EFFECTS OF PLANTING RATE, CUTTING DATE AND CHOPPING ON INTAKE OF SOYBEAN SILAGE FED TO DAIRY COWS

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Soybeans in autumn produce leaf with more than 20% crude protein in dry matter (DM) and are readily grazed by cattle (Ehrlich *et al.* 1996). They can provide a higher quality feed to be offered in the autumn in sub-tropical dairying areas which normally depend on the declining quality of tropical pastures. This experiment made soybeans into round bale silage and assessed the intake and utilisation by dairy cattle. Two hectares of soybeans were planted using minimum till at either a high, 100 kg/ha (HSR) or a standard 70 kg/ha (SSR) seeding rate on 29 November 1994 into oats crop stubble. The soybean crop was cut for silage at either flowering (EC) or mid pod stage (LC) which were 90 days or 112 days after planting respectively. Plant population was measured at the first cut. Total dry matter yield and leaf stem and pod fractions were determined at both cutting times. Twenty-five Holstein-Friesian cows and five first lactation heifers were blocked on milk yield and liveweight and then randomly allocated to five treatments. The treatments were (i) standard planting rate, early cut (SSRxEC), (ii) standard planting rate, late cut (SSRxLC), (iii) high seeding rate, early cut (HSRxEC), (iv) high seeding rate, late cut (HSRxLC) and (v) standard planting rate, late cut plus chopping silage material to 15 cm using a 'Whopper Chopper' (SSRxLC+C). Silage bales were weighed before feeding and refusals recorded before a fresh bale was fed. Samples of silage and refusals were analysed for dry matter, stem length and thickness and daily intakes calculated. Milk yield was measured daily and cows received 5 kg of concentrate daily after morning milking. Cows entered the experiment on 24 July 1995 for 4 weeks with the first week as an adjustment period and 3 weeks sampling. Soybean silage was fed *ad libitum* in paddocks in round bale feeders. In addition two bales of lucerne hay was fed separately to each group per day. Water was available, but the animals had no access to pasture. Plant populations were 371400 and 685700 plants for the SSR and HSR treatments and dry matter yields averaged 5723 and 6743 kg/ha at the EC and LC respectively. In the DM of the whole plant, protein remained around 17% while NDF increased from 49% at EC to 54% at LC. Leaf percent declined from 51% at EC to 33% at LC while stem content remained constant at 47.5% with pod increasing from 1.5 to 19.5%. Milk yields were not different between treatments. Pre feeding stem length was longer and stem thickness tended to be lower for the EC but was not affected by planting rate and post feeding length was shorter except for the chopped treatment which increased slightly. On average 74% of non chopped refusals were stem, 20% weeds, 4 % pod and 2% leaf.

Table 1. Mean pre and post feeding stem length and thickness, dry matter percentage of soybean silage fed *ad libitum*, cow refusals and estimated dry matter (DM) intake

Treatment	Pre feeding stem (cm)		Post feeding stem (cm)		DM%	Refusals	DM
	Length	Thickness	Length	Thickness		%	(kg/cow/day)
SSRxEC	71^{c}	0.51^{bcd}	50^{d}	0.52	39^{a}	25^{b}	7.7
SSRxLC	56^{b}	0.55^{d}	35^{b}	0.54	47^{b}	20^{ab}	9.6
HSRxEC	65^{c}	0.48^{ab}	43^{c}	0.52	36^{a}	22^{ab}	7.7
HSRxLC	65^{c}	0.54^{cd}	35^{b}	0.52	50^{bc}	25^{b}	10.1
SSRxLC+C	14^{a}	0.49^{abc}	15^{a}	0.55	52^{c}	14^{a}	12.5
l.s.d.(P=0.05)	7.2	0.05	5.5	n.s.	3.8	7.8	-

Means in the same column not followed by the same letter are different ($P < 0.05$) ; n.s. $P>0.05$

Increasing plant populations to produce finer stem silage and feeding higher quality early cut forage did not increase animal intakes. Refusals were similar except for the chopped treatment which were less by an average of 8%. Cows had similar wet silage intakes in the non chopped treatments and the higher dry matter content of the LC silage influenced dry matter intake more than stem thickness and cutting date. Chopping significantly lowered refusals, increased wet silage intake and increased dry matter intake.

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