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MECHANICAL HARVESTING OF WINE GRAPES

11. COST COMPARISON BETWEEN TOWED AND SELF-PROPELLED HARVESTERS

Harvesters are expensive and the purchase thereof should be carefully considered. The machine should be purchased for the right reasons and must be suited to the environment in which it will be used.

11.1 Considerations for the purchase of a self-propelled harvester

- Great capital outlay, which can only be justified if the surface/tonnage to be harvested is large enough.
- The speed is higher than a towed model.
- Some companies rent out harvesters and enter into long term contracts with producers. Thus it is not always necessary to purchase a machine.
- Producers can buy a harvester together to lower the capital outlay.
- The capital input of self-propelled harvesters is utilised better when a multipurpose machine is purchased.
- Variable costs of a multipurpose machine can be higher than those of a tractor.
- When a multipurpose machine is purchased, the training of the operator is very important. Training must include different practices which can be executed by the same machine and knowledge of the difference practices must be sufficient.

11.2 Considerations when purchasing a towed harvester

- These harvesters are cheaper than self-propelled harvesters.
- A tractor is required to use the machine. This tractor can however also be used for other practices during the rest of the year.
- A towed harvester requires a bigger turning space at the end of the row compared to a self-propelled machine.
- Minimum tractor size is 56 kW (75 hp).
- The tractor can have two- or four-wheel drive. This consideration depends on the terrain where the tractor and harvester are going to be used.
- Four-wheel drive tractors are ideal on sandy terrains, or where there is large amount of loose sand/rocks. These tractors however require a bigger turning space than two-wheel drive tractors.
- The harvesting tempo of the towed model is lower than that of the self-propelled harvester.

11.3 Cost comparison between the two types of harvesters

This comparison is summed up in two tables, namely self-propelled harvester (Table 1) and towed model harvester (Table 2). The values in these tables were compiled according to the following assumptions:

Self-propelled harvester:

- Purchase value: R 3 200 000
- Scrap value: R 320 000 (10 % of purchase value)
- Lifetime: 5 000 hours
- Harvest capacity: 10 tons/hour
- Fuel consumption: 12 litres/hour
- Depreciation: $(\text{purchase value} - \text{scrap value}) \div \text{lifetime}$
- Insurance & licence: 1 % of average investment \div hours per year
- Interest costs: 9 % of average investment \div hours per year
- Repairs & maintenance: 35 % of purchase value \div lifetime
- Fuel costs: Calculated at a diesel price of R 13/litre

Towed harvester:

- Purchase value: R 1 600 000
- Scrap value: R 160 000 (10 % of purchase value)
- Lifetime: 5 000 hours
- Harvest capacity: 7 tons/hour
- Depreciation: $(\text{purchase value} - \text{scrap value}) \div \text{lifetime}$
- Insurance & licence: 1 % of average investment \div hours per year
- Interest costs: 9 % of average investment \div hours per year
- Repairs & maintenance: 35 % of purchase value \div lifetime
- Tractor costs: Running costs (assuming that the tractor is already owned) calculated on 56 kW four-wheel drive at medium power

From abovementioned, it is clear that the choice of harvester must be well thought through. Factors to be taken into account include harvest size, the terrain on which the machine will be used, whether it is a multipurpose machine or not, the training of the operator (especially with multipurpose machines) and whether a machine will be shared or not.

Table 1: Costs calculated from the abovementioned assumptions for a self-propelled harvester

Tons harvested (tons)	Annual usage (hours)	Depreciation (R/hour)	Insurance & licence (R/hour)	Interest costs (R/hour)	Total fixed costs (R/hour)	Repairs & maintenance (R/hour)	Fuel costs (R/hour)	Variable costs (R/hour)	Total costs (R/hour)	Cost per ton (R/ton)
1000	100	576	176	1584	2336	224	156	380	2716	272
1250	125	576	141	1267	1984	224	156	380	2364	236
1500	150	576	117	1056	1749	224	156	380	2129	213
1750	175	576	101	905	1582	224	156	380	1962	196
2000	200	576	88	792	1456	224	156	380	1836	184
2250	225	576	78	704	1358	224	156	380	1738	174
2500	250	576	70	634	1280	224	156	380	1660	166
2750	275	576	64	576	1216	224	156	380	1596	160
3500	350	576	50	453	1079	224	156	380	1459	146
4000	400	576	44	396	1016	224	156	380	1396	140

Table 2: Costs calculated from the abovementioned assumptions for a towed harvester

Tons harvested (tons)	Annual usage (hours)	Depreciation (R/hour)	Insurance & licence (R/hour)	Interest costs (R/hour)	Total fixed costs (R/hour)	Repairs & maintenance (R/hour)	Variable costs (R/hour)	Total costs (R/hour)	Tractor costs (R/hour)	Total cost of trailer & tractor (R/hour)	Costs per ton (R/ton)
500	71	288	123	1109	1520	112	112	1632	195	1827	261
750	107	288	82	739	1109	112	112	1221	195	1416	202
1000	143	288	62	554	904	112	112	1016	195	1211	173
1250	179	288	49	444	781	112	112	893	195	1088	155
1500	214	288	41	370	699	112	112	811	195	1006	144
1750	250	288	35	317	640	112	112	752	195	947	135
2000	286	288	31	277	596	112	112	708	195	903	129
2200	314	288	28	252	568	112	112	680	195	875	125
2400	343	288	26	231	545	112	112	657	195	852	122
3000	429	288	21	185	493	112	112	605	195	800	114