

Different rumen environments can cause different DM degradation profile of sainfoin

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Introduction

Sainfoin (*Onobrychis vicifolia* Scop) is a non-bloating member of the Fabaceae family (Leguminosae), which is widely grown in Europe and Asia, northern United States and southern Canada. It is a deep-rooted, tall-growing perennial with coarse stems, drought- and winterhardy, resistant to alfalfa weevil and a preferred forage for cattle, sheep, deer and elk (Graham 1941). Terry & Tilley (1964) found that Sainfoin stems were more digestible than those of alfalfa, whereas leaves and petioles were less digestible compared with alfalfa leaves and petioles. Sainfoin hay has lower crude protein (CP), crude fibre (CF) and ash than alfalfa hay harvested at the same maturity (Ditterline & Cooper 1975). Reports about Sainfoin CP and condensed tannin (CT) contents are very variable, from 102 to 285 and 25.2 to 100 g/kg dry matter (DM), respectively (Scharenberg et al. 2007). Although Sainfoin is a legume forage with high hay quality and its agronomic characteristics make it one of the most desired forages, especially in cold regions, there are very low data available about effects of treatment for tannin deactivation on ruminal nutrient degradability.

In the other hand Conventional *in situ* degradability has some problems in the case of tanniferous feeds because of small sample weight in nylon bags and dilution of antinutrients in rumen fluid, that can affect results.

Objectives

Deactivation of tannins and evaluation of the affects on ruminal dry matter degradability of sainfoin with different *in situ* method is the main objective of this study.

Materials & Methods

we use modified method to assess tannin effects on DM degradability. Second cut sainfoin were dried and chopped (3-5cm length), and exposed to 5% (w/v) solution of polyethylene glycol (PEG 6000 MW) and water that mixed with forage with v/w ratio of 1:1 and 4:1 respectively. Treatments were carried out at an ambient temperature for 20 min with hand shaking for water and overnight for PEG. Extractable condensed tannin content was determined using Butanol-HCl reagent. An *in situ* experiment was done in 3×3 change-over design. Three ruminally fistulated Holstein multiparous cows (680±20kg of BW) were used with 10 days for adaptation and 7 days for nylon bag incubations, each period. Forages were fed as sole diet (equals at 0800 and 1600) along with mineral/vitamins to meet 110% of the animal's maintenance requirements. CT content of control was 21.3, which water and PEG decreased it to 1.7 and 0.3 g/kg DM, respectively. Untreated Forage samples were ground to pass 2mm screen (Wiley mill) and sieved to remove particles <50 µm. 5g of samples weighed into nylon bags (10×20cm, 50 µm pore size) with sample size:surface area of 12.5 mg/cm². Duplicates were incubated for 4, 8, 12, 24, 48, 72 and 96h in ventral rumen. Degradation profiles were calculated by the nonlinear model of Ørskov and McDonald (1979). The effective degradability (ED) was calculated using NEWAY package. PROC MIXED of SAS 9.1 (2002) used to statistical analysis at 0.05 probability level.

Results

Degradation rate increased from 0.0626b to 0.0751b and 0.0961a h⁻¹ and lag time decreased from 2.4b h to 1.33a and 0.8 a h for water and PEG, respectively. PEG significantly increased ED from 52.43 to 55.9 and from 47.93 to 51.60 in outflow rates of 0.05 and 0.08 respectively.

Conclusion

We concluded that PEG and water treatments diminished phenolic compound effects on rumen environment and can increase nutrient availability *in situ* due to increased microbial activity and nutrient availability.

Effects of different rumen environments on ruminal DM degradability parameters

| Incubation time | Control | Water | PEG | SEM |
|--------------------------|--------------------|---------------------|--------------------|--------|
| 4 | 38.99 | 39.75 | 42.71 | 1.088 |
| 8 | 45.79 ^b | 47.52 ^{ab} | 51.03 ^a | 0.922 |
| 12 | 51.07 ^b | 53.26 ^{ab} | 56.69 ^a | 0.91 |
| 24 | 60.92 ^b | 62.96 ^{ab} | 65.11 ^a | 1.172 |
| 48 | 68.00 | 68.51 | 69.02 | 1.753 |
| 72 | 69.74 | 69.44 | 69.56 | 1.994 |
| 96 | 70.19 | 69.60 | 69.64 | 2.063 |
| Degradability parameters | | | | |
| a (%) | 33.44 | 33.44 | 33.44 | |
| b (%) | 36.91 | 36.20 | 36.21 | 2.092 |
| c (h ⁻¹) | 0.0626 | 0.0751 | 0.0961 | 0.0096 |
| P(k=0.02) | 60.40 ^b | 61.23 ^b | 62.63 ^a | 1.243 |
| P(k=0.05) | 52.43 ^b | 53.73 ^b | 55.90 ^a | 0.885 |
| P(k=0.08) | 47.93 ^b | 49.13 ^b | 51.60 ^a | 0.754 |

Different superscripts within each raw represent significant difference (p≤0.05)

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