

COMPARISONS OF CROPS OF LUPINS, PEAS AND VETCHES FOR WEANER SHEEP IN SUMMER IN A MEDITERRANEAN ENVIRONMENT

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Summary

Production of Merino ~~wether~~ weaners grazed at 50/ha for 94 days on whole standing crops of Uniwhite lupins, Dunn peas and Languedoc vetches was compared with that from similar sheep grazing stubbles of these crops but fed 0, 250, 500 or 750 g per head/day of grain. Sheep gained more weight and grew more wool when grazed on lupins under all conditions of feeding than when grazed on peas or vetches. 250 g grain/day fed on stubble gave a similar liveweight and wool production to that of the whole crop.

In a second experiment, crossbred lambs grazed at 50/ha on the whole crops gained a similar amount of weight over 42 days on lupins and peas but less on vetches where grain yield was very low. The percentages of lambs marketed off the crop were 73, 60 and 23 respectively, the rest were fed grain on dry pasture until finished. Gross margins per hectare were \$140 on peas, \$92 on lupins and -\$25 on vetches.

I. INTRODUCTION

Weaner sheep will gain considerably more weight in summer in a Mediterranean environment when grazed on whole standing crops of dry sweet lupins than on dry annual pasture (Arnold et al. 1975). However the risk of the disease, lupinosis, is a hazard that many farmers would rather avoid if alternative feeds of equivalent value to lupins were available. Vetches can produce weight gain in weaners in summer, (Anderson, 1975). A comparative study of lupins, peas and vetches in pens showed that there were only small differences between them in nutritive value (Arnold and Wallace unpubl.). If this situation holds true in the field then either vetches or peas could be used in preference to lupins given that all three crops can be grown successfully for about the same cost. Two comparisons were made at the CSIRO Yalanbee Experiment Station, Bakers Hill, W.A. of the yield and nutritive value of lupin, pea and vetch crops for weaner sheep in summer.

II. MATERIALS AND METHODS

(a) Experiment 1

This experiment compared three crops as either unharvested crops and or as stubble with grain fed at different rates. Three randomised blocks were sown to lupins (*L. angustifolius* cv. Uniwhite), peas (cv. Dunn) and vetches (*V. sativa* cv. Languedoc) in mid-May 1971.

The treatments were (1) unharvested crop, (2) stubble, (3) 250 g grain/day and stubble, (4) 500 g grain and stubble and (5) 750 g grain and stubble. Plot size was 0.1 ha and grazing was for 94 days with five, seven month old, Merino wether weaners averaging 25 kg. For the first 42 days, treatments 2-5 were not fed grain because there was residual seed from harvesting on the ground. Feeding then began for a 59 day period with grain fed three times a week. Crop yields were

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measured before grazing began. The sheep were weighed fortnightly. Greasy wool production was measured by shearing the sheep at the beginning and end of the grazing period. The sheep which were grazing lupins were monitored periodically for lupinosis liver damage using plasma levels of ornithine carbamoyl transferase (OCT) as an indicator (Hill and Arnold 1975).

(b) Experiment 2

Three randomised blocks on each of two sites differing in fertilizer history were sown in 1974 to lupins (cv Uniharvest), peas (cv Dunn) and vetches (*V. dasycarpa* cv. Namoi). On one site that had previously received 2000 kg/ha of superphosphate the crops received no fertilizer, and on the other sufficient phosphorus, sulphur and potassium to ensure that P, S and K were not limiting production. At maturity, yields and botanical composition of the forage were measured. The 0.1 ha plots were stocked with five, seven month old, crossbred weaners averaging 24 kg. Liveweights of the sheep were measured fortnightly and lambs reaching 32 kg were slaughtered. Commercial carcass grades and values were obtained. When lambs ceased gaining weight on the crops they were moved to dry pasture and fed 250 g/day lupin grain; the ration was changed to 250 g lupin and 250 g oats after the break of season when protein content of the paddock feed increased. The maximum period on the crops was 42 days. These lambs were also slaughtered and valued on reaching 30 kg liveweight. Gross margin analyses were done for each crop type.

III. RESULTS

(a) Experiment 1

The yields of drymatter for lupins, peas and vetches respectively were 10600, 8060, 6500 kg/ha of which grain was 1000, 820 and 810 kg/ha. The nitrogen contents of the stubbles were 0.8, 1.0 and 1.2% and of the grains 5.6, 4.7 and 4.5% respectively. The grains which were fed were purchased and their nitrogen contents were 5.7, 4.8 and 4.9%.

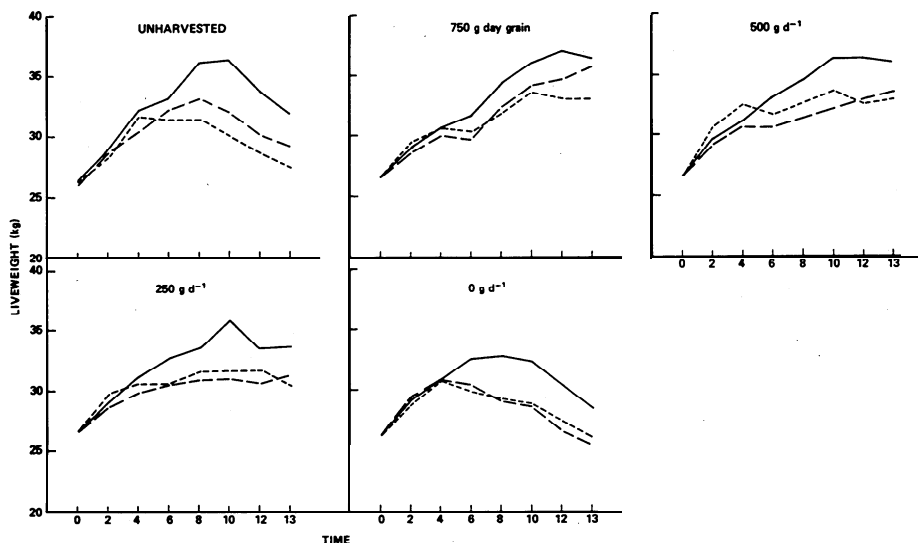


Fig. 1. The response in liveweight with time for sheep fed — Uniwhite lupins, --- peas or - - - vetch at five rates.

