

Effects of dietary omega-3 polyunsaturated fatty acids on growth and immune response of weanling pigs

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Abstract: The recognition that omega-3 polyunsaturated fatty acids (n-3 PUFA) possess potent anti-inflammatory properties in human models has prompted studies investigating their efficacy for animal growth and immunity. This study examined the effect of feeding an n-3 PUFA-enriched diet on growth and immune response of weanling piglets. Newly weaned pigs (averaging 27 ± 2 days of age and 8.1 ± 0.7 kg of body weight) were assigned randomly to receive a control (3% vegetable oil, $n = 20$) or n-3 PUFA-supplemented (3% marine n-3 PUFA, $n = 20$) diet for 28 day after weaning. Female pigs consuming the n-3 PUFA-enriched diet were lighter at week 4 post-weaning than those fed the vegetable oil supplement. Weanling pigs gained more weight, consumed more feed and had better growth to feed ratios between days 14 and 28 than between days 0 and 14 post-weaning. Plasma insulin-like growth factor I (IGF-I) decreased between days 0 (87.2 ± 17.0 ng/mL) and 14 (68.3 ± 21.1 ng/mL) after weaning and then increased again by day 28 (155.2 ± 20.9 ng/mL). In piglets consuming the vegetable oil-enriched diet, plasma tumor necrosis factor alpha (TNF- α) increased from 37.6 ± 14.5 to 102.9 ± 16.6 pg/mL between days 0 and 14 post-weaning and remained high through day 28 (99.0 ± 17.2 pg/mL). The TNF- α increase detected in the piglets fed vegetable oil was not observed in the piglets fed n-3 PUFA. Results indicate that weaning induces considerable immune stress in piglets and that this stress can be mitigated by dietary supplementation of n-3 PUFA.

Keywords: n-3 PUFA, Growth, Immunity, Pig