Mustard and cumin seeds improve feed utilization and milk production of Damascus goats

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Short title: **Mustard and cumin seeds in diet of goats**

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Summary

The experiments reported in this research paper aimed to study the effects of mustard and cumin inclusion at 10 g seed/goat daily on feed utilization, milk production, composition, and profile of milk fatty acids in lactating Damascus goats (44.2 ± 0.5 kg). The study was a completely randomized design with repeated measurements in time using fifteen goats divided into 3 treatments (5 goats each). Goats were offered a control diet of berseem clover and concentrates (1:1 dry matter (DM) basis) or the control diet supplemented with either 10 g/day of mustard seeds (MUS), or 10 g/day of cumin seeds (CUM) for 12 weeks. Treatments had no effect ($P>0.05$) on feed intake, but enhanced ($P<0.05$) digestibility of DM, organic matter, non-structural carbohydrates, and fibre fractions. Digestibility was greater ($P<0.001$) with CUM treatment compared with MUS. Mustard and cumin seeds increased ($P<0.05$) ruminal short chain fatty acids (SCFA), and molar proportion of propionate, with greater ($P<0.001$) SCFA production noted for CUM treatment versus MUS. Greater ($P<0.05$) concentrations of serum total proteins, globulin, and glucose and decreased ($P<0.05$) serum cholesterol concentration were observed with MUS and CUM treatments. Mustard and cumin seeds inclusion elevated milk production ($P=0.007$), as well as milk contents ($P<0.05$) of fat and lactose. Both MUS and CUM treatments decreased ($P<0.05$) milk saturated fatty acids (SFA) and increased total unsaturated fatty acids (UFA) and total conjugated linoleic acid (CLA) contents, with greater effect on milk fatty acids for cumin than mustard. Overall, supplementing diets of Damascus goats with mustard or cumin at 10 g/doe daily enhanced feed digestion, ruminal fermentation, milk yield (actual production by 6.8 and 11.1%, while the energy corrected milk yield by 10.1 and 15.4%, respectively) and positively modified milk fatty acid profile with a 3.9% decrease in milk individual and total SFA, and increased individual and total UFA by about 9.7%, and total CLA by about 23.1%.