

Peri-implantational subnutrition decreases dam IGF-1, but does not impair fertility in suckled cows

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The effect of a negative energy balance during the first term of pregnancy on metabolic and endocrine parameters and pregnancy was studied in two beef cattle breeds, Parda de Montaña (PA, n=75) and Pirenaica (PI, n=40). Seventy-six days after calving, lactating cows were synchronised with a Cosynch protocol and artificially inseminated (AI). Then, cows were allocated to two diets (CONTROL (100% of their requirements) or SUBNUT (65%)) until day 82 of gestation. Cow and calf live-weights, and dam body condition score (BCS) were recorded fortnightly. Dam blood samples were assayed for glucose, cholesterol, NEFA, β -hydroxybutyrate and urea (fortnightly); insulin-like growth factor 1 (IGF-1) (monthly); and progesterone (days 14, 18, 21, 28, 42, 56, 69, 82 post-AI). Pregnancy was recorded 37 days post-AI by ultrasounds. Pirenaica cows showed higher BCS at AI than PA (2.9 vs 2.7, $P<0.001$). CONTROL cows maintained BCS and live-weights, whereas SUBNUT had negative daily gain (0.12 vs -0.36 kg, $P<0.001$). CONTROL lactating calves had higher daily gains than SUBNUT (0.63, 0.56, 0.62 and 0.44 kg for PA-CONTROL, PA-SUBNUT, PI-CONTROL and PI-SUBNUT, $P<0.05$). An interaction occurred in metabolites and IGF-1 profiles among breed, nutrition and time. SUBNUT cows showed higher NEFA values than CONTROL ones. NEFA values on day 56 were related to BCS at AI ($r=0.39$, $P<0.001$). From day 69 onwards, PI-SUBNUT had lower cholesterol than PI-CONTROL ($P<0.05$). At day 82 post-AI, IGF-1 values were higher in CONTROL groups (74.6, 57.2, 90.4 and 73.6 ng/ml, for PA-CONTROL, PA-SUBNUT, PI-CONTROL and PI-SUBNUT, $P<0.001$). Surprisingly, pregnant dams showed lower IGF-1 values than non-pregnant ones (70.4 vs 92.5 ng/ml, $P<0.01$). Progesterone level was greater in pregnant cows from d 21 on ($P<0.001$), providing the earliest and accurate day to pregnancy diagnose. A high fertility rate was obtained (77%) with no breed, nutrition or sire effect. Peri-implantational subnutrition affected cow performance and physiological profiles, and impaired lactating calf growth, but did not damage progesterone level from day 21 post-AI or fertility rate, confirming that undernourished pregnant dams prioritize the partition of dietary energy to reproductive functions.

Effects of pasture grazing on growth performance and physicochemical traits in Hanwoo

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This study investigated the effect of pasture grazing on growth performance, quality grade factors and physicochemical traits of longissimus dorsi in 10 Hanwoo (native Korean cattle) steers. Steers were randomly assigned to two groups (grazing and housing). In the grazing group, steers had access to pasture and were supplemented with concentrates (1.2% of body weight (BW) per day) during the rearing period. Pasture grazing (PG) was performed at a 7 ha grassland from April to November by rotational grazing method. The housed group (Barn feeding system, BFS) was fed with rice straw and concentrate (1.5 and 1.2% of BW per day, respectively) during the rearing period. In the fattening period (for 10 months after growing stage), the grazing group was supplied with fermented TMR feed while housed group received rice straw and concentrates. Initial BWs of BFS and PG were 231 ± 20.33 kg and 245 ± 22 kg, respectively. Average daily gains of both groups did not differ significantly, at 0.85 kg and 0.87 kg, respectively. Final BWs of BFS and PG (27 months) were 728 ± 36.79 and 732 ± 26.97 , respectively. The carcass weight and longissimus muscle back-fat thickness were higher in PG. Warner-Bratzler shear force was higher in PG than that of BFS but other physicochemical traits of m. longissimus dorsi were not different among all treatments. The ratio of w-6/w-3 fatty acids was lower in PG, but amino acids were not different between BFS and PG. These results indicate that grazing from April to November in the rearing period had no effect on physicochemical traits of Hanwoo steers.

