A COMPARISON OF IRRIGATED OATS AND RYE GRASS AS WINTER FORAGE FOR FAT LAMB PRODUCTION IN SOUTH EAST QUEENSLAND

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SUMMARY

Irrigated and N-fertilized Saia oats *(Avena strigosa)* and Grassland Manawa rye grass *(L. perenne x L. multiflorum)* were grazed at 3 stocking rates (20,40 and 60 lambs/ha) by 2 groups of lambs in two successive experiments. Oats produced high forage yields early in the winter season and rye grass continued to yield leafy forage in late winter after the oats had matured. At the lowest stocking rates (20 lambs/ha), high rates of lamb growth (194 to 210 g/d) were attained on both pastures, with the exception of oats grazed late in the season (141 g/d). Liveweight gain significantly decreased with increased stocking rates on oats but less markedly for lambs grazing rye grass. At the higher stocking rates (40 and 60 lambs/ha), lambs grazing rye grass grew significantly better than those on oats, and these growth rates were sustained for a longer period. Rye grass was a superior forage to oats for fattening lambs in this environment.

INTRODUCTION

Although tropical pastures are capable of high dry matter yields, animal production from these pastures is limited by marked seasonality of pasture growth, low percentage utilization and by low voluntary intakes and digestibility of the forage by animals. Other factors limiting the growth of lambs on tropical pastures during summer are cobalt deficiency (Norton and Hales 1976), rust infestation (Davis and Norton 1978), low dietary protein intake (Davis 1980) and low efficiency of net energy utilization (Mamat 1977). During the winter tropical pastures are mature and dormant in south east Queensland, and the maintenance of year round annual production requires that additional forage be grown in this period.

Oats and rye grass are commonly used as winter feed for grazing stock in temperate Australia, but unless irrigation is available, a sub-tropical climate is unsuitable for temperate perennial grasses (Gartner 1965; Jones and Rees 1972). Kemp (1974) compared Wimmera animal rye grass (*Lolium rigidum*), Saia oats *(Avena strigosa)* and Algerian oats (A. *sativa)* for dry matter production in the subtropical Manning district of N.S.W. Saia oats provided more feed early in the season and the annual rye grass was a low cost alternative to oats except where feed was required as soon as possible after sowing.

The following experiment was designed to determine the relative merits of Saia oats and Grassland Manawa rye grass for the provision of high quality feed for fattening lambs throughout a sub-tropical winter season and to investigate the effects of stocking rate on crop and animal production.

MATERIALS AND METHODS

Experimental site and crop management

The experiment was conducted at Mt. Cotton research farm (University of Queensland), 40 km south east of Brisbane. The climate is humid and subtropical,

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with annual rainfall of 1400 mm with a marked summer dominance. The soils are red yellow podzols (Beckman 1967) with deficiencies in most elements needed for plant growth (Blunt and Humphreys 1970). Saia oats *(Avena strigosa)* and Grassland Manawa Rye grass *(L. perenne x L. multiflorum)* were oversown (90 and 40 kg/ha respectively) into Pangola grass *(Digitaria decumbens,* Stent) pastures after cultivation. Each experimental area (0.55 ha) was fertilized with superphosphate (250 kg/ha), KCl (125 kg/ha) and urea (92 kg N/ha) at sowing (13 April, 1978). Urea (100 kg N/ha) and irrigation (40 mm/ha) were applied on three further occasions during the trial. Each area of crop was subdivided into 6 paddocks (2 x 0.15 ha, 2 x 0.075 ha, 2 x 0.05 ha) fenced and stock water supplied. Grazing was commenced 6 weeks after sowing for oats (24 May, 1978) and after 9 weeks for rye grass (14 June 1978).

Animals and their management

The first experiment used 36 crossbred (Border Leicester - Merino x Dorset Horn) lambs of both sexes (mean initial liveweight 26 kg). Each lamb was identified by an eartag, received a cobalt bullet and grinder (CoO, ICI) and was treated for intestinal parasites (Nilverm, ICI) as 3 weekly intervals. In the second experiment, the same procedures were applied to 36 Merino lambs of both sexes (mean initial liveweight 17 kg). All lambs were weighed, after a 14 hour fast, at 3 weekly intervals.

Experimental design

Two separate experiments of 9 weeks duration were conducted in sequence on the experimental area, all paddocks being destocked 3 weeks between experiments. For each experiment, 3 lambs were randomly allocated to 2 replications of 2 pastures (oats and rye grass) and 3 stocking rates (20,40 and 60 lambs/ha) on each pasture. The required stocking rate was obtained by adjusting paddock size.

Analytical methods

Available pasture was sampled at 3 weekly intervals throughout both experiments, and after drying, sub-samples sorted into green and dead leaf and stem. Leaf samples were ground and analyzed for total N after Kjedahl digestion by an autoanalyzer technique (Henzell *et al.* 1968), and for ash by incineration at 600° for 3 hr. The results were analyzed as a 2 x 2 x 3 factorial experiment and the significance of differences between replicates, pastures and stocking rates in each experiment determined by analysis of variance with differences between treatment means detected by Duncans Multiple Range test.

