



THE WHEAT-WHITE CLOVER ROTATION

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by BRUCE J. P. RYDE,
Lecturer in Farm Management.

Wheat is the traditional crop throughout most of the world, and in New Zealand with our varieties it can be grown over a wide range of soils in the lower rainfall localities. To the cash cropping farmer it is one of the most remunerative crops that can be grown, but as it is exhaustive on soil fertility it cannot be grown year after year. From the days of the Norfolk four course rotation, clovers and grasses have been combined with cereal growing to restore fertility, and to-day various rotations are employed to suit the many considerations encountered by farmers — personal, weed control, spread of risks, work and financial.

White clover is widely used throughout the world and in cropping localities of New Zealand it is grown along with grasses to restore fertility per media of the nitrogen it supplies to the grasses and the stock carried on same, and also as a cash returning seed crop.

On the mixed cropping unit at Lincoln College the wheat-white clover rotation has been practised in two paddocks over a period of five years. The soils differ, one paddock being a Medium-Heavy silt loam (Wakanui series) while the other is a Medium silt loam over a sandy silt loam sub soil (Templeton series). YIELDS AND GROSS MARGINS (the gross revenue less direct costs) have been as follows.

	Medium-Heavy Paddock	Medium Paddock		
	Yield per acre	Gross margin per acre	Yield per acre	Net return per acre
1961 Wheat	47 bush.	£27	45 bush.	£26
1962 White Cl.	470 lb. MD	£70 (@ 3/6)	275 lb.	£40
1963 Wheat	62 bush.	£35	54 bush.	£30
1964 White Cl.	657 lb. MD	£83 (@ 3/-)	301 lb. MD	£37
1965 Wheat	69 bush.	£40	40 bush.	£21
Average net return		£50 per acre	£30 per acre	

On the Medium-Heavy soils a generally accepted rotation of peas to wheat, to wheat to barley, to newgrass to ryegrass seed, to white clover seed, then grazing for 3 years, has over the same period of years as above given a gross margin return of £27 per acre per year including returns from ewes and

fattening wether hoggets.

An approximate return of £22 per acre per year would have been obtained off the medium soils following a rotation of field peas to wheat, wheat to newgrass, ryegrass seed to white clover seed, with 4 years graz-

Examples of gross margins applicable to the above rotations are as follows.*

GARDEN PEAS (ex Old Grass)

GROSS REVENUE	35 bushels @ 18/-	.....	.....	31	10	-
DIRECT COSTS				£	s.	d
Cultivation	5 hours @ 3/-	.....	.....	-	15	-
Seed	4 bushels @ 23/6	.....	.....	4	14	-
Fertilizer	1¼ cwt @ 9/8	.....	.....	-	12	1
Spraying material	+ ¼ hour tractor @ 3/-	.....	.....	
	(£1 5 - + - 1 -)	.....	.....	1	6	-
Harvesting	Mowing 1 hour @ 3/-	.....	.....	-	3	-
	Heading 1 hours @ 4/-	.....	.....	-	4	-
Sacks	12 @ 1/0½d	.....	.....	-	12	6
Cartage	12 sacks @ 15½d	.....	.....	-	15	6
	1¼ cwt fertilizer @ 11d	.....	.....	-	1	2
	Total Direct Costs	.....	.....	9	3	3
Gross margin:—	£31 10 - -	£9 3 3				
	=	£22 7 -				

WHEAT (ex Peas)

GROSS REVENUE	55 bushels @ 13/6	.....	.....	£	s.	d
DIRECT COSTS						
Cultivation	3 hours @ 3/-	.....	.....	-	9	-
Seed	1.5 bushels @ 22/6	.....	.....	1	14	-
Spraying (aphids)—	materials & ¼ hrs. tractor @ 3/-	.....	.....	1	9	3
Harvesting	Heading ½ hour @ 4/-	.....	.....	-	2	-
	Sacks 19 @ 1/0½d	.....	.....	-	19	10
Cartage	19 sacks @ 15½d	.....	.....	1	4	7
Levy	4/9 per 50 bushels	.....	.....	-	5	3
Raking and ploughing for a fire break — ¼ hour @ 3/-	.....	.....	.....	-	1	-
	Total Direct Costs	.....	.....	6	4	11
Gross margin:—	£37 2 6 -	£6 4 11				
	=	£30 18 -				

BARLEY (ex Wheat)

