

## Effects of replacing grass silage with maize silage or concentrates on lamb output from housed pregnant ewes

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**Introduction** Rations for pregnant ewes in the UK are often based on grass silage. However, due to a number of factors, the cost of producing high quality grass silage has increased significantly in recent years so lower cost alternatives need to be investigated. Production of forage maize has the potential to reduce forage costs on mixed beef/sheep farms, with high dry-matter yields (comparable to that of a 3-cut silage system) of high quality maize silage possible from a single harvesting operation (Easson and Fearnough, 2000). However there is limited information on the effects of feeding maize silage to pregnant ewes. Alternatively, grass silage could be eliminated from rations by feeding high grain diets. The aims of this study were to evaluate the effects of replacing grass silage with either maize silage or concentrates on the performance of housed pregnant ewes and their lambs.

**Materials and methods** Seven weeks prior to lambing, 104 twin-bearing ewes ( $80 \pm 10.2$  kg live weight, condition score  $3.8 \pm 0.21$ ) were housed, shorn and allocated to one of four treatments, balanced for live weight, body condition and crossing sire breed. For the final 6 weeks of pregnancy, ewes were offered one of four diets: precision chop grass silage + 0.55 kg/d concentrate (GS, Treatment 1); maize silage + 0.55 kg/d concentrate (MS, Treatment 2); a mixture (1:1 on a dry-matter basis) of grass silage and maize silage + 0.55 kg/d (GS/MS, Treatment 3); or 1.55 kg/d concentrates + 50 g/d chopped barley straw (C, Treatment 4). All silages were offered on an *ad libitum* basis. The grass silage was predicted by Near Infrared Reflectance Spectroscopy to supply 278 g DM/kg, 670 g/kg digestible organic matter/kg DM, 10.7 MJ ME/kg DM and 121 g crude-protein/kg DM. Maize silage was predicted to supply 337 g DM/kg, 11.0 MJ ME/kg DM, 84 g CP/kg DM and 243 g starch/kg DM. Concentrates were formulated to supply 209, 293, 242 and 158 g CP/kg DM for Treatments 1-4 respectively, with the aim of achieving a total intake of 130 g metabolisable protein/ewe/day. Half of the ewes were housed individually and intakes were recorded daily for each animal. The remainder were housed in groups of 4-5, with intakes recorded daily for the entire group. Ewe live weight and condition score were measured 6, 4 and 2 weeks pre-lambing and within 24 h of lambing. Lambs were weighed at birth, 6 weeks of age and weaning. Daily live weight gain was determined by linear regression. Lambing difficulty was scored on a four-point scale where 1 = no assistance and 4 = manual delivery with difficulties. Data were analysed using Analysis of Variance (ANOVA) with diet as a fixed effect and covariates included for crossing sire breed, lamb sex and age at weaning, where appropriate.

**Results** Ewes offered maize silage as 0.5 or 1.0 total forage had higher intakes of silage DM ( $P < 0.01$ ) and total DM ( $P < 0.001$ ) during the final 6 weeks of pregnancy compared with ewes offered grass silage as the sole forage. Ewes offered the complete concentrate diet had the lowest DM intake. However there was no evidence of any dietary effects on the nutritional status of ewes, in terms of changes in live weight or condition score. Diet in late pregnancy had no significant effects on lamb output at birth or at weaning. However there was a higher incidence of lambing difficulties with MS compared with GS or C ewes, as shown by their higher mean lambing difficulty score. There were no residual effects of late pregnancy diet on lamb performance.

**Table 1** Effects of replacing grass silage with maize silage or concentrates on ewe and lamb performance

	Grass Silage	Grass Silage + Maize Silage	Maize Silage	Concentrates + Straw	s.e.d	Sig
Forage dry-matter intake (kg/d)	1.03 <sup>a</sup>	1.18 <sup>b</sup>	1.15 <sup>b</sup>	-	0.046	**
Total dry-matter intake (kg/d)	1.50 <sup>b</sup>	1.64 <sup>c</sup>	1.62 <sup>c</sup>	1.21 <sup>a</sup>	0.041	***
Pre-lambing live weight change (kg)	-6.1	-4.2	-5.4	-7.4	1.36	NS
Pre-lambing condition score change	-0.46	-0.52	-0.50	-0.44	0.155	NS
Mean lamb birth wt (kg)	5.38	5.40	5.22	5.41	0.223	NS
Lambing difficulty score	1.46 <sup>a</sup>	1.53 <sup>ab</sup>	1.93 <sup>b</sup>	1.10 <sup>a</sup>	0.229	**
Lambs weaned/ewe	1.62	1.84	1.60	1.77	0.149	NS
Total weaning wt (kg)	57.8	64.1	55.1	60.4	4.87	NS
Daily live weight gain (g/d)	244	257	245	250	8.0	NS

**Conclusion** The results of this study demonstrate that maize silage can replace grass silage in pregnant ewe diets with no adverse effects on lamb output. However the higher intake characteristic of maize silage, without a concomitant increase in lamb output, suggests that feed conversion efficiency is lower than for grass silage. Also the higher incidence of lambing difficulties in ewes offered maize silage is a major concern and requires further investigation. Zero silage systems based on high concentrate inputs can also replace grass silage-based diets without affecting lamb output, although the economics of this system is dependent on concentrate feed costs.

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**References** Easson, D. L. and Fearnough, W., 2000. Grass and Forage Science 55, 221-231.