

USE OF LUPIN HAY AND TRITICALE GRAIN FOR FATTENING SHEEP

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SUMMARY

One year old Merino wethers were fed rations of pasture hay, lupin hay or one of two predominantly grain mixtures for eight weeks. The grain mixtures contained 27% lupins, 9% pasture hay and 64% triticale or oat grain.

Intake of lupin hay was almost twice that of pasture hay, and intake of the two grain-based rations was between that of the two hay rations. The increases in liveweight and carcass parameters were in the order pasture hay < lupin hay < oat-based ration < triticale-based ration. Mixed rations resulted in better animal performance than hay rations.

INTRODUCTION

In an earlier experiment at Rutherglen Research Institute, rations containing oats, lupins and pasture hay produced good weight gains in fattening wethers (Kenney 1981). Other feeds that could be practical to use for this purpose, but which have not been evaluated, are lupin hay and triticale grain. Therefore, to obtain comparative information on these feeds we examined the response of young wethers to rations of pasture hay, lupin hay or mixed diets consisting predominantly of oats or triticale grain.

MATERIALS AND METHODS

One hundred and thirteen one-year-old Merino wethers in poor condition were accustomed to grain by feeding on a ration of 33% oats, 33% triticale, 24% lupins and 10% pasture hay for three weeks before the experiment began in August 1981. They were then drenched with a broad spectrum anthelmintic, weighed and the wool was dyebanded. Five wethers were selected at random for slaughter at the beginning of the experiment and the remainder were allocated to twelve experimental plots using stratified randomisation on the basis of liveweight.

The treatments were four rations, each provided for eight weeks to three plots of wethers, with nine wethers in each plot. The rations were provided *ad libitum* and comprised: a) pasture hay; b) lupin hay; c) 64% triticale grain (cv. Tyalla), 27% lupin grain (cv. Uniharvest) and 9% pasture hay; or d) 64% oat grain (cv. Swan), 27% lupin grain and 9% pasture hay. The following mixture was added to each ration in the ratio 1:20 - 20% ground limestone, 10% gypsum, 20% salt, 20% urea, 10% vitamin-mineral pre-mix and 20% molasses.

The lupin hay (cv. Uniharvest) was cut and conditioned as a whole crop at last flower in mid-November. It was pressed into conventional rectangular bales one week after mowing. The pasture hay was made at a similar time from annual pasture predominantly consisting of *Lolium rigidum* and *Trifolium subterraneum* (cv. Woogenellup). The feeds used were analysed for crude protein and crude fibre (AOAC 1965) and assessed for digestibility (Clarke et al. 1982) (Table 1).

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TABLE 1 Characteristics of Feedstuffs

Measurement	Oats	Triticale	Lupins	Lupin Hay	Pasture Hay
Crude Protein (%DM)	11.5	15.5	32.1	12.4	9.7
Crude Fibre (%DM)	14.1	4.4	16.3	33.2	33.1
Digestibility (%DM) (in vitro)	79.1	87.2	83.1	55.0	58.8

Grain based diets were fed in troughs and residues were collected three times per week. Wethers fed hay received it in mesh containers held above the ground with a new bale being supplied as required. The percentage of hay wasted was assessed by subjectively comparing the volume wasted with that offered. More accurate assessment was impossible because of contamination of wasted hay with faeces and urine. Wastage was estimated as 7% for pasture hay and 10% for lupin hay, and these quantities were deducted from the total hay fed to determine intake.

The wethers were weighed and their condition was scored on a scale of 1 to 5 each week. Feed offered and any residues collected were weighed. Samples were dried at 80°C for 22 hours for dry matter estimates. Dyebanded wool was used to measure growth for the different treatments using the method described by Kenney (1978).

Three representative wethers from each plot were slaughtered at the end of the experiment. The carcasses of these wethers and the five slaughtered earlier were weighed after chilling and the depth of subcutaneous fat over the eye muscle 4.5 cm from centreline, and the area of eye muscle were measured between the 12th and 13th rib.

Analyses of variance were applied to the individual plot means.

