

UMR Herbivores

Team Design, Modelling and Evaluation of Herbivore farming Systems (COMETE)

Sainfoin pellet supplementation to lambs grazed lucerne reduced fat volatile indoles level but did not change meat fatty acid composition

Consumers are increasingly interested in obtaining high quality meat from sustainable farming practices. Forage legumes are of major importance as they improve pasture quality, reduce dependency on external inputs and have excellent nutritional value. However, volatile indoles responsible for off-flavours accumulate more in the meat of lambs on pasture than on grain, especially when lambs graze white clover or lucerne. We investigated whether sainfoin pellet or barley supplementation of lambs grazed lucerne may reduce fat volatile indoles level and off-flavours in lamb meat. Sainfoin pellet supplementation to lambs grazing lucerne reduced fat volatile indoles level but barley supplementation did not. Meat from lambs grazing lucerne contained higher nutritional fatty acids, including n-3 polyunsaturated fatty acids, than meat from stall-fed lambs. Moreover, the presence of vitamin E in lucerne prevented oxidation of these fatty acids during storage. Sainfoin or barley supplementation did not modify meat fatty acid composition.

Grass-feeding of lamb rather than grain-feeding reduces muscle levels of fatty acids (FA) that are considered undesirable or are excessively deposited, such as saturated (SFA) and *trans* FA and increases muscle levels of health-beneficial FA such as polyunsaturated FAs (PUFA), including n-3 long-chain PUFA (n-3 LC PUFA), particularly EPA and DHA, which can profoundly influence human health. The PUFA content in the muscle of lambs finished on lucerne swards has been shown to be even higher than that of lambs finished on perennial ryegrass. However, the volatile indoles responsible for off-flavour in meat accumulate more in the fat of lambs raised on pasture than on grain, and the ruminal synthesis of these faecal-smelling compounds from the amino acid tryptophan may be even greater when animals graze legume-based pastures, such as white clover or lucerne, due to their high degradable protein content. Organic production may be at a greater risk of off-flavour in lamb meat, due to the commitment to pasture-feed animals during the grazing season and the frequently greater proportion of legume species in the pastures (Prache et al., 2011). We tested the effect of 2 farming practices (sainfoin pellet or barley supplementation to lambs grazed lucerne, a third of the diet) on fat skatole and indole levels, lamb chop sensory evaluation, meat fatty acid composition and oxidative stability.



The meat of lambs raised on lucerne was richer in PUFA n-3 and CLA than that of lambs raised on concentrate indoors (contents 3 times and 2.2 times higher respectively), as expected. Supplementation with sainfoin pellets did not change meat fatty acid composition. The presence of vitamin E in lucerne forage protected these FAs from peroxidation during storage. We confirm that lambs grazing lucerne accumulate higher levels of volatile indoles in their fat, inducing a higher intensity of 'animal' odour and 'animal' flavour, than lambs raised indoors. Supplementation with sainfoin pellets reduced fat skatole (-36% and -26% in dorsal and perirenal adipose tissues) and fat indole (-38% and -42% in dorsal and perirenal adipose tissues) levels, but barley supplementation did not. Neither of the farming practices reduced the intensity of 'animal' odour and 'animal' flavour in lamb chop. Sainfoin supplementation delayed the onset of both helminth and coccidian infections, which is of interest for the integrated animal health management.

We will next investigate the effect of another farming practice (short finishing indoors of lambs previously grazed lucerne) and investigate how to detect the risk of off-flavour before slaughter.

Publications

Rivaroli D. et al. (2019) Tannin-rich sainfoin pellet supplementation reduces fat volatile indoles content and delays digestive parasitism in lambs grazing alfalfa. *Animal*, 13, 1883-1890. doi:10.1017/S1751731118003543

Devincenzi T. et al. (2019) How does barley supplementation in lambs grazing alfalfa affect meat sensory quality and authentication? *Animal*, 13, 427-434. doi:10.1017/S1751731118001477

Gruffat D. et al. (2019) Comparison of muscle fatty acid composition and lipid stability in lambs stall-fed or pasture-fed alfalfa with or without sainfoin pellet supplementation. *Animal*, accepted on 17/09/2019. doi:10.1017/S1751731119002507.

Prache et al. (2011) Comparison of meat and carcass quality in organically reared and conventionally reared pasture-fed lambs. *Animal*, 5, 2001-2009.

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