CAPITAL REQUIREMENT OF HORTICULTURE WITH SPECIAL REFERENCE TO FRUIT CULTURE AND CROPS UNDER GLASS

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The concept capital requirement

1. The market grower needs money for wages, materials, work of third parties, etc. This money is locked up in the production process till the moment when the returns exceed the expenses. This money, which is soon available again, is called short circulating capital.

2. Besides, the market grower has to pay productive means that are not consumed in one year, such as glasshouses, buildings, heating plants, plantings, machinery and equipment. These expenses become available in parts in the form of writings off. This is called long circulating capital.

3. In the third place the market grower needs capital that will never become available. This capital, which does not circulate, is for the land, which is not subject to wear and tear.

It is clear that the market grower can only operate his holding if he can meet the need for short, long and non-circulating capital. The capital requirement is highest at the start when the holding is established. Part of the maximum capital is permanently used in the holding. It comprises first of all the non-circulating capital (soil) and secondly, a part of the capital required for buying permanent productive means. These productive means have not all the same working life time and are, therefore, not replaced simultaneously. So the long circulating capital will never be entirely disinvested. The permanent core is great, when replacements are made very regularly and small, when large replacements are made abruptly.

Thirdly, the permanent capital requirement includes part of the short circulating capital. This part may be great, when great expenses have been incurred for the new season and most of the returns have not yet come in. This is the case when products have to be stored or are paid for late, such as long-keeping fruit, flower bulbs, woody nursery stock, etc.

The complementary part of the maximum capital is not permanently required. We may here distinguish a longterm temporary capital requirement (permanent productive means) and a shortterm temporary capital requirement (working capital).

CHANGE OF CAPITAL REQUIREMENT

1. *A change in course of time*

From the foregoing it appeared that the capital requirement changes in the course of the years as a result of the real value of the productive means subject to wear and tear. Besides, the capital requirement changes in the course of the cultural year as a result of the variation in the requirement of working capital needed for the period in which the cost exceeds the returns.

2. *Changes resulting from changes in the prices of productive means*

Any change in the prices of the productive means affects the capital requirement because the value of a productive mean used on the holding is determined by the value of the productive mean that will replace the present one. The value of any performance unit is its replacement value and the latter is affected by the changes in prices. Table 1 gives the price changes of some important productive means, showing their extent and variation.

TABLE 1. — Index figures of prices of productive means in 1961 (1948 = 100)

Coal	240
Oil	75
Fertilizers	125
Labour	250
Dutch-light houses	145
Heating plants tractors	145

Source : Agr. Ec Research Institute

This table shows that in the period 1948-1961 the prices of some productive means have risen considerably, (coal, labour) those of others moderately (the greater part of the permanent productive means), whereas the prices of some have even fallen (oil). Price changes may be due to various causes. It is beyond the scope of this survey to deal with this subject intensively. For the sake of comparison it should be mentioned that, when we put the 1948 prices at 100, the index of wholesale prices in 1961 was 140 and that for the cost of living for the lower income groups 164.

3. *Changes resulting from changes in production technique*

A change in production technique generally affects the proportion in which the productive means are used. Such changes will also often affect the capital requirement. When, for instance, labour-saving machines or implements are introduced on the holding, the capital requirement for the acquisition of permanent productive means will rise and — be it generally in a smaller measure — the requirement of working capital will fall (less labour). There may be a rise or fall in the need for working capital when other productive means are used (oil instead of coal, more expensive or cheaper fertilizers or chemicals, etc).

There may be a rise or a fall in the capital requirement for the acquisition of permanent productive means, when improved machines or implements require a higher or lower investment per performance unit. A zinked iron glasshouse is, for instance, more expensive than an iron one ; thin heating pipes are cheaper per performance unit than thick heating pipes.

