FETAL GROWTH CAPACITY INFLUENCES NUTRITIONAL STATUS OF HEREFORD COWS DURING PREGNANCY

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The capacity of cows to lactate and successfully reproduce is dependent upon their nutritional status which, in turn, is determined by factors influencing their liveweight, and fat and protein stores. This paper reports effects on the nutritional status of well- or poorly-nourished pregnant cows sired by bulls with high capacity for growth of muscle or intramuscular fat.

Primiparous and multiparous Hereford cows were mated to Piedmontese or Wagyu sires by artificial insemination or naturally. At ~100 d gestation the 307 pregnant cows were placed onto low (native) or high (improved temperate, irrigated) quality pasture. Cows were weighed, condition scored and real-time ultrasound scanned to measure rump, rib and intramuscular (IMF) fatness and eye muscle area (EMA) just prior to commencing their nutritional treatment (February 2001) and again just prior to commencement of the calving period (July 2001).

Cow nutrition and parity significantly influenced each measurement and there were nutrition × parity interactions on all variables apart from IMF and EMA. Cows with male fetuses lost more eye muscle mass and condition than those with females fetuses. Liveweight during late pregnancy was also influenced by more complex interactions including those with sex and sire-breed of the fetus.

Table 1. Average changes (Δ) in liveweight (LW), condition score (CS), and rump fat depth, rib fat depth, intramuscular fat (IMF), and eye muscle area (EMA) measured by real-time ultrasound scanning, of cows from early (February 2001) to late (July 2001) pregnancy as affected by sire breed, fetal sex, and parity and nutrition of dam from ~100 days of pregnancy.

	Δ LW kg	Δ CS	Δ Rump Fat mm	Δ Rib Fat mm	Δ IMF %	Δ EMA cm^2
Wagyu-sired fetus	14.7	-0.5	-3.7	3.2	0.0	-0.5
Piedmontese-sired fetus	16.7	-0.5	-3.3	3.7	0.1	-1.4
Female fetus	16.5	-0.4	-3.3	3.7	0.0	0.0
Male fetus	14.9	-0.6	-3.7	3.3	0.1	-1.9
Primiparous cows	31.0	-0.6	-1.0	2.3	0.4	-2.0
Multiparous cows	0.4	-0.4	-5.9	4.6	-0.3	0.1
Low cow nutrition	-27.4	-1.3	-5.7	0.6	-0.5	-10.2
High cow nutrition	58.8	0.3	-1.2	6.3	0.6	8.3
SED	9.8	0.2	1.5	1.3	0.5	2.6
Effects[1]	N, P, NxP,SxPxB NxPxB	N,P,S NxP	N,P NxP	N,P NxP	N,P	N,P,S

[1] Effects ($P < 0.05$) on changes in LW, CS or scanned measurements from early to late pregnancy: N = pregnant cow nutrition; P = parity; S = sex of fetus; B = sire breed of fetus.

The results demonstrate that cow parity and the nutritional regimens imposed had marked effects on the nutritional status of the cows. The effect of fetal sex on EMA suggests that muscle mass is more sensitive to differences in fetal requirements for nutrients than is mass of fat, consistent with the major substrates for fetal growth being glucose and amino acids. The results also demonstrate a redistribution of fat as pregnancy proceeds. They will provide insight into the complex interactions affecting cow nutritional status as pregnancy proceeds and, therefore, into subsequent lactational and reproductive performance.

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