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MICROHISTOLOGICAL FAECES ANALYSIS AS METHOD TO ESTIMATE TOMATO PULP SILAGE PREFERENCE DURING WINTER FEEDING IN A GAME RESERVE



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Introduction

The supplementary winter feeding is a widespread practice in Europe and parts of North America. The role of feeding are maintain the high game population density, maintain their body condition, increase the hunting success, achieve bigger trophies or reduce the winter mortality. Feeding may also be carried out to reduce the environmental damages caused by game species during winter (Putman and Staines 2004). However the role of feeding is not always clear. Investigations in free-ranging populations showed that only a part of red deer individuals consumed the supplementary feed, and only in a low proportion (Katona et al. 2010). Supplementary food can be very expensive, and it is a basic question whether the animals consume it or not. The secondary products from the food industry can provide potential winter extra-food for game species due to their relatively low price and valuable nutrient contents. To know whether the tomato pulp can be utilisable food for game we have to “ask the animals” and collect information about their diet composition. This secondary product was considered as a waste of the manufacturing process. However, it has a high lycopene, ascorbic acid and antioxidant content (Toor and Savage, 2005). Therefore it can become potential food for ungulates. Our research team carried out an investigation about the utilisation of tomato pulp silage as a supplementary feed for game.

Materials and Methods

Study area

The study was carried out in a game preserve in Bárna. The preserve located in the North Hungarian Mountains. In the game preserve (300 ha) five game species were present: the red deer (*Cervus elaphus*, 60-70 individuals estimated) the fallow deer (*Dama dama*, 30-40 individuals) the mouflon (*Ovis aries*, 30-40 individuals) the Pere David's deer (*Elaphurus davidianus*, 8-9 individuals) and the wild boar (*Sus scrofa*, 200 individuals). The forest cover in the area is 82%. The main tree species are the turkey oak (*Quercus cerris*, 30%), the Scots pine (*Pinus sylvestris*, 25%) and the black locust (*Robinia pseudoacacia*, 15%). The dominant shrubs are blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*) and blackberry (*Rubus* spp.).

Field studies

The study was conducted from December 2010 May 2011. In this period 44 bales of tomato pulp silage (each was about one ton) were placed on six feeders in the game preserve. Faecal droppings were collected within a transect line of five meters width between the feeders five times during the feeding period. The faecal pellets were taken into plastic bags and kept in a freezer until further processing.

Diet composition analysis

The diet composition of game species was determined by microhistological faeces analysis (Katona and Altbäcker, 2002). For analysis the samples were thawed at room temperature. A small subsample of these faeces was boiled in 2 ml of HNO₃ for 3 minutes. Epidermis fragments were removed and dispersed into a mixture of 0.1 ml glycerine and 0.05 ml of 0.2% Toluidin-Blue and placed in slides. Microscopic slides were covered and examined by systematic scanning under 100X and 400X magnifications. One hundred epidermis fragments were identified on slides using a reference collection of plant species collected from the study area. Proportion of diet components were estimated as the number of fragments for a particular forage class relative to the total number of fragments. Identified categories were: tomato, maize, corn, grasses, forbs, browse species. Statistical analyses were made with the InStat program. The normality of data was determined by Kolmogorov-Smirnov tests. Statistical comparisons were carried out by parametric unpaired t-test or one-way ANOVA test with Tukey post-hoc test or nonparametric Kruskal-Wallis test with Dunn post hoc test.

Results

In Bárna area 57 individual faecal samples were analyzed. All of these samples contained tomato. In 64 % of these faeces tomato was the dominant food component (36-87%). The Pere David's and red deer consumed the tomato pulp in highest proportion, while mouflon in the lowest proportion (Kruskal-Wallis test: KW=15.818, p<0.001, Dunn post-hoc test: red deer vs. mouflon: p<0.01, Pere David's deer vs. mouflon: p<0.01, others: ns.). The proportion of tomato has significantly decreased in the diet during the feeding period (Kruskal-Wallis test: KW=29.920, p<0.001, Dunn post-hoc test: May vs. February: p<0.001, May vs. April p<0.001, others: ns.). At the same time the proportion of forbs has

significantly increased in the diet (Kruskal-Wallis test: $KW=32.428$, $p<0.001$, Dunn post-hoc test: May vs. December: $p<0.001$, May vs. January: $p<0.001$, May vs. February: $p<0.001$, May vs. April: $p<0.001$, others: ns.).

Conclusions

Our results suggest that supplementary winter feeding could be very important for large game species in intensively managed game preserves with dense game populations. We found that the studied species consumed the tomato pulp in high proportion. This rate of consumption was much higher than we found earlier in free-living deer populations (less than 10%, Katona et al., 2010). However, our result does not necessarily mean that the tomato pulp is an optimal food. It is also possible that tomato pulp was a food, which was available in a greater amount in the game preserve and its consumption did not cause any significant wildlife health problem. Large herbivores generally forage on different shrubs of understory, e.g. elderberry or blackberry. Hawthorn and blackthorn, dominant species of the studied preserve, were not among usually preferred species (Katona et al., 2011). Overall the tomato pulp could provide suitable quality supplementary food for large game species. However, we emphasise the fundamental importance of the natural food resources of the habitat.

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