

Abstract

J Anim Physiol Anim Nutr (Berl). 2006 Dec;90(11-12):487-99

Effects of L-carnitine supplementation in pregnant sows on plasma concentrations of insulin-like growth factors, various hormones and metabolites and chorion characteristics.

Doberenz J, Birkenfeld C, Kluge H, Eder K.

Institut für Ernährungswissenschaften, Martin-Luther-Universität Halle-Wittenberg, Halle/Saale, Germany.

OBJECTIVE: Previous studies have shown that supplementation of sow diets with L-carnitine increases the body weight of piglets at birth. This study was conducted to elucidate the reasons for this phenomenon.

METHODS: Three experiments with 24 (experiment 1), 40 (experiment 2) and 12 (experiment 3) sows were conducted. In all three experiments, sows were allotted to two groups which had free access to a nutritionally adequate diet. Sows of one group were supplemented with 125 mg L-carnitine/day during pregnancy; sows of the other group (control group) did not receive L-carnitine. In experiment 1, plasma samples were collected at day 95 of pregnancy, in experiment 2 plasma samples were collected at days 80 and 100 of pregnancy. In experiment 3, chorions of the sows were collected at parturition. L-carnitine-treated sows had higher plasma concentrations of total L-carnitine than control sows ($p < 0.05$).

RESULTS: The number of piglets born and weights of litter and individual piglets at birth were not different between both groups in all three experiments. L-carnitine-treated sows had higher plasma concentrations of insulin-like growth factor-I (IGF-I) on day 80 of pregnancy (experiment 2, $p < 0.05$) and on day 95 (experiment 1, $p < 0.10$), and a higher plasma concentration of IGF-II on day 80 (experiment 2, $p < 0.05$) than control sows. Moreover, sows supplemented with L-carnitine had heavier chorions (+22%, $p = 0.10$) with greater amounts of protein (+45%, $p < 0.05$) and DNA (+38%, $p < 0.10$) and a higher protein concentration of glucose transporter-1 (+62%, $p < 0.05$). Plasma concentrations of 17 β -oestradiol, progesterone and thyroid hormones as well as concentrations of urea and total free amino acids were not different between both groups of sows. Plasma concentrations of non-esterified fatty acids, ketone bodies, triacylglycerols and cholesterol were also largely indifferent between both groups of sows.

CONCLUSION: In conclusion, this study shows that L-carnitine has less influence on lipid metabolism and utilization of nitrogen in pregnant sows but increases their plasma concentrations of IGFs. This in turn may enhance development of the placenta and the intrauterine nutrition of the fetuses. This may be the reason for increased birth weights observed in recent studies in sows supplemented with L-carnitine.

PMID: 17083430