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# **The effect of nutritional fetal programming on post-pubertal male reproduction in sheep**

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## ABSTRACT

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There is evidence that the *in utero* environment affects or programmes postnatal development and performance of offspring. Previous investigations have been conducted to establish the effects of dam nutrition on the development and reproductive performance of rams following various nutritional regimes of the ewe during pregnancy. This study further examines the effect of nutritional treatments of ewes during pregnancy on post-pubertal male reproductive performance. Sixty-two ram offspring, obtained from twin-bearing ewes that were fed at one of three different nutritional treatments in early pregnancy (Day 21-50, Low (L<sub>D21-50</sub>) vs. Maintenance (M<sub>D21-50</sub>) vs. High (H<sub>D21-50</sub>)), and one of two different nutritional treatments in mid to late pregnancy (Day 51-140, Maintenance (M<sub>D51-140</sub>) vs. High (H<sub>D51-140</sub>)), were utilised in this study. Reproductive performance was measured using the accepted indicators of scrotal circumference, and semen quality and quantity (visual density, motility, quantitative sperm density and morphology) to establish if there was any effect of maternal nutrition on these parameters. The influence of seasonality was also investigated. Ewe nutrition during D 21–50 or D 51–140 had no effect on scrotal circumference, semen quality nor quantity. The rams in this study generally conformed to previously described seasonal patterns of reproductive activity. In conclusion, the present study demonstrates that under these conditions, post-pubertal male reproductive function and capacity and therefore fertility appear to be unaffected by prenatal maternal nutrition, and that rams maintain their cyclical reproductive response to seasonal cues.

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## LIST OF ABBREVIATIONS

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LH	Luteinising hormone
FSH	Follicle stimulating hormone
GnRH	Gonadotrophin-releasing hormone
DHT	Dihydrotestosterone
CNS	Central Nervous System
DNA	Deoxyribonucleic acid
RNA	Ribonucleic acid
GDNF	Glial cell line derived neurotrophic factor
AR	Androgen receptor
MAP	Mitogen-activated protein
cAMP	Cyclic adenosine monophosphate
CREB	cAMP response element binding protein
H <sub>D21-50</sub>	<i>ad libitum</i> grazing conditions that results in ewe average weight gain of 100g/day
M <sub>D21-50</sub>	no change in total ewe liveweight
L <sub>D21-50</sub>	loss in total ewe liveweight of 100g/day
H <sub>D51-140</sub>	<i>ad libitum</i> grazing conditions
M <sub>D51-140</sub>	ensures total ewe liveweight increased at similar level to that of expected conceptus mass

