CAN TAGASASTE, AN EVERGREEN FODDER SHRUB, BE GRAZED TO PRODUCE PRIME LAMBS OUT OF SEASON?

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SUMMARY

Tagasaste is a perennial leguminous fodder shrub. Sheep grazing on $\geq$ 6 months regrowth over summer only grow slowly. However, recent experiments have shown that cattle can condition tagasaste hedgerows into a very short regrowth form, "broccoli form", that presents a leaf-rich diet to grazing animals. Crossbred lambs suckling Merino ewes grazing a "broccoli form" of tagasaste in late summer grew at 228 g/hd.day and some groups achieved the commercial target of $\geq$ 250 g/hd.day.
Keywords: tagasaste, prime lambs, out-of-season, fodder shrub.

INTRODUCTION

Tagasaste *(Chamaecytisus palmensis)*, is a hardy leguminous shrub 3-5 m in height and all parts of the stem and branches are enveloped in leaves that are readily eaten by grazing animals (Snook 1986).

In summer and autumn the edible fraction of tagasaste consists of leaf and stem up to a diameter of about 3 mm. This material contained 15% crude protein and was 70% digestible in nylon bag studies (J. Fortune and A. Bailey pers. comm.). However, sheep grazing $\geq$ 6 months regrowth of tagasaste only grow slowly. Thus, tagasaste is most profitably used by sheep to replace the grain normally fed to bridge the "autumn feed gap" (Oldham *et al.* 1991). However, an alternative possibility, trialed in 1989/90, used tagasaste as a feed for out-of-season production of prime lambs (CM. Oldham and P.M. Moore unpublished). Merino ewes (n = 150) were mated to Suffolk rams in July and lambed into 6-month-old tagasaste regrowth in December (10 ewes/ha). Fifty two percent of the ewes conceived in 6 weeks and lambed with 15% twins. However, 39% of the lambs were lost between birth and sale in July, in part due to predation by foxes. The semi forested environment created by tagasaste is well suited to foxes and since out-of-season lambs are the only lambs available they are heavily preyed upon. The lambs averaged a hot carcase weight of 13 kg and had a mean liveweight gain of 100 g/hd.day from birth to sale. Clearly, this was not a commercial proposition. However, if the lambs had finished in June at a hot carcase weight of 15 kg they would have returned an extra $1 10/ha and been more profitable than using grain to fill the "autumn feed gap".

Borens and Poppi (1990) concluded that the real potential of tagasaste as a production feed would not be realised until a grazing system was devised that supplied a majority of leaf in the diet. New leaf contained > 25% crude protein and up to 80% digestible dry matter, compared with 9% crude protein and 46% digestible dry matter in edible stem. Recently it has been shown that cattle, set-stocked on tagasaste, can be managed-to create this type of grazing system (Oldham and Allen 1994). Breeding cows set-stocked at 1 cow/ha created hedgerows with a dense leaf-rich cover of regrowth $\leq$ 5 cm in length that looked like giant broccoli. On this feed, the cows reared calves that grew at about 1 kg/hd.day from birth to sale in March at 300 kg liveweight.

It was hypothesised that the hedges of tagasaste, conditioned by cattle into "broccoli form", would support early sucker prime lambs to grow at about 250 g/hd.day for sale into the peak of the market in July/August at around 35 kg liveweight and 120 days-of-age, without feeding grain. Further, it was hypothesised that the growth rate of the lambs would be inversely proportional to the length of regrowth of tagasaste on offer.

MATERIALS AND METHODS

Sheep

On 16 March 1993 a flock of 295 five-year-old Merino ewes, pregnant to Poll Dorset rams and due to start lambing on 23 March, were randomly allocated to 7 paddocks of tagasaste at approximately 2 ewes/ha. The ewes were condition scored (l-5) before allocation to paddocks and subsequently when their lambs were weighed. The lambs were weighed on 5 May, 26 May, 23 June and 9 September or at a mean age of 30, 51, 79 and 157 days. The first rain for summer and autumn fell on 2 May (100 mm) and the flocks were combined on new seasons pasture on 23 June, after 99 days grazing tagasaste. Mineral licks were available in each paddock. No grain or hay was fed.

