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Supplementing Goats with Charcoal: Effects on Feeding Behaviour and Faecal Nutrient Output

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Abstract

Charcoal has positive effects on soil fertility; therefore it is directly applied to soils or mixed with compost or manure. When supplementing animals with charcoal it is intensively mixed into the faeces through the digestive processes. Due to its absorptive capacity, charcoal may bind rumen or hindgut microorganisms of supplemented animals and by this hamper digestion processes and reduce the nutrient availability from manure to plants, but also prevent leaching of nutrients to deeper soil layers. However, charcoal can be only a padding in animal diets, as it has no nutritive value and may lead to constipation. The objective of this study was to assess how much charcoal could be included into goats' diet without negative effects on feeding behaviour and health. A feeding trial was conducted with 4 Boer goats ($22.8 \text{ kg} \pm 3.91$) receiving the same diet (50 % hay, 50 % concentrate) over six 14-day-periods in which increasing amounts of activated charcoal (AC; 0, 1.5, 3, 5, 7, 9 % of total diet, dry-matter-basis) were included into the pelleted concentrate. Goats' feeding behaviour (consumption rate, refusals) and manure characteristics (colour, odour, consistency) were observed during the first 5 days of each period. During days 8-10 total faecal excretion was determined using collection bags and samples were taken for C and N analysis. Supplementing goats with up to 9 % AC did not influence their feeding behaviour - they ingested the concentrate at a constant rate and already 4 minutes after feeding less than 5 % of the AC pellets were left. The faecal consistency changed from normal to hard when more than 5 % AC were supplied, and the colour changed from normal to dark at the 3 % and to very dark at the 9 % AC level. The odour was reduced when more than 3 % AC were included in the diet. The faecal C excretion increased while the N excretion tended to decrease with increasing AC level. We conclude that supplementing goats with up to 9 % AC is a possibility to incorporate charcoal into faeces and increase faecal and soil C concentration without negative short-term effects on goats' feeding behaviour and health.

Keywords: Charcoal, feeding behaviour, goat, nutrient excretion