Effects of Lysine and Methionine Supplementation on Fattening and Blood Protein Metabolites in Fallow Deer (*Dama dama*)

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Amino acid supplementation is an almost unexplored research area in cervids. Only three studies have been previously conducted, all with a low sample size (four animals per experimental group) leading to inconclusive results¹,²,³. These previous studies were conducted on *Cervus elaphus* and *Cervus nippon*. For that reason, in this study we focused on the effects of supplementation with ruminally protected amino acids in a large herd of fallow deer (*Dama dama*), which is the most commonly farmed deer species in Europe.

This study was designed to investigate the effects of lysine and methionine supplementation on growth performance, body condition, carcass traits, and blood plasma metabolites related to protein and fat metabolism, of fallow deer during the fattening period. A second goal was to determine the influence of two culling seasons on these parameters. Forty-five farmed male fallow deer were randomly allocated to three groups of 15 animals each, balanced by body weight. The supplementation experiment started at 11 months of age (calves from the previous year). All three groups were pasture-fed and supplemented with barley (500 g/animal/day) and mineral premix *ad libitum*. The groups received varying levels of ruminally-protected lysine and methionine: 1) no amino acids (Control), 2) 9 g/day of lysine (Lys), and 3) 9 g/day of lysine plus 3 g/day of methionine (Lys+Met). Animals were culled in two separate seasons: late autumn (LA; 6 animals/group), and late winter (LW; 9 animals/group). To compensate for the lack of pasture during winter, the animals received grass silage during this period. Generalized Linear Mixed Models tested the effects of treatment and culling period on selected carcass traits (culling weight, average daily weight gain ADG, carcass weight, bone percentage, and blood weight) and blood biochemistry (creatinine, blood urea nitrogen, total proteins, albumin, globulins and tryglicerides).

Supplementation had no significant effects on final weight, while ADG significantly decreased in the LW (p=0.002). Lys+Met supplementation positively influenced BCS (p=0.024), while animals culled in LW showed decreased BCS (p<0.001). Lys+Met (p=0.005) and LW culling (p=0.004) had a positive effect on KFI. That was expected because of the cessation of growth in cervids during winter due to changes in photoperiod⁴. Carcass weight, bone percentage, and blood weight were lower in LW (p<0.05) but were not influenced by treatment. Dressing percentage was higher in Lys+Met treatment (p=0.002) and LW group.
Body condition score (p=0.024), kidney fat index (p=0.005), total kidney fat (p=0.001), and percentage of internal fat (p<0.001) increased significantly with Lys+Met supplementation. During LW, kidney fat index (p=0.004) and kidney fat (p=0.001) were also significantly higher than in LA. Deer that received Lys or Lys+Met supplementation showed elevated values of creatinine, blood urea nitrogen, and triglycerides (all p<0.001). The increased concentration of creatinine was correlated with BCS (r=0.450; p=0.019).

In summary, even if the treatment does not seem to improve weight gain, it affected dressing percentage, especially at autumn culling. The increase in this very important parameter in animal production is supported by the increase of protein-related metabolites (creatinine and blood urea nitrogen). Lys and Lys+Met treatments also affected fat deposition, especially during the winter period, reflected also in the increased values of triglycerides. Thus, apparently, both treatments affected muscle formation during the growth period (summer and autumn) and fat storing during winter. These results suggest a good potential of amino acids to increase muscle development and production during the following spring, since supplemented animals will finish the summer in better condition and with greater fat stores.


