

Forage for stabled horses – techniques for reducing the respirable challenge and microbial content in hay



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Introduction

Hay is still the most common fodder fed to stabled horses across Europe. Even good quality hay contains significant quantities of respirable (<5 µm) particles (RP), which can induce Recurrent Airway Obstruction (RAO) in horses. In an attempt to reduce the respirable challenge many owners soak their fodder before feeding, but previous work has shown that soaking leaches nutrients, produces biologically hazardous effluent and significantly increases the bacteria content of the hay. While steaming in commercial high-temperature hay steamers has shown a reduction in RP of >90%, conserves nutrients and reduces the microbial content, it is unknown if steaming in a homemade container achieves the same effects. These studies examined the efficacy of different wetting treatments at reducing the content of microbes and aero-allergens in hay.

Methodology

Experiment 1: Eight replicate bales of meadow hay were individually subjected to 5 different wetting treatments (5 x 8 n= 40). Each bale was divided into 5 equal sections and subjected to five treatments: 1. dry (control); 2. soaked for 10 minutes in fresh tap water; 3. steamed in the HG 600 (Haygain) steamer; 4. steamed in home-made domestic dustbin steamer; 5. steamed using a kettle of hot water. Post-treatment hay was measured for RP content according to the method of Moore-Colyer, (1996).

Experiment 2: Five bales of meadow hay each divided into 4 sections were treated in a cold room to replicate winter conditions: 1. Dry (control); 2. Steamed in HG 600; 3. Steamed in HG 500; 4. Steamed in domestic dustbin; Post treatment total bacteria (TVC) and mould concentrations were determined according to the method of Moore-Colyer and Fillery (2012). Differences between treatments in both experiments were determined using ANOVA and least significant difference test on log transformed data.

Results

Experiment 1

Geometric mean respirable (RP) particle content / kg hay / litre air after a 10-minute soak (soak), steaming in a haygain 600 steamer (HG 600), steaming in a homemade steamer (Bin) or steaming using a kettle of hot water (Kettle)

	Dry	Soaked	HG 600	Bin	Kettle	s.e.d	Sig
RP/l air/kg hay	1180 ^c	2.8 ^a	3.9 ^a	62.9 ^b	142 ^b	1.81	P<0.001

abc Values in the same row not sharing common superscripts differ significantly (P<0.001)

Experiment 2

Geometric mean colony forming units / g DM (cfu/g DM) of bacteria (TVC) and mould in hay after three different steaming treatments in cold-room conditions

cfu/g DM	Dry	Wheel bin	HG 500	HG 600	s.e.d	sig
log TVC	234422 ^b	549540 ^b	5888 ^{ab}	12.6 ^a	38.9	0.05
log mould	53703 ^b	5012 ^b	4.5 ^a	4.9 ^a	16.22	0.003

ab Values in the same row not sharing common superscripts differ significantly (P<0.05)

Conclusions

Results from both experiments clearly show that steaming in a specifically designed spiked steamer is the most effective method for reducing the respirable challenge and microbial contamination of hay. Incomplete steaming using either a home-made steamer or kettle of hot water is less efficient at reducing RP in hay, and actually increases the bacteria content of the forage thus compromising the hygienic quality of the hay.

Organism

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