

Comparison of the nutritional and digestion characteristics of two forms of preserved lucerne forage fed to mature horses

D G Thomas¹, L A Tucker²

¹Massey University, Palmerston North, New Zealand

²LWT Animal Nutrition Ltd, Feilding, New Zealand

Email: lucy.tucker@xtra.co.nz

Introduction Lucerne *Medicago sativa* (also known as alfalfa) is fed to horses in many forms, ranging from ground meal, pelleted, hay, or dry chaff to fermented or ensiled product. Currently there is little data concerning the preservation processing of lucerne impacts its energy availability and digestibility characteristics in horses (NRC, 2007). Lucerne chaff contains high levels of nutrients such as protein and calcium compared to grass hay (Cuddeford, 1994), can improve electrolyte imbalances and hoof problems, and be a good feed for older horses. Horses have also been shown to retain lucerne for longer than oat straw in their gut (Cuddeford *et al.* 1995), and lucerne hay has higher dry matter and protein digestibility, and enhanced mineral absorption compared to grasses (Crozier *et al.*, 1997). Lucerne may also be useful in the prevention of gastric ulceration in horses (Andrews *et al.*, 2005). Legume forages generally contain more soluble carbohydrates than grass forages (Fonnesbeck, 1968), making lucerne hay more digestible than grass hay, however the impact of preservation method has not been investigated. The current trial was conducted to determine whether controlled fermented Lucerne had better energy availability for horses compared to a conventional dried lucerne chaff. Ascertaining nutritional differences caused by preservation methods will allow correct inclusion of lucerne in equine rations.

Material and methods Twelve non-racing thoroughbred horses were kept in 3.6 x 4 m pens, bedded on wood peelings. Following a seven day adaptation period, using a dry lucerne chaff and a complete feed (in reducing amounts per day), each horse received either controlled fermented (CF) lucerne (Fiber Pro, Fiber Fresh Feeds Ltd, Reporoa, New Zealand) or a lucerne chaff (LC) control diet. The diet was fed in two daily feeds for two seven day periods in a cross-over design, giving 12 replicates per diet. The amounts fed were based on an iso-energetic daily intake according to standard DE and DM levels (NRC, 1989). Horses were monitored throughout the trial for body weight (by weigh tape) and condition score. Any feed refused was weighed and recorded on a daily basis. Faecal score (1-5 scale, where 1=diarrhoea and 5=hard pellets), body condition score (1-5, where 1=emaciated and 5=obese) and faecal samples were taken at the end of each seven-day period. Samples of both feed and faeces were analysed for dry matter, gross energy (by bomb calorimetry), total ash and acid insoluble ash. Total digestibility was calculated as per the methodology of Bergero *et al.* (2005). Data was analysed by the GLM procedure of Unistat 5.5 (Unistat UK Ltd.), with the cross-over designated as a time replicate.

Results Horses fed CF lucerne had significantly higher dry matter intakes ($p < 0.001$), due to less feed refusal. There were no significant differences between faecal output on a dry matter basis, and faecal scores for both forage diets were consistently good (4 or higher). Faecal ash was 37% higher ($p < 0.001$) for the CF lucerne, even though the ash levels in the original forages, on a DM basis, were similar (10.5% for the chaff and 10.8% for the CF lucerne). The gross energy of the diets was 18.2 MJ/kg for the chaff and 18.9 MJ/kg for the CF lucerne. However, when horses were fed the CF lucerne they consumed over 20% more energy ($P < 0.001$) than when fed lucerne chaff. The total amount of energy excreted did not vary significantly between the diets, even though there was 17% more gross energy per kg faecal material ($P = 0.003$) for the horses fed the dry lucerne chaff. The CF lucerne product resulted in 32% more retained energy per day ($P = 0.0007$) compared to the dry lucerne chaff. Digestible energy (DE) for the CF lucerne was 22% higher ($P = 0.021$) compared to the dry chaff form.

Table 1 Consumption and excretion characteristics of CF lucerne or dry lucerne chaff fed to non-racing thoroughbred horses

Parameter	CF lucerne	Lucerne Chaff	SEM
Dry matter intake (kg/d)	7.88 ^a	6.53 ^b	0.300
Faecal ash (%)	15.2 ^a	9.6 ^b	0.394
Gross energy faeces (MJ/kg)	19.88 ^b	20.21 ^a	0.096
GE consumed (MJ/d)	148.90 ^a	118.64 ^b	5.511
Retained energy (MJ/d)	87.64 ^a	60.00 ^b	6.968
Digestible energy (MJ/kg feed)	11.08 ^a	9.03 ^b	0.457

Figures in rows containing different letters are significantly different ($P < 0.05$).

Conclusions The trial demonstrated that CF lucerne is higher in DE compared to standard values given for conventional dry lucerne chaff. When total feed digestibility was calculated, there were no significant differences between the forms of lucerne. This indicated a potential high level of variance in the digestibility of the other nutrients present in the forages, which requires further elucidation.

References

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