Brief communication

A pilot study: Digestion inhibiting effect of silver birch in moose

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Background

The bark of silver birch (*Betula pendula* Roth.) is known to contain a phenolic glucoside, platyphylloside, which *in vitro* inhibits digestion in rumen fluid of several domestic ruminants (Sunnerheim-Sjöberg, 1991; Sunnerheim-Sjöberg *et al.*, 1988; 1995; Bratt & Sunnerheim, 1999; Bratt *et al.*, unpubl.) and moose (*Alces alces* L) (Sunnerheim *et al.*, unpubl.) and *in vivo* of rabbits (Sunnerheim-Sjöberg, 1991). This pilot study using one moose was undertaken to find out whether a diet of twigs of silver birch would affect the metabolism of the rumen content. If that would be the case, it would be one possible explanation to the probably multifactorial "Älvsborg disease" which is a wasting syndrome of still unknown aetiology. Clinically affected animals exhibit a very poor condition (malnutrition or emaciation), an aberrant behaviour, signs of central nervous disturbances and often also diarrhoea, (Stéen *et al.*, 1989). One explanation to the syndrome might be overpopulation since long forcing animals to feed on low priority plants, some of them containing digestibility inhibiting compounds. Under such conditions moose may suffer from malnutrition and its consequences (Haukioja & Lehtilä, 1992).

Experiment

A 1 1/2 year moose bull, corralled in a zoo, was fed brushwood of silver birch during four consecutive days. Every day 32 kg of brushwood was given as an *ad. lib.* ration. The daily ration before and after the experiment consisted of 1 kg pelleted reindeer fodder (Renfor), 1 kg pelleted sheep fodder (Fårfor), 0,8 kg pelleted aspen bark, 0,4 kg beet pulp given twice a day, and 0,5 kg oats and 50 g carotene given in the morning. Water was given *ad. lib.* in 12 liter buckets. In addition, the moose had – also during the experiment – possibilities to browse and graze of whatever was growing in the paddock. The birch twigs were shown to contain platyphylloside ((5*S*)-5-hydroxy-1,7-bis-(*p*-hydroxyphenyl-3-heptanone-5-O-*β*-D-glucopyranoside) by TLC- and HPLC-analysis.

Results and discussion

The moose reduced its fodder intake the day birch was introduced but then increased its consumption during the following days (Table 1). An obvious decrease in the excretion of faecal material, a reduction from 9 to 3 kg, was evident two days after the introduction of birch brushwood and continued

Table 1. Fodder, brushwood and water consumption along with faecal production per day.

Day	1	2	3	4	5	6	7	8	9
Regular fodder intake/kg	6,9	0	0	0	0	6,4	6,4	6,4	6,4
Brushwood intake/kg	0	3,2	8	8	6	0	0	0	0
Water consumption/L		5	7	6	5	10	10	6	8
Fecal production/kg		9,2	9	3,2	3,7	3,4	6,1	8,6	6,9

during the following days of the experiment. Two days after the brush-wood had been replaced by the regular fodder, the faecal production returned to initial amounts. The water intake was also affected by the change in fodder regimen.

An abrupt change in the feeding regimen is, in all ruminants, expected to affect the ruminal flora and the food intake. Seemingly the moose bull adapted to and accepted quite well the fodder change and apparently also the taste of the brushwood as indicated by its increased consumption. No clinical effects were recorded but for a somewhat loser consistency of the fecals on day 8. The animal, in all respects, appeared normal. The very marked decrease in the amounts of fecals produced after consumption of birch brushwood indicates a pronounced digestion inhibiting effect. The breakdown of the ruminal content is delayed to such an extent that only minor parts of the ruminal content will be broken down enough to be able to pass over from the reticulum to the omasum and abomasum. The situation is further evidenced by the rapid "recovery" when the birch brushwood was replaced by the original fodder.

The experiment, although involving only one animal, supports the *in vitro* effects of Betula pendula bark on the ruminal microbial flora and thus the ruminal digestion earlier reported (Sunnerheim-Sjöberg, 1991; Sunnerheim-Sjöberg *et al.*, 1988; 1995; Bratt & Sunnerheim, 1999; Sunnerheim *et al.*, unpubl.; Bratt *et al.*, unpubl.).

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