EVALUATION OF GRASSLANDS ADVANCE TALL FESCUE UNDER GRAZING

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ABSTRACT
Four cultivars of tall fescue (*Festuca arundinacea* Schreb.) were evaluated under sheep grazing at Palmerston North, New Zealand to assess the productivity and persistence of the newly released cultivar Grasslands Advance. Results from four years under grazing showed Grasslands Advance to be a considerable improvement over the older cultivar Grasslands Roa in both total sward yield and in dry matter contribution of tall fescue. It outperformed the other three cultivars in years 2 and 3 and was not significantly different to Grasslands Roa and AU Triumph in year 1 or AU Triumph in year 4. Seasonal production was excellent all year round for Grasslands Advance, outyielding other cultivars in winter. These results are discussed in relation to current New Zealand farming practice.

KEYWORDS
Tall fescue, sheep grazing, cultivars, productivity, persistence

INTRODUCTION
The summer-dry eastern areas of New Zealand have for many years been seeking a better performing perennial grass than perennial ryegrass (*Lolium perenne* L.). In 1981 Grasslands Roa tall fescue (*Festuca arundinacea* Schreb.) was released and was the result of an intensive screening of mainly Mediterranean material with the emphasis on acceptability to sheep and low leaf strength (Anderson, 1982). Since the release of G. Roa, tall fescue has gradually assumed increasing importance in New Zealand as farmers have recognised its qualities (Easton, 1994). Tall fescue breeding at AgResearch Grasslands (formerly DSIR Grasslands) through the 1980s and early 1990s sought to improve vigour of establishment while maintaining the forage quality of G. Roa and enhancing its seasonal regrowth (Easton and Pennell, 1993). This resulted in the commercial release of G. Advance tall fescue which is largely derived from material related to G. Roa (Easton, unpublished). Fraser and Lyons (1994) presented data which showed establishment vigour of G. Advance to be similar to that of AU Triumph and 30% greater than that of G. Roa. The same paper demonstrated G. Advance and AU Triumph were 17 and 8% higher in annual dry matter grass production than G. Roa, with G. Advance significantly outyielding the other two cultivars in the warm season. What remained was to ensure production and persistence of this new cultivar was greater than that of G. Roa which it replaced and at least equal to the less palatable, widely used AU Triumph.

MATERIALS AND METHODS
The trial was sited on a free-draining Manawatu fine sandy loam overlying medium/coarse sands and deep gravel. The area was spray/fallowed over the summer, lightly cultivated and drilled with an Aitchison SeedMatic 800 on 25 March 1992. Each of the tall fescue cultivars was sown into 145 m^2 plots at a rate of 15.5 kg/ha, with Grasslands Kopu white clover at 3 kg/ha. The whole trial was lightly grazed at the end of July before all plots were individually fenced.

The trial design was a randomised block consisting of 6 replicates of 4 tall fescue cultivars. The cultivars used in this tall fescue evaluation were G. Advance, G. Roa, AU Triumph and Johnstone. Grazing management was equivalent to 3-4 weekly grazings by young sheep during spring, summer and autumn, and 6-8 weekly in winter, all to a post-grazing residual dry matter of 8-1000 kg/ha, over a 48 hour grazing period. Herbage accumulation was measured prior to each grazing by cutting two 0.5 m^{-2} quadrats per plot to 30 mm, and a subsample taken for botanical composition determination. Post grazing residuals were determined using a calibrated pasture probe. Soil tests taken before sowing indicated an Olsen P of 16 mg/gm. Annual autumn applications of 200 kg/ha of 30% potassic superphosphate had increased Olsen P tests to 22 mg/gm by the end of the experiment. The initial pH of 5.6 has been maintained throughout the length of the trial. The trial concluded on 31 May 1996.

RESULTS
Results from Table 1 show G. Advance to be a considerable improvement over G. Roa both in terms of absolute yield and contribution of fescue to total sward productivity, with G. Advance having a higher level of productivity in all years apart from the first. At no stage of this trial was G. Advance out-produced by AU Triumph, and in fact in Years 1 and 2 of this trial G. Advance outperformed AU Triumph. Johnstone tall fescue did not perform at all well in any stage of this trial. The percentage tall fescue in G. Advance climbed steadily over the four years from 65% to 84% of total dry matter yield. There was a similar general trend with the other fescue cultivars, but they did not reach the high levels of contribution attained by G. Advance from Year 2 onwards.

Table 2 shows seasonal dry matter production meaned over the 4 years of the trial and, excluding the poor performance of Johnstone, there is no difference in spring production. However, G. Advance outyielded G. Roa in summer which was one of the breeding aims for this cultivar. This superiority over G. Roa continues in the autumn, and in winter G. Advance shows a significant dry matter advantage over the others.

DISCUSSION
Evidence from the first year's dry matter production from this trial supports that of Easton and Pennell (1993) that G. Advance tall fescue has a more rapid establishment than the older cultivar G. Roa. In addition work by Fraser and Lyons (1994) has established the forage quality of G. Advance compared with G. Roa, in terms of animal growth rates, has been maintained thus establishing a successful second breeding objective (Easton and Pennell, 1993).

The consistently high dry matter yields of the tall fescue component of G. Advance, along with the steady increase in percentage tall fescue contribution to total sward productivity over the four years auger well as indicators of its persistence. Of the other cultivars in the evaluation only AU Triumph had comparable yields in Year 4.

The cool season production of G. Advance represents successful selection for this trait, along with excellent year-round vigour. AU Triumph was also selected for cool season growth (Pederson et al., 1983), but in a different environment where summers are more stressful. The absolute dominance of late winter/early spring calving and lambing in New Zealand farming systems accentuates the importance of winter/spring production for lactating animals, while summer/autumn growth is essential for finishing prime stock and extending the lactation curve for the dairy industry (Exton et al., 1996). Overall, G. Advance is the best of the four tall fescue cultivars evaluated in this trial and fulfils the requirements above. Tall fescue has been clearly shown as a better performer in summer/autumn compared with perennial ryegrass (Wright et al. 1985, McCallum et al. 1990, Judd et al. 1990, Hainsworth et al. 1991, Exton et al. 1996).

The successful breeding of an improved New Zealand-adapted tall fescue cultivar, G. Advance, will open the way to a greater use of tall fescue in pastoral systems in New Zealand where high stocking rates and high production are demanded.

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Table 1
Annual dry matter production for four tall fescue cultivars under sheep grazing for four years (kg/ha of tall fescue component only, percentage of total production in brackets).

	92/93		93/94		94/95		95/96	
G. Advance	10275ab	(65)	10835q	(74)	9290a	(80)	12215a	(84)
G. Roa	9925b	(62)	8100b	(64)	7275b	(70)	9455b	(75)
AU Triumph	11475a	(68)	8160b	(64)	7725b	(69)	11660a	(77)
Johnstone	5970c	(42)	3415c	(31)	3490c	(40)	6500c	(49)
S.E.M.	706		476		586		522	

Table 2
Seasonal dry matter production for four tall fescue cultivars under sheep grazing. Mean of four years (kg/ha of tall fescue component only, percentage of total production in brackets).

	Spring		Summer		Autumn		Winter	
G. Advance	4050	(84)	3280a	(70)	2375a	(79)	2190a	(82)
G. Roa	3585	(80)	2625b	(61)	1915b	(72)	1610c	(70)
AU Triumph	4120a	(78)	2965ab	(64)	2095ab	(74)	1830b	(75)
Johnstone	2575b	(52)	1565c	(38)	985c	(42)	725d	(37)
S.E.M.	305		167		63		77	