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SOME NOTES ON THE DEPRECIATION AND REPAIR COSTS OF FARM MACHINERY

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PUBLICATIONS

A. Annual Reports on Financial Results of East of Scotland Farms :-

Hill Sheep Farms Stock-Rearing Farms	Reports for the years 1948-49 to 1958-59
Stock Raising and Feeding Farms Arable Farms	Reports for the years 1948-49 to 1958-59
Dairy Farms	Reports for the years 1948-49 to 1958-59

B. Enterprise Studies :-

Milk Production (Annual Reports)
Commercial Egg Production
Pig Production
Oats, Potatoes and Sugar Beet Costs
Etc.

C. Miscellaneous

Piece-Work Potato Gathering
Hill Farming During the Post-War Period
Some Notes on Reseeding Old Grassland on Hill and Upland Farms, 1955-57
Diesel Tractor Costs and Performance in the East of Scotland, 1956-57
Some Notes on Grain Drying - 1957 Harvest
Report on Grain Drying - 1958 Harvest
Organisation of Hill and Upland Farming in Selkirkshire
Economic Aspects of Tractor Work, 1957-58

Copies of these publications may be obtained on request to the Secretary of the College or the Advisory Economist.

SOME NOTES

ON

THE DEPRECIATION AND REPAIR COSTS OF FARM MACHINERY

As a result of a survey carried out on 16 farms in Midlothian and Peebles information was collected about the depreciation and repair costs of some of the machines commonly in use on farms. The main object was to examine the effect of age and usage on the level of these costs and so provide some guide to farmers when deciding how long it is likely to be worthwhile keeping such machines on their farms. The survey also provided information as to the relative economy of new and second-hand machines.

The depreciation charges were based on the actual costs of the machines less their estimated second-hand values at the time the survey was taken, the difference being spread over the life of the machines on the farm. The levels of second-hand prices are of importance to buyers of new and second-hand machines alike. On the one hand they may enable the buyer of new machinery to justify replacing a machine at an early stage and thereby avoid heavy repair costs. On the other hand they provide a range of prices to suit the circumstances of farmers who would otherwise be unable to operate economically with new machinery. Such exchanges may therefore be of benefit to both the seller and the buyer. This is because the use of new machinery on a small scale incurs higher unit costs for depreciation while repair costs tend to be incurred in proportion to usage. The advantage to the second-hand buyer derives mainly from the fact that the drop in market value of a new machine is normally high in the first few years and gradually becomes less the longer it is kept on the farm. This is shown in Table I (see Appendix) where the estimated second-hand values of new machinery at different ages are expressed as percentages of the initial cost prices. Second-hand machines are not included in this table.

The figures in this table show that the percentage fall in market value does in fact follow this pattern - the machines, in many cases, being worth only about half their original value after four years while subsequently the drop in market value is much less. Faster than "normal" rates of depreciation are, however, seen to occur in a few instances where changes in design have rendered such machines obsolete. For example, the pick-up balers aged 5 and 6 years were of the low density type which is now less popular than the high density machines such as those aged 1 and 2 years. On the other hand, depreciation rates tend to fall more slowly in the case of newer types of machinery such as precision seeders. Where machines fetch as much as 80-90 per cent of their original value after 1 - 2 years, farmers will be encouraged to buy new and replace quickly. In this case the difference in depreciation costs for new and second-hand machines may be relatively small and the risk to the prospective second-hand buyer will be high. On the other hand, where heavier rates of depreciation occur as when a machine is only worth about half its original value after a few years, farmers are likely to find it more economical to keep the machine for a longer period. The second-hand purchase, in this case, would be a better 'buy' and likely to attract a greater number of farmers operating on a smaller scale. The extent of the advantage in buying second-hand is indicated in table II (see Appendix).

With the exception of the forage harvester, the depreciation costs per annum of the second-hand machinery were considerably less than for similar machinery bought new. In most cases the annual depreciation costs of second-hand machinery expressed as percentages of the buying prices were as low or lower than for new machinery.

The heavy depreciation charge in the case of the second-hand forage harvester was due to obsolescence - costing £270, the machine was eventually sold after 3 years for only £40. Obsolescence was also an important factor causing the high depreciation costs of the new pick-up balers and of the second-hand combine harvesters. Once the second-hand prices of such machinery settle down at the lower levels, farmers operating on a smaller scale may well find that the service they provide is quite satisfactory for their needs and costs very little.

Two /

Two suggestions arise from the foregoing discussion. One is that as far as depreciation costs are concerned it would pay - to a greater or lesser extent - to keep a machine until the end of its working life. The other is that there is a considerable advantage in buying second-hand. It now remains to see to what extent the incidence of repair costs might encourage quicker replacement or deter farmers from using second-hand machinery.