Tagasaste   paddocks

The paddocks ranged in area from 11-41 ha. The hedgerows of tagasaste were 5 m apart and more or less continuous, thus it was assumed that there was approximately 2000 m of hedgerow/ha. The paddocks were stocked with cattle, or had previously been stocked with cattle, such that the mean length of regrowth of tagasaste varied from ≤ 5 cm ("broccoli form", approximately 500 kg edible green matter (EGM) from tagasaste/ha or 200 kg edible dry matter (EDM)/ha) to around 15 cm (approximately 750 kg EGM/ha from tagasaste or 300 kg EDM/ha). Each estimate of EDM of green tagasaste on offer was the mean of 20 visual assessments taken at predetermined sites on a diagonal transect. As a part of a continuing program of research, visual estimates are calibrated against a harvested yield of leaf and edible stem from 2 m sections of hedgerow each 3 months. For the calibration cut taken in February 1993, 7 sections of hedgerow were harvested and the visual estimates of EDM ranged between 100 and 2000 kg EDM/ha. The relationship was linear and described by the eqation;

EDM (kg/ha) = Measured EDM (g/2 m of hedgerow) x 1000 = Visually estimated EDM (kg/ha) x $(1.60 \pm 0.132) + 362$. Statview 512; $r^2 = 0.97$; $P < 0.0001$; see Figure 1.
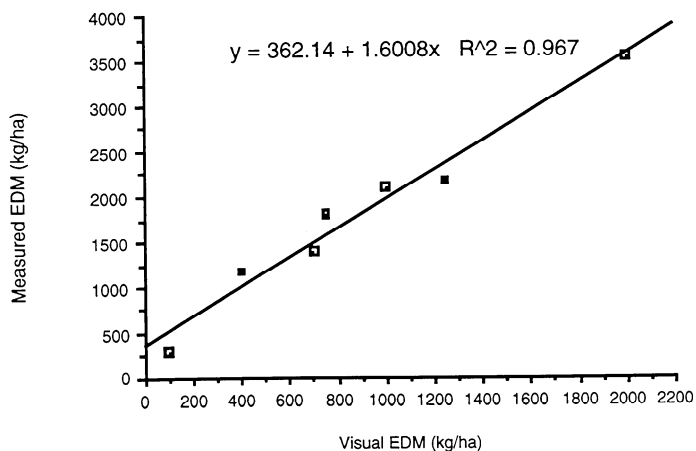

Figure 1. The relationship between visually estimated yields of green tagasaste expressed as edible dry matter (EDM, kg/ha) and measured yields from 7 x 2 m sections of hedgerow in February 1993

The inter-row space between hedgerows of tagasaste in this environment grows a range of annual grasses and herbs. The total dry matter (TDM) in the inter-row was estimated visually 10 times for each paddock adjacent to the sites for the estimates of tagasaste.   The TDM ranged from 80-1365 kg/ha (Tablel). As with the tagasaste, the visual estimates of TDM were calibrated using actual cuts from 10 quadrats (33 cm x 33 cm). The paddocks were stocked at 1.9 ewes/ha and cattle numbers were managed to keep the tagasaste roughly at the same length of regrowth during the study. The feed available from the hedgerows of tagasaste (kg EGM/ha) and the pasture inter-row space (kg TDM/ha) was estimated before the sheep were introduced and whenever the lambs were weighed

RESULTS

Tagasaste paddocks

The estimated tagasaste and pasture mass available in the tagasaste paddocks before and at the end of grazing is shown in Table 1.

Ewes

Reproductive performance   Overall, 17% of the ewes were unaccounted for at tailing (5 April) and losses were similar in all paddocks. At tailing, 72% of ewes were suckling lambs and 6% were suckling twins. There was no difference between paddocks.

Condition score   The mean condition score of pregnant ewes before lambing was 2.2 (0.6 below that of non-pregnant flockmates).   At tailing, after 50 days of grazing tagasaste, the condition score of both groups had been reduced by 0.5 of a condition score. In the next 49 days the condition scores of both groups recovered by 0.3 of a score.

Table 1. Estimated edible green matter (EGM) from tagasaste and total dry matter (TDM) from the pasture inter-row of 7 paddocks of tagasaste at the start (16 March) and end (23 June) of grazing by sheep

Paddock	Tagasaste on offer (kg EGM/ha; ± sem)				Pasture on offer (kg TDM/ha; ± sem)			
	16 March		23 June		16 March		23 June[A]	
1	447	37	1115	253	80	21	348	83
2	515	62	297	37	93	21	405	69
3	695	110	362	90	220	83	168	84
4	557	67	217	32	515	180	515	89
5	712	70	562	77	253	70	118	24
6	615	62	745	115	515	127	308	63
7	350	25	315	37	1365	148	680	84

[A]The new season's inter-row pasture was growing in the tagasaste paddocks from 5 May.

