Fiber growth of goats as influenced by the doe's genotype, plane of nutrition and physiological stage (gestation and lactation).

Submitted in partial fulfillment for the degree M Inst Agrar

by

Ngwekhulu Livhuwani

Submitted to:

Department of Animal and Wildlife Sciences
Faculty of Natural and Agricultural Sciences
University of Pretoria
Pretoria
2002

Table of contents

Tables and f	igures	Page v
Acknowledg	gements	Page vi
Declaration.		Page vii
Summary		Page viii
Chapter 1: A	ims and motivation.	Page 1
1.1 F	roblem statement	Page 1
1.2 E	Effects of pregnancy on fiber growth	Page 2
1.3 E	Effects of lactation on fiber growth	Page 4
1.4 E	Effects of pregnancy and lactation on fiber growth	Page 5
1.5 F	Relationship between fiber growth in pregnancy and lactation	Page 7
1.6 F	Relationship between milk protein secretion and wool	
p	roduction	Page 7
1.7 F	iber growth recovery	Page 8
1.8 F	iber growth rate and feed intake	Page 9
1.9 F	Leasons for the variation in the form of a relationship between	fiber growth
a	nd feed intake	Page 10
1.10	Feeding regimes.	Page 11
1.11	Body weight status	Page 12
1.12	Interaction between nutrition and environment	Page 12
1.13	Feed intake and fiber characteristics	Page13
1.14	Effects of protein and energy on fiber growth	Page 14
1.15	Relationship of feed intake to body weight change and stage	e of
g	rowth	Page 15
1.16	Relationship between body weight, weight change and fiber	
p	roduction	Page 16
1.17	Competition between milk and fiber production	Page 16
1.18	Nutrient partitioning between milk and fiber	Page 17
1.19	The effects of pregnancy and lactation on feed intake	Page 18

1	.20	Interaction between the physiological state of the animal, p	rotein to energy
	ratio	of absorbed nutrients and fiber growth	age 19
1	.21	Conclusion of literature review	Page 20
1	.22	Hypothesis and aim	Page 21
Chapter	2		Page 22
2	2.1 Met	hods of estimating wool growth	.Page 22
2	2.2 Dye	-banding	Page 22
2	2.3 Patc	hing	Page 23
	5 Elas	2.3.1 Disadvantages	Page 24
2	2.4 Mea	asurement using Cysteine labeled with Sulfur-35	Page 24
2	2.5 Met	hods of fiber diameter measurements	Page 25
	2	2.5.1 (a) Project microscope method	.Page 25
	((b) The Automation of the project-microscope method of fi	ber
	(diameter measurement	. Page 26
	12	2.5.2 The Gravimetric method	Page 27
	1	2.5.3 The Compressor meter method	Page 27
	2	2.5.4 The Porous plug method	Page 27
2	.6 Mea	surement of fiber length	Page 28
Chapter	3. Mate	erials and methods	Page 30
3	.1 Obje	ectives	Page 30
3	.2 Exp	erimental design	Page 30
3	.3 Dye	-banding	Page 31
3	.4 Prep	paration of the dye-band solution	Page 31
3	.5 App	lication of dye-band solution	Page 32
3	.6 Harv	vesting the dye-bands	Page 32
3	.7 Patc	hing	Page 32
3	.8 Nutr	ritional planes	Page 33
3	.9 Parit	ty	Page 33
3	.10 Cal	lculation of the mohair weight	Page 33
3	11 Ch	emical analysis	Page 34

Chapter 4. Results.	Page 35
4.1 Mohair growth	Page 35
4.1.1 Locality differences in mohair growth during differences	nt physiological
Tubles: stages	Page 35
4.1.2 Locality differences	.Page 37
4.1.3 Effects of feeding level on fiber growth	Page 39
4.1.4 Locality differences and fiber protein	Page 41
4.1.5 Nutritional plane effect on fiber protein content	Page 42
4.1.6 Interaction between locality and level of feeding	Page 44
4.2 Discussion	Page 45
4.3 Concluding remarks.	Page 47
Chapter 5 References	Page 48

Tables and figures

	T	1	1 -	0.23	٠
- 1	2	n	IP	. 6	1

4.1 Least square means and standard errors for growth period	. Page 46
4.2 Least square means and standard errors for protein content	. Page 47
4.3 Analysis of variance for growth period	. Page 48
4.4 Analysis of variance for protein content at different physiological	
stages	Page 48
Figures:	
4.1 Mohair growth at shoulder and midrib during different physiological s	tages of the
animal	Page 49
4.2 Effects of nutritional levels on fiber growth	Page 51
4.3 Body area differences in protein content	Page 52
4.4 Effects of level of feeding on protein content	Page 54

Acknowledgements:

I appreciate dearly everyone who assisted towards completion of this dissertation. Your help was invaluable.

- To Prof. P. B Cronje' for his assistance, advice, suggestion, criticism and precious time spent on guiding me during this period.
- To Prof. N. H Casey for carrying on with the support and positive suggestions.
- To Prof. A. E Nesamvuni for his encouragement all along and his tremendous help with the statistical analysis of the data.
- To my fellow students and friends: Hector Dombo, Ryan Cook for their help in the collection of the data and Gonzalo Luna for their help, encouragement and interest.
- To the technical assistance and kindness of Ms. Elydia Mulder.
- To the National Research Foundation (NRF) and the University of Pretoria for financial assistance
- To all my friends who were by my side through this time.

Summary

The aim of this thesis was to investigate how fiber growth of goats is determined by genotype, (purebred Angora and crossbred between Angora and Boer goat), physiological stages of the females from mid pregnancy until fifty days after the kids had been weaned and the plane of nutrition. Twelve Angora (pure bred) and ten Angora x Boer goat doe's with an initial mass of 28.70±4.42, between three and five years of age were used.

Half of them received 120% NRC energy requirements and the other half received 80% requirements. Mohair patches of 100cm² were collected from the animals at parturition, mid-lactation, weaning and fifty days post weaning.

The fiber greasy weight started declining with commencement of lactation in crossbred animals of both high and low nutrition. The greasy mass again increased from the period of weaning until fifty days post weaning suggesting that crossbred animals do not produce a lot of fiber at the expense of fetal and kid growth. Since fiber production from the crossbred animals is lower, I recommend that the Angora genotype be increased to gain more fiber and futher research be done on the topic.