GROSS REVENUE	65 bushels @ 8/10½	.....	.....	£	s.	d
DIRECT COSTS						
Cultivation	4½ hours @ 3/-	.....	.....	-	13	6
Seed	2 bushels @ 15/-	.....	.....	1	10	-
Fertilizer	1 cwt @ 9/8	.....	.....	-	9	8
Spraying (weeds) —	materials + ¼ hours tractor	.....	.....	
	@ 3/-	.....	.....	-	11	-
Harvesting	Heading ½ hour @ 4/-	.....	.....	-	2	-
	Sacks 24 @ 1/0½d	.....	.....	1	5	-
Cartage	24 sacks @ 15½d	.....	.....	1	11	-
	1 cwt fertilizer @ 11d	.....	.....	-	-	11
Raking and ploughing for a fire break—¼ hour tractor @ 3/-	.....	.....	.....	-	1	-
	Total Direct Costs	.....	.....	6	4	1
Gross margin:—	£28 16 - -	£6 4 1				
	=	£22 12 -				

2 YR. FAT LAMB EWE FLOCK

		£	s.	d.
GROSS REVENUE (lambing 115%)				
Lambs	1.15 @ 38/- net	2	3	8
Wool	10 lbs @ 3/8 net	1	16	8
Culled Ewe	½ @ 20/-	-	10	-
		4 10 4		
DIRECT COSTS				
Ewe replacement — ½ + 0.05 (death) @ 45/-		1	4	9
Shearing 1/100 x £7 10 -		-	1	6
Crutching 1/100 x £3 10 -		-	-	8
Vaccination		-	-	3
Drenching		-	-	5
Docking		-	-	2
Dipping		-	-	6
Footrotting		-	-	2
Ram costs (net)		-	1	-
Cartage	1 ewe @ 20 miles @ 1/3	-	1	3
		1 11 1		
Gross margin:—	Total Direct Costs	£4 10 4	—	£1 11 1
		= £2 19 - per ewe		

HUSBANDRY ASPECTS

In recent years the white clover has been broadcast at 4 lbs per acre when the wheat is drilled in May, through a turnip box fitted behind the drill so the seed is not buried deeply by the coulters. It could go in with the fertilizer if there were separate spouts from the grain and manure boxes so that the mixture did not go down the coulters, for it is essential not to bury the white clover seed.

Previously the clover was over-drilled into wheat in September but often the young clover seedlings did not establish due to the strong wheat growth or died through lack of soil moisture in the summer.

Sowings of clover later than May have been lost through frost lift, but there is the second chance to establish it in the Spring.

Once clover has been harvested off a paddock, by skim ploughing then ploughing back prior to sowing wheat, clover seed is brought close to the surface with often an excellent establishment resulting.

After the wheat is harvested the straw can then be removed or left with no detrimental affect to the clover. A good white clover establishment can be grazed soon after harvest, but a week one should be left until the autumn rains boost its

growth. Normal grazing management follows with the time of closing for seed depending on the season and the soil type. Any weeds or grass species are sprayed to remove any competition.

However twitches, where present initially, get an excellent opportunity to spread through the paddock and it is then necessary to terminate the rotation by introducing fallows to kill them.

EFFECT ON SOIL

Wheat yields have been maintained on the M-H soils due to the build up of soil nitrogen by the year in clover. It is possible that two wheat crops in succession could be taken on strong soils but on the lighter wheat soils it may be advisable to leave the clover down for two years. With the land under frequent cultivation soil structure could deteriorate, and at this stage it would be necessary to go back into pasture for a period of years.

MANAGEMENT FACTORS

When incorporating another enterprise or changing any established programme several factors must be considered. The increase in net profit must be significant. Any increase in risk or work load must

be acceptable to the farmer. The complexity of management associated with the change must be compatible with the managerial ability and skill of the farmer. The adjustment of stock policies must be considered. With small seed production the pinch period for stock is in the spring after the paddocks have been closed for seed, but over the winter there is more feed available and hoggets are brought in, to be later sold in August-September. An alternative is the selling of ewes and lambs all counted or by lambing a certain number of ewes earlier and getting their lambs away quickly at

light weights before closing these seed paddocks.

This wheat-white clover combination has maintained wheat yields and has given high white clover yields. With the increased wheat price to 14/6 bushell this rotation is a practical way for a farmer to grow a greater area of wheat and increase his net return.

* These data have been abstracted from the Agricultural Economics Research Unit Bulletin No. 7 by J. D. Stewart and P. Nuthall.

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