Table III (see Appendix) shows the average repair costs per acre incurred by new and second-hand machinery. As might be expected the complicated machinery such as harvesters incurred much higher costs than those having relatively few working parts such as seed and fertiliser drills. Also of interest is the fact that the repair costs of the second-hand machinery were not necessarily higher than for the new machinery. This however may be due to the variation in repair costs from year to year.

Table IV (see Appendix) shows how repair costs per acre vary with increases in the total acreage worked by new machinery.

Where machines incur only a few repair costs over a long number of years, retention on the farm for as long as the machines continue to give reasonable service would probably be best from a cost point of view. Farmers operating on a small scale are also likely to find a considerable advantage in buying such machines second-hand. After the first sharp increase in major repairs there appears to be no distinguishable relationship between increasing usage and the current level of repair costs for the more complicated machinery. This may be made clearer by taking as an example the average level of repair costs per acre of the mowers at the different stages. This is shown in Table V. (see Appendix)

It follows from this table that unless selling before the 300 acre stage was justified it would probably pay to keep the machine until the end of its working life. To justify selling at the earlier stage would depend on the acreage covered by the machine in a year, since the smaller the acreage worked per annum the longer it would be before the major rise in repair costs would be incurred. For instance, if the machine dealt with only 50 acres a year the sharp increase in repair costs would not arise until the 5th or 6th year; if it dealt with 100 acres a year the high repair costs would arise in the 3rd year. Since, as previously suggested, a machine may be worth no more than 50% of its original value after 5 or 6 years while in the 3rd year it may fetch 75% of its cost price, it follows that the farmer with the larger acreage is better placed to sell quickly and avoid the heavier repair costs. It might also seem reasonable to suppose that it would be to the advantage of the farmer on the smaller acreage to buy second-hand if he is unable, in either case, to avoid the heavy repair bills.

SUMMARY

It is not possible from the limited results of this survey to come to any general conclusion with regard to the real incidence of depreciation and repair costs of either new or second-hand machinery. Certain suggestions do, however, emerge.

When considering the replacement of machinery purchased as new one important point the farmer should consider is the extent to which obsolescence is likely to affect the second-hand market value. If this factor is likely to have a serious effect it would seem advisable to replace at fairly close intervals and so avoid a heavy charge for depreciation.

In cases where obsolescence is not likely to have an unduly depressing effect on the second-hand values the question whether to replace new machinery or not seems to revolve round the extent of annual usage. Where a machine is put to considerable use per year the cost per unit of work for depreciation is likely to be low and replacement at an early date appears to be justified to avoid the fast onset of heavy repair costs which are associated with a high rate of usage. In cases where usage is low it becomes a question of considering the likely incidence of heavier depreciation charges and greater risk of obsolescence over the extended number of years required to /

to build up a useful usage total. The balance in this case may well be in favour of retaining rather than replacing.

The purchase of second-hand machinery offers considerable possibilities for those farmers who may be restricted in their approach to mechanisation by limitations of available capital or by the restricted usage possible on the farm - i.e. the smaller farmer. In most cases the risk of obsolescence has been carried by the original purchaser and subsequent depreciation costs are likely to be low per annum. Annual repair costs need not necessarily be high since such machinery is often completely overhauled, before resale and future repairs will only be incurred in proportion to usage. The second-hand machinery market may thus be considered as an effective means whereby the smaller farmer may extend his mechanisation at a reasonable cost.

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Grateful acknowledgment is hereby made of the valuable assistance given by the farmers who co-operated in this survey and of their willingness to provide the accurate data required.

TABLE I ESTIMATED CURRENT MARKET VALUES AS PERCENTAGES OF INITIAL COST AT DIFFERENT AGES - NEW MACHINERY

Age in Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 and over
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Grass Seed Barrows	94				50		43		32					33						29
Combined Grain & Fert. Drills		81	63		69			48		32										
Root Precision Seeders	83	79	83	69																
Mowers	78	78	39	31			41		41	29			19							
Binders						59					28					29				20
Pick-up Balers	83	73			37	44														
Potato Diggers		76	60										33						23	
Farm Yard Manure Spreaders (with Carriers)	82	79																		
Sprayers	81		54	56	68	49		17		25										
Fertiliser distributors :-																				
a) Broadcast		82		44			34				26									
b) Spinner	83		53	56	48															
Forage Harvesters	89	80																		
Average	84½	78½	63	51	54	51	39	32½	36½	29	27		26			29			23	24½

