

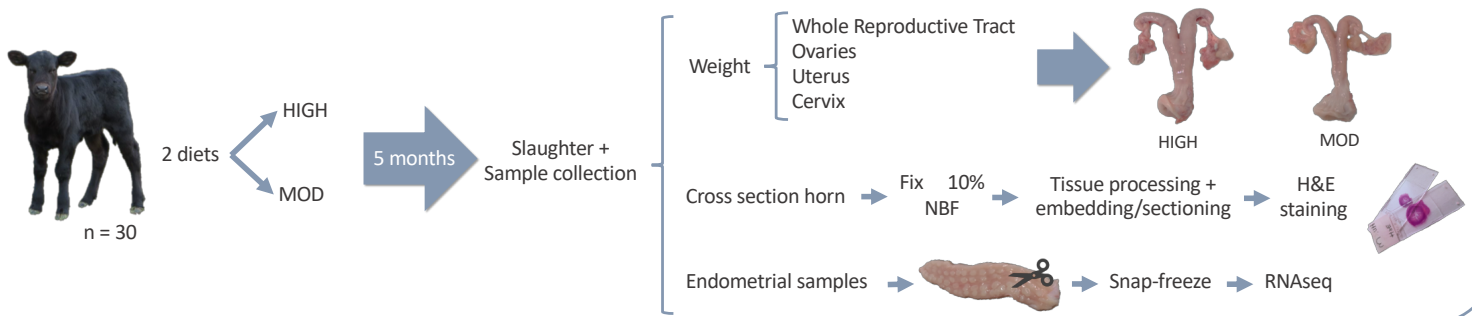
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Introduction

In cattle, uterine gland development (adenogenesis) occurs postnatally, beginning immediately after birth, and is normally complete by approximately six months of age (1). Normal development of uterine glands is essential for subsequent fertility, as demonstrated with the uterine gland knock out (UGKO) sheep model in which conceptus elongation is not supported (2). Early life plane of nutrition has an impact on age at puberty and future health and performance (3,4), but its impact on adenogenesis is unclear. The aim of this study was to compare the effect of a high (HIGH) and moderate (MOD) plane of nutrition during the first 21 weeks of life on heifer reproductive organ growth, endometrial gland development, and endometrial gene expression.

Material and Methods



Results

1 Body weight (BW), average daily gain (ADG) and weights of the reproductive tract and its component parts of prepubertal heifers fed a moderate (MOD) or enhanced (HIGH) plane of nutrition (mean ± standard deviation).

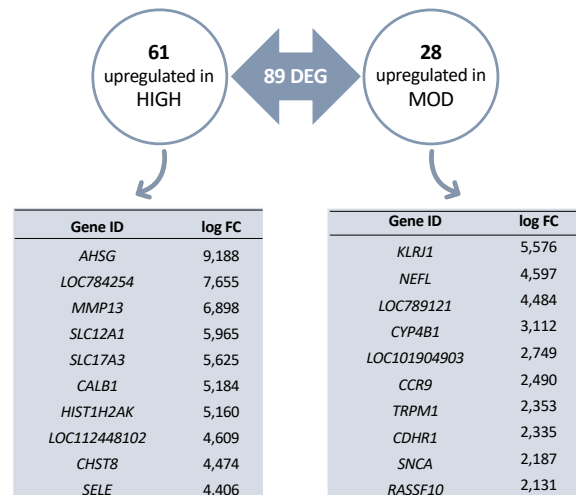
Measurement	HIGH	MOD	P value
BW (kg)	189.6	110.2	<0.001
ADG (Kg/d)	1.18	0.5	<0.001
Whole reproductive tract (g)	114.01 ± 35.56	52.67 ± 14.29	<0.001*
Cervix (g)	33.17 ± 9.35	16.14 ± 5.27	<0.001*
Uterus (g)	59.35 ± 25.78	27.46 ± 10.61	<0.001*
Ovaries (g)	14.8 ± 11.38	5.4 ± 1.94	<0.001*

* These differences were also present when organ weight was expressed on a per unit of body weight basis (P<0.05)

2 Evaluation of the endometrial gland development in cross sections of the uterine horn (scale bar = 1 mm; mean ± standard deviation).

Measurement	HIGH	MOD	P value
Endometrial area (mm ²)	57.39 ± 33.29	20.67 ± 8.56	<0.05
Total n° of glands/cross section	1896.5 ± 865.7	1017.7 ± 255	<0.05
Gland density (n° glands/mm ²)	39.13 ± 19.47	52.09 ± 10.43	0.181

3 Endometrial samples RNAseq data with the total number of differentially expressed genes (DEG), the number of genes upregulated in each group and the top 10 upregulated genes per group (log FC: logarithm of the fold change).



Conclusions

- Enhanced (HIGH) early-life plane of nutrition increased the size of the reproductive tract in heifer calves.
- The endometrial area and total number of glands in a cross section was higher in the HIGH group than in the MOD. However, there were no differences in gland density.
- Dietary induced alterations in the endometrial transcriptome. Further analysis is underway regarding the pathways enhanced in each case.

References:
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(4) Soberon, F., E. Raffrenato, R. W. Everett, and M. E. Van Amburgh. 2012. 'Prewaning Milk Replacer Intake and Effects on Long-Term Productivity of Dairy Calves'. *Journal of Dairy Science*