



Pilot study on work load management and feed intake time when feeding horses with small mesh haynets



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ABSTRACT

Horses are by nature herbivores and graze during the main part of the day. For stabled horses the feeding rations are often restricted and it would be preferred to develop a feeding system that allows long feed intake times. A possible way to lengthen the feed intake time is to hamper the availability of the forage by using a small-mesh haynet. The study had two aims concerning feeding horses with small-mesh haynets; first to investigate how the stable staff's work load was affected and second to study the horse's feed intake time. Two parallel studies were carried out at the Swedish National Equestrian Centre Strömsholm. In both studies four split-up portions daily were used as control management. The first study on work load measured the time of feeding routines using 14 horses fed with small-mesh haynets once a day and 17 horses in the control management. The second study focused on the feed intake time using a cross-over design where four horses were filmed during four consecutive days in each feeding system; feeding forage once a day in small-mesh haynets (mesh size $3 \times 3 \text{ cm}^2$) compared to control management. The data were statistically analysed and the level of significance was set to $p < 0.05$. The horses remained their body condition and no colic occurred.

The daily working time per horse and day for feeding management was significantly longer ($p < 0.001$) when using small-mesh haynets (mean 6 min 34 s) compared to the control group (mean 2 min 53 s). The total feed intake time increased in three out of four horses (by 50–67%).

We concluded that the working time for the small-mesh haynets was significantly longer compared to control management with weighing into individual feeding portions administrated three times a day. The feed intake time increased in three of the four horses with the small-mesh haynets and individual variations were observed.

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1. Introduction

Horses are by nature herbivores and graze during the main part of the day. The Swedish animal welfare legislation (Djurskyddsmyndigheten, 2007a) regulates that horses should be fed with an individual balanced feed ration with a daily sufficient amount of forage to meet the demand for fibres, long feed intake time and for the horse to have something to do. Boyd et al. (1988) studied Przewalski horses in a zoo during two summers and found that they spent $46.4 \pm 5.9\%$ of the time on seeking feed. The horses fed mainly (68%) during night (20:00–04:00) when the temperature was low and least time on feeding between 08:00 and 12:00 (Boyd et al., 1988). Duncan (1980) found that the horses grazed approximately 60% of the time and a little longer during the winter compared to the rest of the year. Further the Swedish animal

welfare legislation regulates that systems for feeding and drinking have to be designed, dimensioned and placed in a way so that the horse can feed and drink in a calm and natural way (Djurskyddsmyndigheten, 2007b). The natural posture for feeding is from the ground. When ponies were fed in a feeding trough, they moved the feed from the trough to the floor and distributed their feed intake time to 57% in the trough and 47% from the ground (Sweeting et al., 1985). Lindbäck (2012) showed that when the horse fed from the ground it chewed with contact of the forage 82% of the time compared to fed with a hay-bag 55% and fed with a haynet ($6 \times 6 \text{ cm}^2$ mesh) 72%, which indicates that the most natural way is feeding from the ground. Abrahamsson (2012) found significant different feeding-rate in kg dry matter per hour; 1.29 kg from the ground, 0.72 kg from small mesh haynet and 0.3 kg from a wired hay-rack. The feeding-rate from the wired hay-rack increased with a wetter haylage to 0.75 kg per hour, so the dry matter of the haylage was also of importance. Further, they found that the feeding consumption was lower from the small mesh

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haynets (1.52 kg DM per 100 kg bw) as compared to from the ground (1.65 kg DM per 100 kg bw) (Abrahamsson, 2012). Glunk et al. (2014) found that the rate of forage consumption decreased 40% with a small mesh haynet (3.2 cm openings) as compared to feeding from the ground. Ellis et al. (2015) compared different haynets and found that a small mesh haynet (25–30 mm openings) increased the feeding time by 5 min/kg that was equal to 20% when compared to “large-holed” haynets (75 mm). Ellis et al. (2015) showed that the total intake time of hay increased with multi-layered haynets (double or triple layers) compared to single layered haynets. In addition multiple feeding stations increased feed intake time.

