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# Reproductive and metabolic endocrinology in rams selected for high or low plasma IGF-1 concentrations

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## Table of contents

Table of contents.....	ii
List of figures.....	v
List of tables.....	vii
Chapter 1: General introduction.....	1
1.1 Biology of insulin-like growth factors.....	3
1.2 Basic physiology of somatotrophic axis.....	6
1.2.1 Regulation of the somatotrophic axis.....	6
1.2.2 Insulin-like growth factors signals.....	10
1.2.3 Growth hormone.....	10
1.2.4 IGFs and IGF receptors.....	11
1.2.5 IGF binding proteins.....	11
1.3 Basic physiology of reproduction in sheep.....	12
1.3.1 Reproductive seasonality in sheep.....	13
1.3.2 Male reproductive system in rams.....	14
1.4 Insulin-like growth factors and reproduction system.....	16
1.4.1 The roles of GH and IGF-I in reproduction.....	16
1.4.2 IGFs and IGFBPs in the testis.....	17
1.4.2.1 IGF-I and IGF- II in the testis.....	17
1.4.2.2 IGF binding proteins.....	20
1.4.3 The effect of IGF-I on female reproduction.....	22
1.4.4 The effect of IGF-I on male reproduction.....	23
1.5 Low and high IGF-I selection lines of animals.....	24
1.6 Aims of the study.....	26
1.7 Summary of experiments.....	26
Chapter 2: Effects of selection for high and low serum insulin-like growth factor I (IGF-1) on reproductive performance in rams.....	30
2.1 Introduction.....	30
2.2 Materials and methods.....	32
2.2.1 Animals.....	32
2.1.1 Physical examination.....	33

2.1.2	Semen examination.....	33
2.1.3	Sperm density.....	34
2.1.4	Sperm morphology.....	34
2.1.5	Statistical analyses .....	35
2.2	Results: scrotal circumference and semen quality .....	36
2.2.1	Effects of IGF-I selection line and season on scrotal circumference.....	36
	Experiment 1 .....	36
	Experiment 2.....	37
2.2.2	Effects of IGF-I selection line and season on sperm motility and sperm density	
	Experiment 1 .....	38
	Experiment 2.....	40
2.2.3	Effects of IGF-I selection line and season on sperm abnormalities.....	42
	Experiment 1 .....	42
	Experiment 2.....	45
2.3	Discussion.....	49

Chapter 3: Effects of selection for high vs. low blood serum IGF-I concentrations on plasma concentrations of testosterone and insulin and on reproductive performance in rams

.....	.....	52
3.1	Introduction.....	52
3.2	Materials and methods .....	54
3.2.1	Animals.....	54
3.2.2	Collection of blood samples and administration of hormones.....	54
3.2.3	Radioimmunoassay of testosterone.....	55
3.2.4	Radioimmunoassay of insulin.....	56
3.2.5	Two-site immunoradiometric assay of IGF-I .....	57
3.2.6	Statistical analyses .....	59
3.3	Results.....	61
3.3.1	Effects of IGF-I selection line and season on plasma testosterone and on testosterone responses to an hCG challenge .....	61
3.3.2	Effects of IGF-I selection line and season on plasma IGF-I and on IGF-I responses to an hGRF challenge .....	65

3.3.3	Effects of IGF-I selection line and season on plasma insulin and on insulin responses to an hGRF challenge .....	68
3.3.4	Covariation for IGF-I and insulin concentrations on testosterone concentrations before/after hCG challenge .....	70
3.4	Discussion .....	74
Chapter 4: Expression of mRNA encoding IGF-I, IGF Type I receptor, IGF-binding proteins (IGFBP-1 to -6) between rams selected on basis of blood serum IGF-I concentration .....		
		79
4.1	Introduction .....	79
4.2	Materials and methods .....	80
4.2.1	Animals .....	80
4.2.2	Primer design .....	80
4.2.3	Total RNA extraction and RT-PCR .....	83
4.2.4	Statistical analyses .....	84
4.3	Results .....	84
4.3.1	Expression of mRNA encoding IGF-I and IGF Type I receptor .....	84
4.3.2	Expression of mRNA encoding IGF-binding proteins .....	86
4.4	Discussion .....	89
Chapter 5: General discussion .....		
		96
References .....		
		108

## List of figures

- Figure 1.1* The components of IGF system include IGFs (IGF-I and IGF- II), IGF binding proteins-1 to -6, IGFBP proteases, and type I and type II IGF receptors.
- Figure 1.2* Simplified diagram of the somatotropic axis involving the sites of production of GH and IGF-I, the feedback loops and their secretion, six binding proteins, and various metabolic actions. The hypothalamic hormones GRF and somatostatin control GH secretion from the pituitary. GH, bound to a GH-binding protein, circulates in the blood, inhibits its own secretion and stimulates IGF-I production in liver. The action of GH promotes either directly or indirectly the production of IGF-I.
- Figure 1.3* The role of the IGF-I system in testicular function.
- Figure 1.4* Overall experiments of this study
- Figure 2.1* Scrotal circumference in rams of three IGF-I selection lines in December 2005 and March 2006.
- Figure 2.2* Scrotal circumference in rams of two IGF-I selection lines in July, September and November 2006 and March 2007.
- Figure 2.3* Sperm motility score in rams of three IGF-I selection lines in December 2005 and March 2006.
- Figure 2.4* Sperm density in rams of three IGF-I selection lines in December 2005 and March 2006.
- Figure 2.5* Sperm motility (a) and sperm density (b) in rams of two IGF-I selection lines in July, September and November 2006 and March 2007.
- Figure 2.6* Percentages of sperm with (a) total abnormalities, with (b) abnormalities of the head region, and with (c) cytoplasmic droplets in rams of three IGF-I selection lines in December 2005 and March 2006.
- Figure 2.7* Percentages of sperm with (a) total abnormalities, with (b) major abnormalities, with (c) minor abnormalities, with abnormalities of

the (d) head region and of (e) cytoplasmic droplets, in rams of two IGF-I selection lines throughout the year.