RESULTS

Table 1 shows mean values for the green leaf available (kg/ha) and the percentage of green leaf (in parentheses) during each sampling period in each experiment. Rye grass was slower in early growth than oats, and grazing was consequently commenced 3 weeks later on rye grass than oats. Neither pasture was judged capable of sustaining the highest stocking rate (60 lambs/ha) at this time. At the end of the first experiment, leaf yield from both pastures had decreased to low levels, particularly at the higher stocking rate (40 lamb/ha), and grazing was discontinued to avoid weight loss. At the beginning of the second experiment, total pasture dry matter yields were similar, but the rye grass pastures had significantly ($P < 0.01$) higher leaf yields. Throughout this experiment rye grass was leafier and provided significantly ($P < 0.05$) greater amounts of green leaf per lamb when compared with oats. At the end of the nine week grazing period, little green leaf was available for lambs grazing oats

TABLE 1 Mean values for green leaf available (kg/ha) and leaf percentage in oats and rye grass during grazing by lambs at three stocking rates (20,40 and 60 lambs/ha)

Grazing Period (weeks)	Oats			Rye grass			LSD
	20	40	60	20	40	60	(P < 0.05)
Experiment 1							
0-3	1056(70)+	818(64)	-	-	-	-	680
3-6	1020(53)	396(42)	-	1111(91)	663(88)	-	603
6-9	1060(41)	213(28)	-	1521(84)	464(82)	-	975
Experiment 2							
0-3	681(31)	954(40)	677(35)	1970(88)	1711(84)	1791(81)	838
3-6	360(13)	492(24)	288(17)	1816(76)	1713(83)	1495(73)	678
6-9	159(7)	124(10)	34(3)	1621(73)	1565(79)	1292(75)	396

+ Values in parentheses are percentage green leaf.

whereas rye grass pastures had maintained high yields of green leaf at all stocking rates. There were no significant differences between pastures in N content. Mean values (g N/kg DM) were, oats 38.8, rye grass 42.4.

The mean values for liveweight gain of lambs in the first 6 and last 3 weeks of each experiment are given in Table 2. In the first experiment, lambs at both stocking rates on rye grass and at the lowest stocking rate on oats reached saleable weight (35 kg) in the 6 week grazing period. In both pastures, liveweight gain decreased with increased stocking rate, but this effect was only significant in oats. Similar trends in liveweight gain with increased stocking rate were also observed in the second experiment, although consistently higher liveweight gains were made by lambs on rye grass, and in the final 3 weeks of grazing, all lambs grazing oats lost weight whilst only those at the higher stocking rates lost weight on rye grass.

TABLE 2 Mean values for the liveweight change (g/d) of lambs grazing oats and rye grass pastures at three stocking rates (20,40 and 60 lambs/ha)

Grazing Period (weeks)	Oats			Rye grass			LSD
	20	40	60	20	40	60	(P < 0.05)
Experiment 1							
0-6	198a+	120b	-	201a	169a	-	76
6-9	184a	106b	-	-	-	-	86
Experiment 2							
0-6	141a	132ab	87b	183a	177a	142a	51
6-9	-61a	-20a	-103b	97c	5a	-15a	53

+Values within a line having different subscripts differ significantly (P < 0.05).

DISCUSSION

Saia oats provided significantly more feed early in the winter season (May)

when compared with ryegrass, and permitted an early commencement of grazing. Equivalent yields of rye grass were obtained 3 weeks later. However, little new growth occurred in oats after mid-August, whereas ryegrass continued to produce high yields of green leaf after mid-November. These results suggest that by an integrated use of both oats and rye-grass, a source of high quality forage may be provided for stock from mid March to mid November (6 months), by which time the tropical pasture species would be available for grazing. Dann et *al*.(1974) have suggested that some form of rotational grazing is superior to continuous grazing for forage oats. In our study, heavy defoliation of oats (40 lambs/ha) early in the season resulted in, after a 3 week recovery period, higher yields of green forage and relatively better lamb growth than that from paddocks which had been rested for the same period, but grazed at a lower stocking rate (20 lambs/ha). Further studies are needed to define optimum stocking management of oats and rye grass in our environment.

The growth rates of lambs at the lower stocking rate (-200 g/d) are comparable with those for intensively reared lambs (Buffier *et al.* 1975) and are considerably higher than those achieved by lambs grazing N-fertilized Pangola grass pastures at the same stocking rate. The effects of pasture and stocking rate on liveweight change were closely related to the amount of green leaf available (Willoughby 1959; Arnold 1964). The significantly higher live weight gains of lambs on rye grass were promoted by higher leaf yields in this pasture; and the liveweight loss of lambs grazing oats in the second experiment were caused by low levels of available leaf (8 to 0.6 kg/hd). In the first 6 weeks of experiment 2, maximum liveweight gain/ha (220 kg) was achieved at 40 lambs/ha, and did not decrease with increased stocking rate. Comparable values for lambs grazing rye grass were 297 kg/ha at 40 lambs/ha and this value increased to 358 kg/ha at the highest stocking rate (60 lambs/ha). It may further be calculated that rye grass pastures were capable of sustaining a growth rate in lambs stocked at 60/ha similar to that of lambs stocked at 20/ha on oats. It may be concluded that rye grass provide superior forage to oats for fattening lambs, both by increasing liveweight gains and by extending the growing season in the subtropical environment.

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