There were no problems with getting sheep to eat the grain rations which were fed in troughs. Six sheep died from lupinosis. Three were on one unharvested plot where all sheep had elevated OCT's and data from that plot have been omitted. Five of twenty sheep on one block representing all levels of lupin feeding had elevated OCT's. Three sheep grazing peas died from unknown causes.

The mean liveweights of the sheep on the 15 treatments are plotted in figure 1. At all rates of grain feeding lupins gave higher liveweights than peas or vetches which were the same. The maximum liveweight reached increased with grain feeding but the main effect of grain feeding was to prevent liveweights from falling in the later part of the grazing period (Table 1).

Greasy wool production was higher ($P < 0.001$) on lupins (1034 g) than on peas (828 g) or vetches (810 g); and varied similarly for-all crops with level of grain feeding ($P < 0.001$) see Table 1.

TABLE 1
Mean responses in liveweight and greasy wool
production to grain feeding

	Unharvested	Level of grain feeding at g/day			
		750	500	250	0
Maximum weight (kg)	33.5	35.2	34.5	33.0	31.1
Final weight (kg)	29.2	34.8	34.3	31.4	26.5
Greasy wool (g)	892	1007	980	891	749
Total grain fed (kg) per sheep	20*	44 ^o	30 ^o	15 ^o	0 ^o

* Based on 100 kg/ha initially

^o Excluding residual grain after harvest

(b) Experiment 2

The yield of crop varied with site, but only the liveweight gains of the sheep grazing vetches (fig. 2) differed on the two sites. The vetches had lodged after a very wet winter and produced little grain at either site. Peas yielded 15% less grain than lupins but produced similar liveweight gains. However more lambs reached slaughter weight on lupins than on peas or vetches. The "dressing out" percentage was much lower for lambs grazing on vetches and hence carcase weight and carcase value were lower. Four lambs died on lupins and vetches and one on peas.

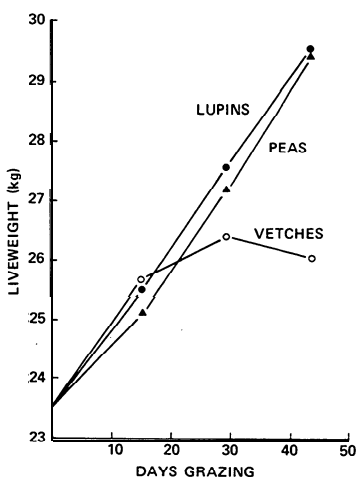


Fig. 2. Mean liveweight gain of sheep grazing lupins, peas and vetches.

The gross margin analysis costed the crops equally at \$46.0/ha and the extra grain to finish lambs at \$66/tonne for oats and \$90/tonne for lupins. There were more lambs from vetches that were supplemented on pasture so that the total variable costs were highest for vetches. Gross margin was highest for peas (Table 2).

After removing the lambs from the crops the plots were left to allow germination of grain remaining. There was 148, 131 and 13 kg/ha grain germinating on lupin, pea and vetch plots respectively. Stubble yields at the end of grazing were 3700, 1700 and 1400 kg/ha respectively.

TABLE 2
Results for Experiment 2

CROP		Lupins	Peas	Vetches	Significance of differences
Total yield kg/ha	H ⁺	8909	4733	2894	
	L	7065	3494	2600	
Grain yield kg/ha	H	2316	2035	72	
	L	1908	1467	208	
Lamb gain in 42 days (kg)		5.9	5.8	2.5	XX
% lambs slaughtered from crops		73	60	23	XXX
Mean carcass weight (kg)		15.2	15.0	11.7	XX
Dressing cut %		48.2	47.2	38.0	XXX
Carcass value (\$)		8.4	8.3	4.9	XXX
Total variable costs (\$)		80	83	126	
Final gross margin (\$)		92	140	-25	XXX
per hectare					

H⁺ = high fertility

L = low fertility

IV. DISCUSSION

Any comparison between these crops will be influenced by crop yield simply because animal production will decline earlier in lower yielding crops. In both experiments lupins outyielded peas and vetches in total drymatter yield.

Sheep liveweight gain on the unharvested crops of peas and lupins was 140 g/day in both experiments for the first six weeks of grazing. Thus there seems to be no difference in feeding value for weight gain between peas and lupins. Vetches gave variable results. In 1971, when grain yield was similar to that on peas, sheep gained for six weeks at 115 g/day on Languedoc vetches; in 1974 growth rate on Namoi vetches was 137 g/day for 15 days before grain supply presumably limited growth rate. Both rates of gain are higher than the best reported by Anderson (1975) of 75 g/day.

Experiment 1 showed that after the residual grain from harvest had been eaten sheep either grew faster or maintained higher weights at all levels of grain feeding on lupins than on peas or vetches. This suggests that the stubble value of lupins is higher perhaps because the sheep had a larger amount of stubble to select their diet from.

Using unharvested crops means that the rate of gain and so time of turn-off of finished lambs is controlled by the sheep, whereas feeding grain on a stubble allows greater control and may cost less grain.

It is concluded that peas are an attractive alternative to lupins for finishing lambs in summer in a Mediterranean environment, particularly because there is no risk of lupinosis.

V. REFERENCES

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