TABLE II AVERAGE DEPRECIATION COSTS PER ANNUM FOR NEW AND SECOND-HAND MACHINERY

	NEW			SECOND-HAND		
		Average Depreciation			Average Depreciation	
	Average Age* (Years)	Cost per annum	As % of Initial Cost	Average Age* (Years)	Cost per Annum	As % of Initial Cost
		£ s. d.	%		£ s. d.	%
Grass Seed Barrows	12¾	2:17: 5	7	6¾	1: 3: 9	5
Grain Drills	8	6: -: -	4	8½	4:11: 8	9
Combined Grain & Fertiliser Drills	5½	16:18: 8	8	5¾	9: 3: 2	8
Root Drills	5	4:16: -	13	7	-:13: 4	6
Root Precision Seeders	2⅓	7:11: -	11			
Fertiliser Distributors a) Broadcast	6	6:18: 9	9	1	3: -: -	11
b) Spinner	3	6: 8: 9	15			
Farmyard Manure Spreaders : a) with carriers	1½	32: -: -	15	4	3:15: -	11
b) without carriers						
Mowers	5½	12:16: -	14	5	1:15: 7	5
Binders	15	7: 6: 4	5	1 ⅔	4: 1: 8	7
Combine Harvesters				3	76:13: 4	14
Forage Harvesters	1¼	32:12: -	11	3	76:13: 4	28
Pick-up Baler	3	83: 5: -	14			
Potato Diggers a) Spinner	12	3:11: 4	8	1 ⅔	1:15: 7	7
b) Elevator	2	24: -: -	12			
Sprayers	4 ⅔	8: 3:11	12			

* Refers to the number of years the machine was on the farm.

TABLE III AVERAGE ANNUAL REPAIR COSTS PER ACRE FOR NEW AND SECOND-HAND MACHINERY

	NEW		SECOND-HAND	
	Average Acreage per annum	Average Repair cost per acre	Average Acreage per annum	Average Repair cost per acre
		s. d.		s. d.
Grass Seed Barrows	37	- -¾	30	- -
Grain Drills	27	1 3	41	- 7½
Combine Grain & Fertiliser Drills	71	- 10½	68	1 -½
Root Drills	31	- -	18	- -
Root Precision Seeders	25	- 1¾		
Fertiliser Distributors a) Broadcast	137	- 7¼	82	- -
b) Spinner	116	- 1		
Farmyard Manure Spreaders : a) with carriers	35*	1 2½		
b) without carriers			35*	- 4½
Mowers	56	1 9	49	1 8½
Binders	42	4 7½	47	1 9¼
Combine Harvesters			76	6 9½
Forage Harvesters	84	- 6	25	3 4
Pick-up Balers	63	1 4		
Potato Diggers a) spinner	5	- 1	5	- -
b) elevator	16	- -		
Sprayers	63	- 3¾		

* Acreage covered assumes an average dressing of 10 tons farmyard manure per acre.

TABLE IV CURRENT REPAIR COSTS PER ACRE ACCORDING TO USAGE - NEW MACHINERY

USAGE	Up to 100 Acres s. d.	- 200 Acres s. d.	- 300 Acres s. d.	- 400 Acres s. d.	- 500 Acres s. d.	- 600 Acres s. d.	- 700 Acres s. d.	- 800 Acres s. d.	- 900 Acres s. d.	- 1000 Acres s. d.	Over 1000 Acres s. d.
Grass Seed Barrows			- -		- -			- 3			
Grain Drills			1 3								
Combined Grain & Fertiliser Drills	- -	- -	2 -				1 -			1 5	
Root Drills		- -									
Root Precision Seeders	- 2	- -									
Fertiliser distributors a) Broadcast			- -				- $8\frac{3}{4}$				- $11\frac{3}{4}$
b) Spinner	- -	- -			- $\frac{1}{2}$	- $2\frac{1}{4}$		- 4			
Mowers	- $4\frac{1}{2}$	- $11\frac{1}{2}$	5 1	2 6	1 3		4 2		1 $9\frac{3}{4}$		
Binders		3 6							6 6	4 $10\frac{1}{4}$	3 $7\frac{1}{4}$
Forage Harvesters	- $2\frac{1}{2}$		- $11\frac{1}{2}$								
Pick-up Balers	- -	- 11		- $2\frac{1}{2}$							
Potato Diggers a) Spinner	- 1										
b) Elevator	- -										
Sprayers		- $4\frac{1}{4}$	- $1\frac{1}{2}$	- $4\frac{3}{4}$			- $\frac{3}{4}$				
Farmyard Manure Spreaders (with carriers)	1 $2\frac{1}{2}$										

* Usage = Age x Acreage covered per annum

TABLE V AVERAGE REPAIR COSTS PER ACRE FOR A MOWER AT DIFFERENT STAGES

TOTAL USAGE	AVERAGE REPAIR COST PER ACRE
	s. d.
- 100 Acres	$4\frac{1}{2}$
- 200 "	8
- 300 "	2 $1\frac{1}{2}$
- 400 "	2 $2\frac{3}{4}$
- 500 "	2 $-\frac{1}{2}$
- 600 "	2 $-\frac{1}{2}$
- 700 "	2 4
- 800 "	2 4
- 900 "	2 $3\frac{1}{2}$