

PhD Thesis Defense

On Wednesday February 12th 2025 at 10.00 am in the classroom G, Via Santa Sofia 100

Martino Musati (XXXVII cycle)

Will discuss his PhD theses titled

Doctor
Europaeus
Candidate

TOWARDS A "ZERO KM" DIET FOR RUMINANT FEEDING

Thesis Abstract

Using agro-industrial by-products in replacement of conventional feedstuff is a strategy to reduce the environmental impact of feed production and transport, and the feed-food competition, while decreasing the cost of their disposal. Nut industries generate a huge amount of fibrous by-products that are also a source of bioactive compounds, such as tannins, and have a notable lipid content, largely composed by unsaturated fatty acids (FA). This thesis aims to assess the most promising nut skin produced in mediterranean region in an *in vitro* trial for being subsequently implemented in lamb diet. In the first part of the thesis, an *in vitro* study was conducted to examine the effects of partial replacement of maize with almond, hazelnut, and pistachio kernel skins at three doses (70, 140, and 210 g/kg dry matter) on ruminal fermentation and biohydrogenation. Pistachio skins did not affect any ruminal fermentation parameter. On the contrary, the almond and especially hazelnut skins were capable of reducing gas and methane production and ammonia concentration, as well as accumulating health-promoting poly-unsaturated (PUFA) and mono-unsaturated FAs. Therefore, the *in vivo* trial investigated the effect of the dietary inclusion of hazelnut skin and extruded linseed on FA profile and oxidative stability of lamb meat. Forty lambs were divided into 4 groups and fed for 60 d with: a conventional cereal-based diet, or the same diet with 8% of extruded linseed, or 15% of hazelnut skin, or 4% of linseed plus 7.5% of hazelnut skin as partial replacement of maize. Dietary treatments did not affect growth performances, carcass traits, and ruminal fermentation. The combined effect of linseed and hazelnut skin enriched the intramuscular fat with health promoting FA. Particularly, increases in C18:3 n-3 (3.75-fold), and very long-chain n-3 PUFA (+40%) were attributed to the supplementation with linseed, rich in C18:3 n-3. In addition, increases in C18:2 *c9t11* (+ 33%), and C18:1 *t11* (+ 59%) were attributed to hazelnut skin tannins modulating ruminal biohydrogenation and accumulating intermediate metabolites. Dietary combination of hazelnut skin and linseed increased the content of tocopherols, while reducing lipid oxidation (TBARS value) during 7 days of refrigerated storage. Feeding lamb with hazelnut skin and/or linseed did not affect meat hydrophilic antioxidant capacity, colour stability, nor the formation of hydroperoxides, thiols, or carbonyls. These results suggest that vitamin E provided by hazelnut skin contributed to delay lipid oxidation in meat, despite the higher concentration of n-3 PUFA.

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