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1 Introduction

Undernutrition in early pregnancy, which is common in extensive beef cattle systems, may affect the productive efficiency of the cow-calf system

2 Objective

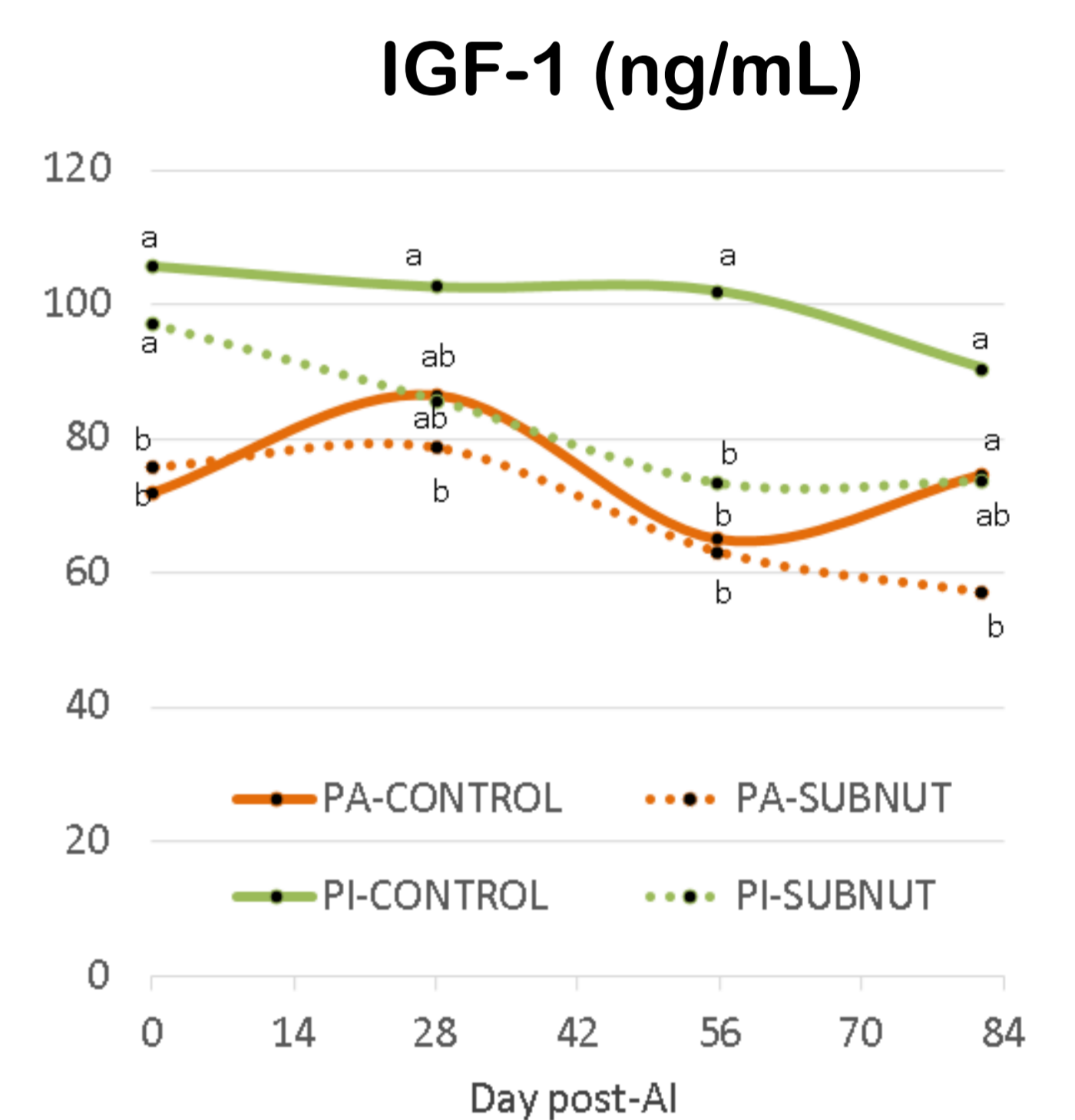
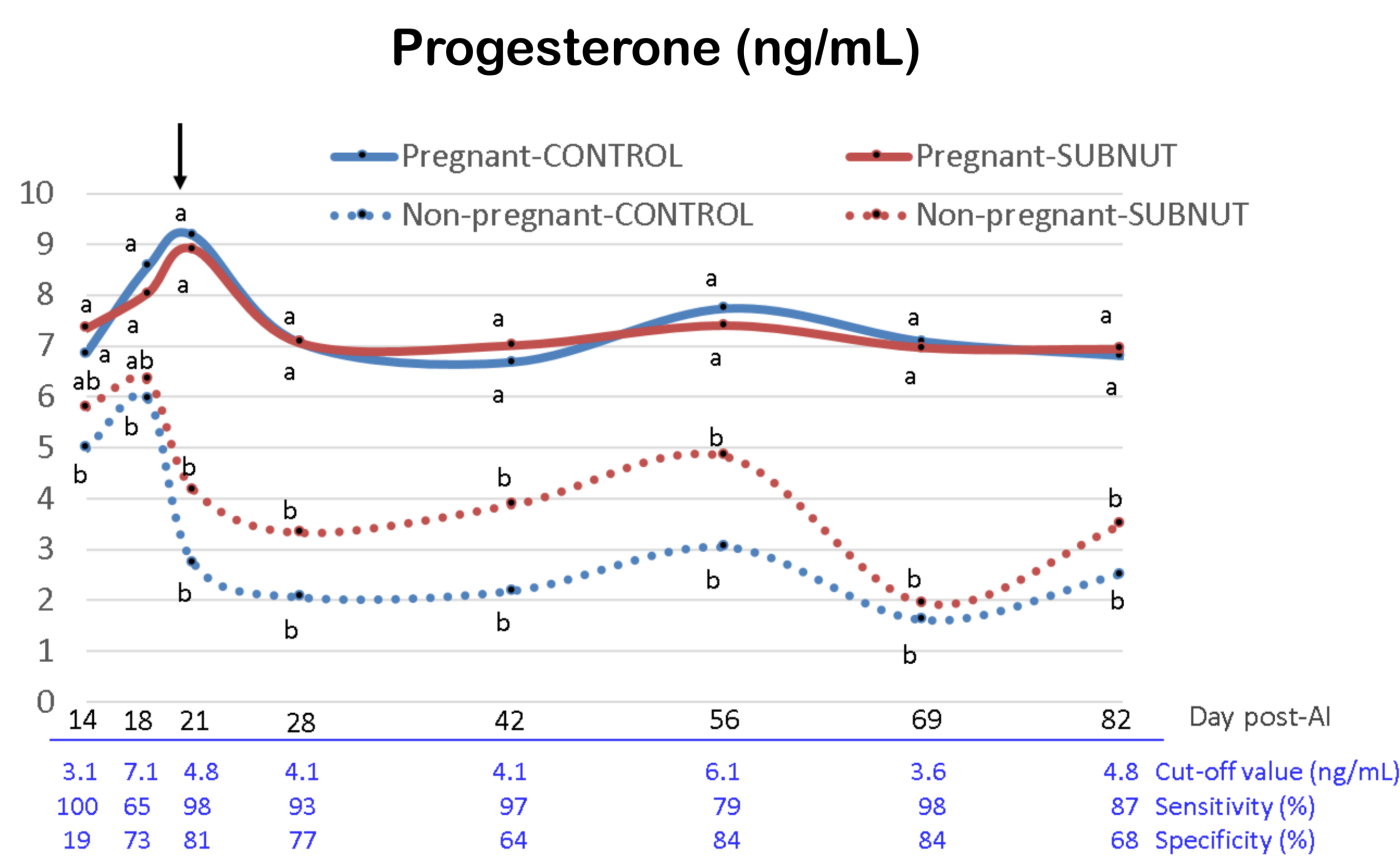
To study the effect of a negative energy balance during the first term of pregnancy on cow-calf live weights, cow metabolism and pregnancy rate in beef breeds

