

Effects of Dietary Fishmeal and Soybean Meal on Ovine Innate and Acquired Immunity During Pregnancy and Lactation.

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Although the benefits of omega-3 (n-3) fatty acids (FA) for human health are well known, Westernized diets are largely n-3 deficient. To address this deficiency, the livestock industry has been supplementing animals with fishmeal, rich in n-3 FA, to produce value added products (VAP) for health conscious consumers. We hypothesize that fishmeal supplementation will impact the health of livestock. To test this, forty pregnant ewes were supplemented with rumen protected soybean meal (SBM) rich in n-6 FA, or rumen protected fishmeal (FM) rich in n-3 FA, commencing gestation day 100 (gd100). During lactation, on day 30 (ld30), ewes were sensitized with hen egg white lysozyme (HEWL) antigen and dinitrochlorobenzene (DNCB) hapten to assess their innate immune (haptoglobin) response. On ld40, their acquired immune response was assessed by measuring the skin allergen (hypersensitivity) response to HEWL and DNCB. Blood samples collected throughout the study demonstrated that FM and SBM supplementation enriched ewes with n-3 and n-6, respectively. Time 0, basal haptoglobin levels were higher in the n-6 group than the n-3 group ($p < 0.0001$), and they responded differently over time. SBM ewes showed a linear ($p < 0.003$) where FM ewes showed a quadratic ($p < 0.0001$) hypersensitivity response to HEWL. No treatment differences were observed for the hypersensitivity response to DNCB. Together, these results suggest that FA-rich supplements greatly impact the innate and acquired immune response of animals, and the implications of

this immunomodulation warrant further investigation.