Effect of dietary arginine supplementation to sows on litter size, fetal weight and myogenesis at d 75 of gestation

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Arginine level is known to be elevated in porcine amniotic and allantoic fluid during early pregnancy suggesting that it plays an important role in embryonic, placental and fetal development. Thus, the aim of the study was to determine the effect of dietary arginine supplementation to primiparous gilts on litter size, fetal weight (FW) and myogenesis at d 75 of gestation. At the day of mating 20 Swiss Large White gilts were randomly allocated to either control (C) or the arginine treatment (A). All gilts were offered daily 3 kg of a standard diet from mating to d 75 of gestation. Additionally, A-sows received from d 14 to 28 daily 25 g L-arginine. Because of non-pregnancy 3 C-gilts were excluded from the trail. At d 75 of gestation all sows were sacrificed and all fetuses counted and weighed. From each litter the lightest, heaviest, and the ones with an average FW from both genders were selected and the semitendinosus (ST) muscles were excised. The cross-sectional area of the ST and the number of primary (P) and secondary fibers (S) and the S/P ratio were determined. In A-sows litter size was greater (13.0 vs. 9.3; $P = 0.04$) than in C-sows whereas FW did not ($P = 0.95$) differ. The ST of A-sows fetuses had more P (17699 vs. 16477; $P < 0.04$) and the S/P ratio was lower (20.3 vs. 21.5; $P < 0.07$) than in fetuses from C-sows. Regardless of treatment, the cross-sectional area of the ST was larger (28.4 vs. 23.7 mm2; $P < 0.01$) and the total number of S (384389 vs. 340471), the S/P fiber ratio (21.6 vs. 19.5) and the total fiber number were greater (401975 vs. 357193; $P < 0.05$) in fetuses with a high compared to a medium or low FW. Neither ovulation rate (yellow body count) nor the number of mummies differed among treatments, which implies that dietary arginine supplementation during early gestation improved embryo implantation rate without negatively affecting FW. The greater number of P in the ST of fetuses from A-sows suggest that total fiber number at birth might be positively affected by L-arginine since hyperplasia of P is terminated at d 55 of gestation and P serve as scaffold for subsequent S formation.

KEYWORDS
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