

Effects of Dietary Soybean Meal Substitution by Flaxseed and Lupins on Milk Production, Milk Fatty Acid Profile, and Health of Dairy Ewes - Abstract

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Summary

Soybean and its by-product soybean meal are arguably the most commonly proteinaceous feed ingredients used in farm animals. Nevertheless, these feed ingredients are produced in Europe in very low quantities; therefore, large amounts are imported annually, which necessitate high economical cost and environmental impact. It is possible that novel feed ingredients can limit the needs for soybean, but also improve the overall health and performance parameters of milk producing animals such as sheep. This study examined the possible changes in the milk production, milk composition and health, caused by the partial replacement of soybean meal by flaxseeds and lupins. Initially, 30 dairy ewes (Lesvos and Chios crossbreed) were fed conventional diets, based on alfalfa hay, straw and concentrate feed that contained soybean meal for a period of one month and on day 30 (Samples A), milk samples were collected from all animals. Then, for a period of two months the same ewes were fed a second concentrate feed with lower level of soybean meal that contained 10% flaxseed and 10% lupins, whereas milk samples were collected on days 60 (Samples B) and 90 (Samples C). Blood samples were also collected for biochemical analysis (Albumin; Alanine aminotransferase; Aspartate aminotransferase; Glucose; Cholesterol; Creatine kinase) on days 30, 60 and 90. Milk fatty acid profile was analyzed by a gas chromatography method. The milk fatty acid analysis showed that milk samples B and C had higher amounts of unsaturated fatty acids compared to the control (A:24.35%; B:28.15%; C: 28.12%) and especially polyunsaturated fatty acids (A:2.81%; B:5.01%; C:5.85%) and omega-3 fatty acids (A:0.17%; B:0.73%; C:1.06%). Moreover, milk samples B and C had lower atherogenicity index (A:3.19; B:2.58; C:2.72), thrombogenic index (A:4.02; B:2.73; C: 2.53) and improved omega-6/omega-3 ratio (A:14.94; B:5.55; C:3.94). The blood analysis showed that samples C had the

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highest values of alanine aminotransferase (A:59.0 u/dl; B:66.9 u/dl; C:76.0 u/dl), glucose (A:62.7 mg/dl; B:63.4 mg/dl; C:81.5 mg/dl) and cholesterol (A:44.1 mg/dl; B: 57.3 mg/dl; C:73.6 mg/dl). In conclusion, the substitution of soybean meal by flaxseed and lupins in ewes' diets, improved ewes' milk fatty acid profile, and modified some blood health indexes. Further investigation is needed to elucidate the underlying biological mechanisms and to identify the optimal feed composition.

Keywords: Dairy sheep; soybean meal; flaxseed; lupins, performance; milk fatty acids.

JEL Codes: N50; Q10; Q13.

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