*Figure 3.1a* Plasma testosterone concentrations before and after hCG challenges in rams of two IGF-I selection lines.

*Figure 3.1b* Plasma testosterone concentrations in rams of two IGF-I selection lines before and after hCG challenges

*Figure 3.2.* Plasma IGF-I concentrations before and after hGRF challenges in rams of two IGF-I selection lines.

*Figure 3.3.* Plasma insulin concentrations before and after hGRF challenges in rams of two IGF-I selection lines.

*Figure 3.4* Testosterone concentrations before and after hCG challenge adjusted for IGF-I concentrations

*Figure 3.5* Plot of least squares means for testosterone and IGF-I concentration. The equation for the regression line was  $Y=0.008x + 6.020$ , where variable Y=serum IGF-I concentrations and variable X = serum insulin concentrations II

*Figure 4.1* Mean IGF-I and Type I IGF receptor mRNA expression in the testis and the liver between high and low line.

*Figure 4.2* Mean IGFBP-2, -3 and -4 mRNA expression in the ram testis.

*Figure 4.3* Mean IGFBP-5 and -6 mRNA expressions in the ram testis.

## List of tables

- Table 2.1* Statistical analysis of Experiment 1 for comparisons of scrotal circumference between lines for each month.
- Table 2.2* Statistical analysis of Experiment 2 for comparisons of scrotal circumference between lines for each month.
- Table 2.3* Statistical analysis of Experiment 1 for comparisons of sperm motility between lines for each month
- Table 2.4* Statistical analysis of Experiment 1 for comparisons of sperm motility between months
- Table 2.5* Statistical analysis of Experiment 2 for comparisons of sperm motility and density between lines for each month.
- Table 2.6* Statistical analysis of Experiment 1 for comparisons of sperm with abnormalities between lines for each month.
- Table 2.7* Statistical analysis Experiment 2 for comparisons of sperm with abnormalities between lines for each month.
- Table 3.1* Statistical analysis for testosterone comparisons of lines and before/after challenge for each month
- Table 3.2* Statistical analysis for comparisons of IGF concentrations between months for each line
- Table 3.3* Statistical analysis for insulin for comparisons of before and after challenge for each line in July and March
- Table 3.4* Statistical analysis of covariation for IGF-I and insulin concentrations on testosterone concentrations before and after hCG challenge
- Table 4.1* Summary of upstream and downstream PCR primer sequences, annealing temperatures (AT) used during PCR and Genbank<sup>®</sup> accession NO and size of cDNA.
- Table 4.1* Statistical analysis of mRNA expression of IGFBP-2, -3, -4, -5 and -6 in testis for comparisons of variables between lines
- Table 4.2* Statistical analysis of mRNA expression of IGF-I and Type I IGF receptor in testis, and IGF-I in liver for comparisons of variables between lines

## **Abstract**

The objectives of this study were to define reproductive and metabolic endocrinology in Romney rams selected at the time of weaning for high or low peripheral IGF-1 concentrations with particular relevance to the annual changes in the relationships between GH, IGF-I and insulin and the relationship between that system and the activity of the reproductive endocrine axis. Parameters examined in detail included testis function, the response of IGF-I and insulin to GRF, and expression of IGF-I and its binding proteins in the testis. A preliminary experiment (December 2005 and March 2006) examined semen sample high, low and unselected IGF-I rams. In the main experiment, blood and semen samples were collected in July, September and November 2006 and March 2007 from yearling rams (high or low IGF-I concentrations). Scrotal circumference and inguinal skin were recorded. Blood samples were collected via jugular venipuncture. After a collection of the control samples, rams were given 50 ug hGRF and 1,000 IU hCG. Second blood samples were collected 40 min (testosterone) and 10 h later (insulin and IGF-I). Seasonal differences from July to March were evident in the percentage of abnormal sperm, scrotal circumference and sperm motility, and concentrations of testosterone, IGF-I and insulin. IGF-I line differences were also found in scrotal circumference and IGF-I and insulin concentrations. Testosterone concentrations did not differ between lines, but, when actual IGF-I concentrations were taken into consideration, exhibited different secretion patterns between lines. In the experiment 3, samples of liver and testis tissue were collected from four animals for expression of mRNA for IGF-I, Type I IGF receptor and IGF binding proteins. It was found that genes for IGF-I, Types I IGF receptor and IGF binding proteins -2, -3, -4, -5 and -6 were expressed in the testis. Significant high expression of Type I IGF receptor and IGFBP-3 in the testis was found in the low line, with different levels of high and low expression of IGF-I in the liver of the two lines. These studies suggested that circulating concentrations IGF-I are associated with gonadotropin-stimulated steroidogenesis that affects scrotal circumference, but differences in IGF-I status between lines are modulated by the different expression of mRNA for IGF-1R and IGFBPs and by negative feedback between lines.