RESULTS

Results are presented in table 2. The DM intake of lupin hay was almost twice that of pasture hay whilst intakes of the mixed rations were greater than that for pasture hay but less than that for lupin hay ($P<0.05$). More was eaten of the triticale-based ration than of the oat-based ration ($P<0.05$). The estimated digestible dry matter intake (DDMI) was almost as great for the lupin hay as for the oat-based ration, though animal performance on lupin hay was much lower.

There was little change in liveweight on the pasture hay ration, a slight gain on lupin hay, and substantial gains on the grain-based mixes ($P<0.05$). Carcase weight, fat depth, and eye muscle area generally declined slightly over the experimental period on the pasture hay, increased slightly on lupin hay, and increased substantially on the mixed rations ($P<0.05$). Wool growth was significantly greater on the grain rations ($P<0.05$).

TABLE 2 Effects of treatments on feed intake and animal liveweight and carcass characteristics

	Pre-Treatment only	Pasture Hay	Lupin Hay	Oat mix	Triticale mix
DM Intake (kg)†	-	45.5a‡	83.4b	59.4c	62.5d
Digestible DM Intake (kg)σ		27	46	47	52
Liveweight (kg)	29.3 (0.3)β	30.4a	33.0b	38.9c	40.8d
Condition Score	1.9 (0.05)	1.0a	1.4a	2.3b	2.8c
Wool Growth α	-	1.0a	1.1a	1.6b	1.7b
Carcass Weight (kg)	11.9 (0.4)	11.0a	13.1b	16.5c	17.9d
Fat Depth (mm)	0.5 (0.14)	0.1a	0.4ab	1.0b	2.2c
Eye Muscle Area (cm)	10.9 (1.1)	9.1a	10.8b	12.2bc	13.3c

† 7% of pasture hay and 10% of lupin hay offered has been deducted as wastage

‡ Means within a line with different subscripts differ significantly ($P < 0.05$)

σ Estimated using DM digestibility from table 1

β Standard Error in parenthesis

α As a ratio of the wool growth of those fed pasture hay

DISCUSSION

Both mixed rations proved satisfactory for fattening young wethers, but lupin hay was suitable only for maintaining condition, whilst wethers performed poorly on pasture hay.

In two respects the results on hay are consistent with results obtained at other centres. Firstly, the poor sheep growth on hay is consistent with the results obtained by Hodge and Bogdanovic (1983), and these workers suggested that very few hays are capable of producing growth in young sheep. Secondly, Gillespie and McLaughlin (1977) observed, as we did, that in a group of wethers fed pasture hay, liveweights were at least maintained but carcass weights fell.

The comparatively poor animal performance on the lupin hay ration is inconsistent with our high estimate for DDMI on this ration. The most reasonable explanation is that we greatly over-estimated intake on this ration by under-estimating wastage. However, a 29% wastage of lupin hay would have been necessary to account for the difference observed in animal performance.

The comparatively good animal performance on the triticale-based ration compared to the oat-based one was probably due to the higher digestibility of triticale. The results presented in Table 2 show a conversion of feed to carcass weight of 10.4:1 for the triticale-based ration and 12.9:1 for the oat-based ration.

By contrast, Kenney (1981) found that wethers fed a wheat-based ration performed no better than those fed an oat-based ration even though wheat is usually 10% more digestible than oats (Leche et al. 1982). The difference

between Kenney's result with wheat and our result with triticale is probably associated with the digestive disorders that tend to occur on wheat-based diets. In the present experiment there was no evidence of digestive disorders associated with the triticale-based diet and the risk of such disorders should be less with triticale than with wheat because it has a higher fibre content - 3.5% for triticale as compared to 2.6% for wheat (Leche et al. 1982).

None of our rations produced carcasses either as heavy or with the amount of fat considered ideal for existing markets, but it is possible that such standards would have been reached if the mixed rations had been fed for a longer period.

In conclusion, it was found that lupin hay by itself was unsuitable for fattening young sheep but the mixed diets based on triticale or oats were satisfactory. The mixed diet containing triticale was better than that containing oats and it may have been better than a similar diet based on wheat.

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