

Influence of extrusion processing on fatty acids retention in full-fat flax seed (*Linum usitatissimum* L.) meal

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Background: Flaxseed (*Linum usitatissimum* L.) provides multiple nutritional benefits including high quality protein, dietary fibre and is the most abundant source of α -linolenic acid ($C_{18:3}$). This study focuses on the effect of extrusion processing on fatty acids retention in full-fat flaxseed meal. The ranges of processing variables selected using central composite design were: barrel exit temperature (BET) of 76.3-143.6°C; screw speed (SS) of 59.6-160.5 rpm and feed rate (FR) of 26.4-93.6 kg/h.

Results: The extrusion processing at different barrel temperatures, screw speed and feed rate did not showed gradual decrease or increase in palmitic, stearic, oleic and linoleic acid contents. The amount of α -linolenic acid retention in extruded samples ranged from 92% to 99.2%. Optimal operating conditions were established; BET (138.4-138.8°C), SS (160-160.5 rpm) and FR (26.4-34.1 kg/h) for maximum (98.3-98.8%) retention of α -linolenic acid. This effect was mainly dependent on BET ($p \leq 0.01$), whereas mutual interaction effect of BET, SS and FR was found to be non-significant ($p > 0.05$).

Conclusions: The results of this study demonstrated that the extrusion processing can be successfully explored to produce fatty meals with significant fatty acids retention for commercially food or feed purposes.

Key words: Extrusion, Fatty acids, Flaxseed, α -Linolenic acid, Retention, RSM

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