

Processing and Products

T301 Characterization of omega-3 PUFA enrichment in laying hens. S. Nain* and R. A. Renema, *University of Alberta, Edmonton, AB, Canada.*

This study explored the effects of feeding linolenic acid and the time required to reach a plateau of omega-3 polyunsaturated fatty acid (ω -3 PUFA) concentration in blood plasma and egg yolk in laying hens fed Linpro, an extruded flax product. Additionally, the efficiency of long chain ω -3 fatty acid enzymatic conversion was also investigated. A group of 75, 65 week old Lohman White Leghorn layers divided into 3 groups (25/group) and subjected to either of one diet, Control diet, or low (Moderate) or high omega-3 diet (High) for 18 d. Diets had similar ME and CP concentrations, and contained 0, 7.5% or 15% Linpro, respectively. Baseline values were established for the BW, fatty acid composition in egg yolk and blood plasma before dietary treatment. Data was analyzed with Proc Mixed of SAS and broken stick analysis to determine ω -3 PUFA plateau using the NLIN procedure of SAS. Significance was assessed at the $P < 0.05$ level. The BW of the hens fed Moderate and High diets was reduced compared with Control birds during the study (P

= 0.003). Dietary treatments did not affect egg production, egg weight, feed intake, or feed conversion. Total ω -3 PUFA in egg yolk achieved plateau of stationary phase at 343.7 mg/egg and 272.0 mg/egg in 6.6 and 5.9 d with High and Moderate diets respectively. In plasma the ω -3 PUFA concentration reached saturation in 7.2 d with 0.93 mg/ml and 0.67 mg/ml with High and Moderate diets, respectively. Dietary LNA increased yolk LNA and led to increased long-chain ω -3 PUFA while reducing ω -6 PUFA in yolk and blood plasma. Moreover, Moderate and High diets resulted in 64% and 70% increases in yolk DHA, respectively, while in plasma the increase in DHA was only 13% and 8% in these groups, respectively. The calculated desaturase and elongase enzymatic activities for ω -6 PUFA (C20:4/C18:2) were negatively correlated with LNA ($r = -0.59$). Broken stick analysis indicated that High birds reached the target threshold of 300 mg of total ω -3 PUFA/egg in 5d. Individual hen effects on ω -3 PUFA absorption in this project suggest further work to optimizing egg enrichment through dietary strategies would be beneficial for the field of egg enrichment.

Key Words: LinPRO, egg yolk, plasma