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Utilisation of whole-crop pea silages differing in condensed tannin content as a replacement for soya bean meal in the diet of dairy cows

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Introduction Adesogan *et al.* (2004), has demonstrated that ensiled pea wheat intercrops can reduce the amount of concentrate fed to dairy cows by 50% without affecting milk yield or composition. A limitation of forage peas for high yielding dairy cows is the low by-pass protein content, but it has been suggested by Broderick (1995), that feeding forages that contain low levels of condensed tannin can improve nitrogen utilisation. The objective of the current experiments was to evaluate the potential of whole-crop pea silage differing in condensed tannin content to replace soya bean meal in the diet of late lactation, pregnant dairy cows.

Materials and methods Whole-crop pea silage was produced from spring-sown crops of Racer (high tannin) and Croma (low tannin), which were cut 13 weeks after sowing, wilted for 30 h and ensiled with a bacterial inoculant. A conventionally managed crop of winter wheat (*cv.* Equinox) was harvested at target DM of 440 g/kg and ensiled (WCW). Grass silage (G) was cut from a predominantly perennial ryegrass sward, wilted for 24 h and ensiled. Eighteen multiparous pregnant, late lactation Holstein-Friesian dairy cows were randomly allocated to one of two experiments in a 3x3 latin square design. Each 28 d period consisted of a 21 d dietary adaptation period followed by a 7 d sampling period. The control diet was a 50:50 mix (DM basis) of G and WCW offered *ad libitum* and fed with 6.9 kg/d standard concentrate and 1.1 kg/d soya (GWS). The test diets were a 25:25:50 mix (DM basis) of G, WCW and one of the two pea silages offered *ad libitum*, fed with 6.9 kg/d standard concentrate. Cows in experiment 1 were offered the high tannin pea silage with the addition of either 1.1 kg/d soya (HTS) or 1.1 kg/d wheat (HTW), and those in experiment 2 were offered the low tannin pea silage with either 1.1 kg/d soya (LTS) or 1.1 kg/d wheat (LTW).

Results The high and low tannin pea silages had a similar chemical composition and only differed in condensed tannin content (93.4 and 47.2 g tannic acid equivalents/kg DM respectively), crude protein content (189 and 177 g/kg DM respectively) and starch content (58 and 87 g/kg DM respectively). Average daily forage intake, milk yield, milk composition and nitrogen efficiency for milk production (N. eff.) for experiments 1 and 2 are presented in Table 1. In experiment 1 N. eff. was higher ($P<0.05$) in cows fed GWS compared to those fed HTW, cows fed HTS had a higher ($P<0.05$) forage DM intake compared to those fed GWS. In experiment 2 cows fed GWS had a lower ($P<0.05$) forage DM intake compared to those fed LTS or LTW. There was no difference in milk protein concentration between cows fed either GWS or LTW. Cows fed GWS had the highest N. eff. and those fed LTS had the lowest N. eff. in experiment 2. There was no difference between any dietary treatment and milk yield or 4% fat corrected milk yield (FCM) in either experiment 1 or 2.

Table 1 Effect of diet on daily intake, milk yield, milk composition and nitrogen efficiency for milk production

	Experiment 1					Experiment 2				
	GWS	HTS	HTW	s.e.d.	P	GWS	LTS	LTW	s.e.d.	P
Forage intake (kg DM/d)	12.0	13.4	13.0	0.53	0.041	11.6	13.9	13.2	0.35	<0.001
Milk yield (kg/d)	23.1	23.8	22.0	0.86	0.123	24.2	25.4	23.8	0.43	0.299
4% FCM (kg/d)	24.7	25.6	24.1	0.89	0.264	26.3	25.5	26.9	0.64	0.108
Butterfat (g/kg)	43.1	43.1	43.9	0.87	0.669	43.6	41.9	45.7	1.04	0.011
Protein (g/kg)	35.7	35.4	36.1	1.15	0.847	35.4	34.4	34.7	0.42	0.112
N. eff. (%)	28.9	23.4	24.6	0.74	<0.001	30.0	23.4	25.9	0.79	<0.001

Conclusions The results from these two experiments demonstrate that the inclusion of whole-crop pea silage into the diets of late lactation dairy cows can replace 1.1 kg soya bean meal daily without affecting milk yield or composition. The forage mixes containing the high tannin forage had a lower nitrogen efficiency for milk production than those containing the low tannin forage.

References

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