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**The effect of ewe nutrition during pregnancy on the
reproductive system of the offspring**

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Abstract

Human and domestic animal epidemiological studies have shown that the early life intrauterine environment can play a critical role in determining the development of various organs and systems at the cellular level, and the lifetime health status and productive performance of an individual. However, only sparse information exists for sheep, regarding the effects of maternal feeding during pregnancy under New Zealand grazing conditions on offspring growth and reproductive performance.

In this thesis, two paradigms were examined; (i) Dam size (heavy *vs* light; selected based on extreme live weights from a commercial flock) and dam nutrition for a prolonged period in pregnancy (*ad libitum vs* maintenance; P21-140), and (ii) Dam nutrition during early P21-50 (*ad libitum vs* maintenance *vs* sub maintenance) and mid-to-late pregnancy P50-139 (*ad libitum vs* maintenance) which are to the range of nutritional treatments used by New Zealand farmers. *Ad libitum* was used to provide unrestricted access to pasture forage, maintenance was to ensure total live weight gain equivalent to the expected conceptus mass and sub maintenance was to achieve a loss in total ewe live weight 0.1 kg/day. The growth and reproductive performance of the offspring during both the pre-natal and post-natal periods were examined.

The results from this thesis indicated that it was possible to alter ovarian cell development of the female offspring during fetal and adult life by varying dam size at the time of conception. In male offspring, only minor effects of dam size on fetal testicular cell development were observed. Maternal nutrition during pregnancy altered female offspring fetal ovarian cell development but there was no effect on reproductive performance as an adult. In fetal male offspring, maternal nutrition did not alter testicular cell development, however, minor effects were observed on adult reproductive performance. Overall, there was little effect of both paradigms on male and female offspring lifetime performance.

Combined, the results suggest that farmers using similar grazing conditions to the present studies do not need to take into account nutrition of the dam when selecting male or female replacements. Future studies may consider more extreme underfeeding, but this may not be relevant on sheep farming in New Zealand. Further studies are required to further investigate the possible effects of maternal size on lifetime performance of the offspring.

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