3 Materials and Methods

- Lactating multiparous cows of Parda de Montaña (PA, n=75) and Pirenaica (PI, n=40) cattle breeds
- Co-synch and Fixed-timed AI at d 0 (76 days postpartum), and pregnancy diagnose at d 37 post-AI by ultrasound scanning
- Diets to cover 100% (CONTROL) vs. 65% (SUBNUT) of the energy requirements for maintenance, pregnancy and lactation, during the first 82 days of pregnancy
- Cow-calf live weights (to estimate average daily gain, ADG) and cow BCS recorded fortnightly
- Dam blood samples: Progesterone (days 14, 18, 21, 28, 42, 56, 69 and 82 post-AI); Insulin-like growth factor 1 (IGF-1, monthly); Cholesterol and NEFA (fortnightly)

4 Results

- **Cow BCS at AI:** 2.9 vs. 2.7 for PI and PA (P<0.001) (no effect of nutrition)
- **Cow ADG:** 0.12 vs. -0.36 kg for CONTROL and SUBNUT (P<0.001)
- **Cholesterol:** From d 69 on, lower in PI-SUBNUT than in PI-CONTROL (P<0.05)
- **NEFA:** 0.37 vs. 0.21 mmol/L for CONTROL and SUBNUT (P<0.05)
- **Pregnancy rate:** 77% (no effect of breed, nutrition or sire)
- **Calf ADG:** 0.63 vs. 0.50 kg, for CONTROL and SUBNUT (P<0.05)



- **Progesterone** was greater in pregnant than in non-pregnant cows from d 21 on, providing the earliest and accurate day to pregnancy diagnose

- **IGF-1** > in PA-CONTROL (d 56) and PI-CONTROL (d 82) than SUBNUT lots (P<0.05)
- **IGF-1:** 70.4 vs. 92.5 ng/mL for pregnant and non-pregnant dams (P<0.01)



5 Conclusions

- Peri-implantational subnutrition impaired in a short-term cow metabolism and growth of calf reared concurrently to subnutrition, but did not damage progesterone level from day 21 post-AI or pregnancy rate
- Undernourished pregnant dams prioritized the partition of dietary energy to reproductive functions