Table 2. The mean growth rates of lambs (g/hd.day; ± sem) in 7 paddocks of tagasaste (periods 1 and 2) and in the combined flock when grazing green sub clover/rye grass pasture in period 3

Paddock	n	Period 1	sem	Period 2	sem	Period 3	sem
1	34	274[a]	12.7	241[ab]	8.5	190[a]	4.7
2	26	213[b]	9.4	190[c]	9.2	189[a]	7.3
3	31	268[a]	12.7	240[ab]	7.9	189[a]	6.8
4	12	230[b]	17.6	250[a]	13.2	184[a]	17.1
5	14	198[b]	21.8	202[c]	18.6	193[a]	5.9
6	31	222[b]	10.4	213[bc]	10.2	202[a]	5.4
7	26	220[b]	12.8	241[ab]	16.1	183[a]	5.6
Mean		237		226		191	

Period 1 (5 May - 26 May), tagasaste.
Period 2 (26 May - 23 June), tagasaste.
Period 3 (23 June - 9 September), green sub clover/rye grass pasture.
Within periods, means with different superscripts are different (t-test; $P < 0.05$).

Lambs

Growth rate There was no difference in the growth rate of female or wether lambs. Overall, the lambs grew at 228 g/hd.day while they grazed with their mothers on tagasaste (Table 2; periods 1 and 2). However, their growth rate slowed when grazing new seasons pasture (Table 2; period 3), so that their mean growth rate from first weighing to sale at 157 days-of-age was 203 g/hd.day.

There were differences in the mean growth rates of lambs associated with different paddocks of tagasaste (Table 2). During periods 1 and 2, lambs in paddocks 1, 3, 4 and 7 approached the target of 250 g/hd.day set before lambing. However, there was no consistent relationship between the amount of tagasaste on offer (kg EGM/ha) and the growth rate of the lambs (Figure 2) or pasture on offer (kg TDM/ha).

DISCUSSION

Overall, the sucker lambs in this study grazing with their mothers on tagasaste, conditioned by cattle into the "broccoli form", grew at 228 g/hd.day, over twice as fast as the lambs described by CM. Oldham
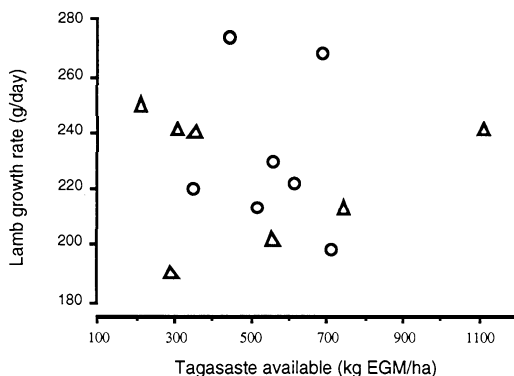
Figure 2. The relationship between tagasaste available from 5 April to 26 April (period 1, circles) and 26 April to 23 June (period 2, triangles) and the associated growth rate of lambs in 7 paddocks

and P.M. Moore (unpublished). This growth rate suggests that the strategy warrants further investigation. The lambs in paddocks 1 and 3 achieved the objective of ≥ 250 g/hd.day at a time of the year when a similar performance on dry pasture would have been impossible without large inputs of expensive grain. However, the growth of the lambs was not predicted by a simple function related to the amount of tagasaste on offer. The relative nutritive value of tagasaste at various lengths of regrowth at all times of the year is the subject of an ongoing study funded by the Meat Research Corporation (UWA 007).

The growth rate of all groups of lambs slowed to around 190 g/hd.day when the flocks were switched to pure new seasons pasture. This reduced the overall growth rate from first weighing to sale, at a mean age of 157 days-of-age, to 203 g/hd.day, a growth rate that would normally be insufficient to finish early sucker lambs before prices rapidly decline. Thus it was probably a commercial mistake to have removed the flocks from tagasaste.

Both the wet and dry ewes lost around half a condition score during their first 40 days in tagasaste. Since the dry ewes did not have the extra demand of lactation, this suggests that they did not readily adapt to the tagasaste, either because it was unpalatable, or of low nutritive value or a combination of both. The acceptance by stock and the nutritive value of tagasaste appears to be affected by changes in concentration and composition of phenolic compounds associated with the season and/or stage of regrowth (Oldham 1993). Samples of EDM from tagasaste taken during the experiment will be analysed for phenolics as part of the continuing project UWA 007. It is possible that the lamb growth rates on tagasaste may have been better had there been some rain over summer to reduce the stress on the tagasaste during grazing.

In both the current experiment, and the preliminary experiment described in the introduction, the survival rate of lambs to tailing was verv poor. This aspect of the svstem would need to be addressed in any application of these studies.

ACKNOWLEDGMENTS

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