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日粮油脂对高产母猪奶水组成及必须脂肪酸平衡的影响

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本论文开展两个试验研究日粮中添加油脂（必需脂肪酸亚油酸和α-亚麻酸的日粮来源）对高产母猪奶水组成的影响，并预估母猪必需脂肪酸的沉积。试验一，30 头母猪，处理间母猪胎次一致，每头母猪带仔 12 头。试验处理为 6%动植物混合油（A-V），6%精炼油（CWG）和对照组（无油脂添加）。日粮为玉米豆粕型，并添加 8%玉米 DDGS、6%麦麸，日粮中 SID 赖氨酸含量为 3.25g /Mcal 代谢能。日粮中添加油脂可以增加母猪奶水中脂肪的分泌量（P=0.082，559g/d VS 499g/d）。必需脂肪酸沉积以表观回肠吸收量减去乳中分泌量计算得到。对照组哺乳母猪奶水中的亚油酸分泌量高于摄入量，导致了哺乳母猪机体亚油酸的负平衡（分娩后第 3、10、17 天分别为-22.4、-38.0、-14.1g/d）。试验二，50 头母猪，处理间胎次一致，每头母猪带仔 12 头。将母猪随机分为五组，一组为对照组（无脂肪添加），另四组为 2×2 双因素试验设计，试验处理包括两个亚油酸水平（添加量分别为 2.1%和 3.3%）和两个α-亚麻酸水平（添加量为 0.15%和 0.45%）。试验处理由日粮中添加 4%不同比例的混合油脂（菜籽油、玉米油、亚麻油）达成。日粮中 n-6 和 n-3 脂肪酸比例由 5 至 22 不等。增加日粮中必须脂肪酸含量可以提高乳汁中亚油酸（P < 0.001；日粮中亚油酸 2.1%和 3.3%添加量组乳中亚油酸含量分别为 16.7%和 20.8%）和α-亚麻酸的含量（P < 0.001；日粮中α-亚麻酸 0.15%和 0.45%组乳中α-亚麻酸分别为 1.1%和 1.9%）。日粮中添加必需脂肪酸可以增加α-亚麻酸的沉积（P＜0.001；0.15%和 0.45%组分别为-0.2 和 5.3g/d），但是对亚油酸沉积无显著影响（P=0.14；2.1%和 3.3%添加量组分别为-3.4 和 10.0g/d）。总之，哺乳母猪日粮中添加脂肪能增加乳脂分泌。日粮中必需脂肪酸的添加可以改变乳脂脂肪酸组成。日粮中添加必须脂肪酸可以促进哺乳母猪必需脂肪酸的储备，随后改善保育猪的健康和母猪后期生产水平。

Impact of dietary lipids on sow milk composition and balance of essential fatty acids during lactation in prolific sows

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Two studies were designed to determine the effects of supplementing diets with lipid sources of EFA (linoleic and α-linolenic acid) on sow milk composition to estimate the balance of EFA for sows nursing large litters. In Exp. 1, 30 sows, equally balanced by parity (1 and 3 to 5) and nursing 12 pigs, were fed diets supplemented with 6% animal-vegetable blend (A-V), 6% choice white grease (CWG), or a control diet without added lipid. Diets were corn-soybean meal based with 8% corn distiller dried grains with solubles and 6% wheat middlings and contained 3.25 g standardized ileal digestible Lys/Mcal ME. Sows fed lipid-supplemented diets secreted greater amounts of fat (P = 0.082; 499 and 559 g/d for control and lipid-added diets, respectively) than sows fed the control diet. The balance of EFA was computed as apparent ileal digestible intake of EFA minus the outflow of EFA in milk. For sows fed the control diet, the amount of linoleic acid secreted in milk was greater than the amount consumed, throughout lactation. This resulted in a pronounced negative balance of linoleic acid (-22.4, -38.0, and -14.1 g/d for d 3, 10, and 17 of lactation, respectively). In Exp. 2, 50 sows, equally balanced by parity and nursing 12 pigs, were randomly assigned to a 2 × 2 factorial arrangement of diets plus a control diet without added lipids. Factors included linoleic acid (2.1% and 3.3%) and α-linolenic acid (0.15% and 0.45%). The different concentrations of EFA were obtained by adding 4% of different mixtures of canola, corn, and flaxseed oils to diets. The n-6 to n-3 fatty acid ratios in the diets ranged from 5 to 22. Increasing supplemental EFA increased (P < 0.001) milk concentrations of linoleic (16.7% and 20.8%, for 2.1% and 3.3% linoleic acid, respectively) and α-linolenic acid (P < 0.001; 1.1 and 1.9% for 0.15 and 0.45% α-linolenic acid, respectively). Increasing supplemental EFA increased

the estimated balance of α-linolenic acid ($P < 0.001$; -0.2 and 5.3 g/d for 0.15% and 0.45% α-linolenic acid, respectively), but not linoleic acid ($P = 0.14$; -3.4 and 10.0 g/d for 2.1% and 3.3% linoleic acid, respectively). In conclusion, lipid supplementation to sow lactation diets improved milk fat secretion. The fatty acid composition of milk fat reflected the dietary supplementation of EFA. The net effect of supplemental EFA was to create a positive balance during lactation, which may prove to be beneficial for the development of nursing piglets and the subsequent reproduction of sows.