Ad lib of forage is preferred to satisfy the feeding behaviour and to promote physical and mental health of the horse. If access to forage is limited, the passive time increases and the risk for the horse to develop a stereotype increases (Ellis et al., 2015). Creighton and Hockenhull (2010) mapped feeding related problems in leisure horses in Great Britain using an internet survey. Data were collected from 890 horses, where 70% showed a form of feeding related behavioural disorder mainly frustration (49%), aggressive behaviour (44%) and stereotypic behaviour (39%). Limited access to forage increased the risk for frustration and ad lib forage decreased the risk (Creighton and Hockenhull, 2010). McGreevy et al. (1995) showed that the risk for behavioural disorders increased in Thoroughbreds when the horses were given less than 6.8 kg forage per day when other bedding materials than straw was used and when the box design prevented social contacts between horses. Cooper et al. (2004) found that an increased numbers of feeding occasions per day decreased oral stereotypes, but increased weaving connected to the feeding occasion. The feeding regime can have negative impact on the digestive system (Ellis et al., 2015). Murray and Schusser (1993) suggested that traditional feeding with split rations during the day can be a contributing factor to gastric ulcer due to fasting periods as compared to grazing with a continuous production of saliva. An increased risk for colic can be linked to many factors, where feeding related factor such as change in feeding regime, amount of concentrate, type of forage, access to grass or to water, may be the highest risks (Tinker et al., 1997; Cohen et al., 1999; Hudson et al., 2001). Aristizabal et al. (2014) studied intragastric pH when horses were fed from the ground or from a hay grid feeder. They found no significant differences between the treatments for the parameters mean intragastric pH value, mean intragastric pH over time and the length of time the pH was below 4.0.

There are clear advantages for the health of the horse to develop feeding system that allows long feed intake times. Today the forage in Sweden holds a high content of energy and nutrients. Therefore, ad lib is not a proper regime and it is necessary to restrict the intake and lengthen the eating time for example using a small mesh haynet. According to one manufacture (Slowfeeding, 2012) it is only possible for the horse to get a few blades of grass at a time through the small mesh, which makes the feeding-time longer and consequently increases the chewing-time. The manufacture states this benefits to the physical and mental health of the horse. There are a few scientific reports to support the manufacturer's arguments. If one chooses to provide forage in haynets to increase feed intake time, this may result in additional work effort for the stable staff. According to the Swedish Work Environment Authority (Arbetsmiljöverket, 2003), the working environment need to be satisfying in relation to the character of the work and the social and technical development in the society, also the work need to be adapted to the humans different physical and mental prerequisites. Ninety-one percent of 576 riding instructors in an enquiry had experienced physical problems the last year mainly from the shoulders, lower back and neck (Löfqvist et al., 2009) and stated that the most physical strain was connected to mucking and

handling straw, hay and sawdust. Therefore, it is of importance consider the aspects of working environment when evaluating a new feeding system. We have not found any documentation on how the feeding-system with small mesh haynets affects the working routines of the stable staff.

1.1. Aims

The study had two aims concerning feeding horses once a day with their total ratio of forage in a small-mesh haynets compared to a control management with three portions per day administered from the ground. (1) The first aim was to study the work load of the stable staff, especially concerning time spent on the process of feeding. (2) The second aim was to carry out a pilot study on the effect on the feed intake time in the two systems.

2. Material and methods

2.1. Study design

The study was ethical approved according to animal welfare (No. C 138/11). Both studies were carried out at the Swedish National Equestrian Centre at Strömsholm (59°31'21.0"N 16°15'10.6"E). (1) The main study on work load was carried out in a stable with 31 individual stalls (10.5 m²). The test period lasted 33 days from mid-November to mid-December 2012. In the test group each horse was fed its total daily ration of forage in a small mesh (3*3 cm²) haynet (100*150 cm²) in the afternoon at 16:00. The haynets were hanged on the sidewall of the box and placed with the lowest point one metre over the ground. The horses in the control management were fed forage from the ground three times a day at 06:30, 16:00, 20:00 and given 2 kg of straw at 11:30. The daily stable duties were carried out by 19 students in Equine Students from SLU with previous experience of stable work, divided into three sub-groups. (2) The second study on feed intake time was carried out in a stable with 37 individual stalls (10.5 m²). The test-period lasted for four weeks from mid-November to mid-December in 2012. A cross-over design was applied such as two horses were fed four times a day as control management and two horses were fed the total daily ration of forage with a small mesh (3*3 cm²) haynet (100*150 cm²) once a day at 16:00 and an additional 2 kg of straw at 06:30. The haynets were placed in the front of the box and the lowest point of the net was one metre over ground. Possible left-overs of forage were weighed before refilling the haynets.

Before the studies started, the horses were accustomed to being fed forage from the ground four times a day at 06:30, 11:30, 16:00 and 20:00. The horses were given an adaption period to the haynets before the measurements started. During the first five days of adaption to the small mesh haynets, the horses were given an additional 4 kg of haylage divided into four portions each day. This routine was recommended by the manufacturer of the small mesh haynets to secure that the horse had enough forage during the period it learned to feed from the haynet.

2.2. Animals and management

In the first study (1) a total 31 Swedish Warmblooded riding-horses were used divided into two groups. Fourteen horses (6–15 years, 516–666 kg and fed 1.6 ± 0.2 kg DM per 100 kg BW) were used in the group with haynets. Seventeen horses (5–19 years, 546–646 kg and fed 1.5 ± 0.1 kg dry matter per 100 kg BW) were used in the group of control management. In the second study (2) four Swedish Warmblooded riding-horses (11–26 year, 522–652 kg and fed 1.7–2.0 kg DM per 100 kg BW) were used. All horses

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