Thamari yang dianalisis mengandungi 1966 rekod yang merangkumi 600 ibu pembiak dan 1434 anak daripada 27 bapak yang digunakan untuk pembiakan pada 12 musim pembiakan dalam enam tahun. Gerompok bebiri tersebut adalah di bawah sistem pembiakan terhad dua musim setahun. Keputusan menunjukkan kesuburan, keperidian dan fekunditi masing-masing adalah 79%, 91% dan 72%, dan berat ibu semasa mengawan hanyalah sumber variasi yang mempengaruhi ($p < 0.01$)ciri-ciri tersebut. Bilangan anak seperinduk semasa kelahiran dan semasa penyapihan adalah masing-masing 1.07 dan 0.94 anak/ibu, dan dipengaruhi ($p<0.05$) oleh genotip ibu dan berat ibu selepas melahirkan anak. Bapak juga mempengaruhi ($p<0.05$) bilangan anak seperinduk. Berat anak semasa lahir (3.0 kg) adalah dipengaruhi ($p<0.01$) oleh tahun kelahiran, bapak, pariti , komposisi jantina anak, berat ibu selepas melahirkan anak dan interaksi antara bilangan anak seperinduk semasa lahir dan bapak. Purata pertambahan berat harian anak semasa penyapihan dan prapenyapihan adalah masing-masing 16.02 kg dan 145 g/hari serta dipengaruhi oleh tahun dan musin mengawan, bapak, bilangan anak seperinduk semasa lahir dan semasa penyapihan, berat anak semasa lahir dan berat ibu selepas melahirkan dan interaksi antara bilangan anak seperinduk semasa lahir dan bapak. Kadar kematian anak semasa lahir (3.0%) dipengaruhi ($p<0.01$) oleh genotip ibu manakala kadar kematian prapenyapihan (4.4%) dipengaruhi oleh genotip ibu dan jenis kelahiran. Berat badan anak pada umur enam bulan adalah 18.8 kg dan dipengaruhi ($p<0.01$) oleh tahun kelahiran, jantina, jenis kelahiran, berat lahir anak, berat ibu selepas melahirkan anak, bapak dan interaksi antara jantina dan jenis kelahiran ($p<0.05$).

Anggaran heritabiliti bagi berat lahir, berat sapih dan purata tumbesaran harian pra penyapihan adalah 0.23 ± 0.08, 0.03 ± 0.04 dan 0.02 ± 0.04.

Kesimpulannya, adalah jelas bahawa bebiri merupakan ternakan terpenting yang dipelihara oleh penternak dan disimpan untuk pelbagai tujuan. Beberapa ciri produktif pada bebiri Thamar didapati lebih rendah daripada nilai purata yang dilaporkan bagi lain-lain baka. Ini boleh dipertingkatkan dengan penambahan bilangan anak dilahirkan oleh seekor induk betina dan meningkatkan prestasi pembesaran, yang dapat dichapai dengan menggunakan sistem pengawanan yang optimum selari dengan peningkatan pengurusan dan pemakanan. Genotip induk betina dan jantan serta berat induk betina semasa pengawanan dan semasa kelahiran adalah sumber variasi yang terpenting mempengaruhi beberapa ciri produktif bebiri Thamari.. Dengan itu, sumbangan faktor-faktor penting terhadap keseluruhan variasi fenotip prestasi bebiri Thamari perlu disingkarkan sebelum mengamalkan pemilihan dan mengnggarkan parameter genetik.

ACKNOWLEDGEMENTS

My great thanks, appreciation and gratitude to my country, the Republic of Yemen, and to the University of Thamar for giving me the chance to do this study and for the financial support. Special thanks due to Prof. Dr. Ahamad Abdu Saleh (Thamar University) for his support, friendship, understanding and encouragement to do this degree, and also to Prof. Dr. Abdullah Al-Mojahid (Sana'a University) for his .support and encouragement.

I would like to thank the supervisory committee; Assoc. Prof. Dr. Ismail Idris, Assoc. Prof. Dr. Jothi Malar Panandan and Assoc. Prof. Dr. Saidi Moin for their understanding and patience and for their valuable comments on the draft of this thesis. Special thanks due to my co-supervisor, Assoc. Prof. Dr. Jothi Malar Panandan for her friendly relationship, hospitality, sincere constructive comments, guidance and encouragement at every stage of my research study and for her help and guidance during the statistical analysis and at preparing the final draft of this thesis in particular.

I would like to thank the Examination Committee; Prof. Dr. Zainal Aznam Mohd Jelan, Associate Professor Halimatun Yaakub, Prof. Dr. Abd Razak Alimon, and Prof. Dr. Ramli Abdullah for their valuable and constructive comments and corrections made in this thesis.

I would like also to thank the staff of the Universiti Putra Malaysia, the Department of Animal Science, Faculty of Agriculture, the School of Graduate Studies (SGS), and Kolej 14 for helping me in one way or another towards the completion of the study.

I would like to extend my thanks to Dr. Mohamed Ali Hassan (Thamar University) and to Mr. Aiedh Mohammed Al-Faqieh (Education Institute) for their help represented me during my study abroad and during contacting the survey study.

My deepest gratitude to my family, my deceased father, my dearest mother and my children Ibrahime, Omar, Mohammed, Aiman and Yasmine. Thank you for moral supports, encouragement and understanding, and for being strong and patience during my study abroad.

Finally, thanks to all my friends in the Department of Animal Sciences and others who had given me help in one way or another to the successful completion of this study.

I certify that a Thesis Examination Committee has met on 28 July 2009 to conduct the final examination of Abdullah Ali Abdullah Al-Nokhaif on his thesis entitled 'Growth Performance of Thamari Sheep in Yemen' in accordance with Universities and university colleges Act 1971 and the constitution of the Universiti Putra Malaysia [P.U.(A) 106] March 15, 1998. The committee recommends that the candidate be awarded thr Doctor of Philosophy.

Members of the Thesis Examination Committee were as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirements for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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Date: 10 December 2009

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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ABDULLAH ALI ABDULLAH AL-NOKHAIF

Date: 30 October 2009

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ADG1	pre-weaning average daily gain
ADG2	post-weaning average daily gain
BWT	birth weight
Diff.	difference
F \ f	female
g	gram
GDP	gross domestic product
he	hectares
IWOE	weight of ewe at breeding
kg	kilogram
kg\d	kilogram per day
LADG1	litter pre-weaning average daily gain
LADG2	litter post-weaning average daily gain
LSB	litter size at birth
LSC	litter sex
LSW	litter size at weaning
LWTB	litter birth weight
LWTW	litter weaning weight
M \ m	male
MB	lamb mortality at birth
mth	month
N	no
PM	lamb mortality during suckling period
PPWT	weight of ewe at lambing
R	Phenotypic correlation
REML	Restricted Maximum Likelihood
RLIP	Range and Livestock Improvement Project
RRS	Regional Research Station

S	single
Sign.	significant
SOL	season of lambing
SOM	Season of mating
T	twin
TM	total lamb mortality from birth to weaning
TOB	birth type
WT6M	weight at six months
WWT	weaning weight
Y	yes
YOL	year of lambing
YOM	year of mating