The above-mentioned causes of a change in capital requirement apply to holdings of the stationary type. It may be worth mentioning that in practice the changes in capital requirement are often caused by changes in the volume of production (size of holding) and changes in the composition of the productive assortment, for instance when a change is made to cultures or cultural methods requiring more capital. By way of illustration it may be mentioned that in the Westland in the period 1948-1961 the average area under glass rose from 0,35 ha to about 0,52 ha per holding. Also the change from open air to glasshouse cultures and from cold glasshouse cultures to heated glasshouse cultures may considerably increase the capital requirement. It is, however, clear that these changes in the capital requirement of the holding differ substantially from those resulting from changes in prices and production technique.

The average capital requirement of horticulture

From the annual research by the Agr. Ec. Research Institute into the remunerativeness of horticulture in the large centres it appears that there is a reasonable constant relation between costs and the average capital requirement. This relation depends on the type of holding and varies from 2 to 2,8 (average 2,5).

In 1961 the productive value of horticulture amounted Dfl. 1,200 m. If we deduct from this amount the profit (about 20 %) and the productive value of some products that were grown entirely or almost entirely on non-horticultural holdings, we find the total cost incurred by all horticultural holdings together. By multiplying this amount by 2,5 we find an average capital requirement for horticulture of Dfl. 2.000 m. to Dfl. 2.250 m. It should be noted that this is only a very rough estimate of the average capital requirement in horticulture.

This may be amplified by stating the average capital requirement for some types of holdings.

In the Westland, the Kring, Aalsmeer and the glasshouse centre of Venlo it amounts to : Dfl. 100.000.

The specialized fruit farm of about 7 ha has an average capital requirement of Dfl. 130.000.

The capital requirement of open air vegetable gardens is smaller and varies from area to area from Dfl. 30.000 to Dfl. 50.000.

The capital requirement of some specialized types of holdings

We shall now deal with the capital requirement and the changes in the course of the years of some specialized types of holdings.The figures for 1948 will be compared with those for 1962 and the figures of an average holding with those of a modern one. We shall also treat the course of the capital requirement.

TABLE 2. — Capital requirement (establishment value) of specialized fruit farm of 8 ha cadastral measure (about 7 ha net cultivable) in the south-west of the Netherlands

	Capital requirement in 1948		Capital requirement in 1961-1962	
	price level 1948	price level 1961/1962	average holding	very modern holding
Land	24.000	72.000	72.000	72.000
Plantings	50.000	80.000 (1)	70.000	73.000
Other permanent productive means	17.000	24.000	30.000	35.000
Working capital	9.000	21.000	22.000	20.000
Total	100.000	197.000	194.000	200.000
Permanent labour in man-years	2.8	2.8	2.6	1.8
Yield in tons per ha	12	12	17	19

(1) Rough estimate. — *Source :* Agr. Ec. Research Institute

The fruit farm

As an example has been taken a specialized fruit farm of about 7 ha net cultivable. According to table 2 the capital requirement (establishment value) of this type of holding was in 1948 about Dfl. 100.000 and according to 1961-1962 price levels Dfl. 197.000. This means that when a fruit farm would be established on the same footing as in 1948 a capital of Dfl. 197.000 would be required.

Column 3 of the table 2 states the capital requirement of a fruit farm established in 1961, amounting to Dfl. 194.000, so that relatively the capital requirement has remained fairly unchanged in the period 1948 to 1961/1962. This, however, does not mean that the fruit farm of 1961 is identical to this fruit farm of 1948. A comparison of columns 2 and 3 of table 2 further shows that the 1961 investment in plantings is lower than the 1948 investment. This is due to the fact that the period of establishment in 1961 is shorter and requires less labour. This fall is offset by a rise resulting from mechanization (other permanent productive means). The 1961 fruit farm has a larger shed, a diesel tractor instead of an oil tractor, an atomizer instead of a motor sprayer, while further the equipment has been extended by a rotary cutter and a sorting machine. These changes in the structure of the fruit farm have caused a rise in the average yield from 12 to 17 tons/ha and a fall in the labour requirement.

The last column gives the capital requirement of a very modern fruit farm. The rise in the investment in plantings results from a larger share of modern plantings. The rise with equipment is due to the heavier tractor, the offset roto tiller and some further equipment.

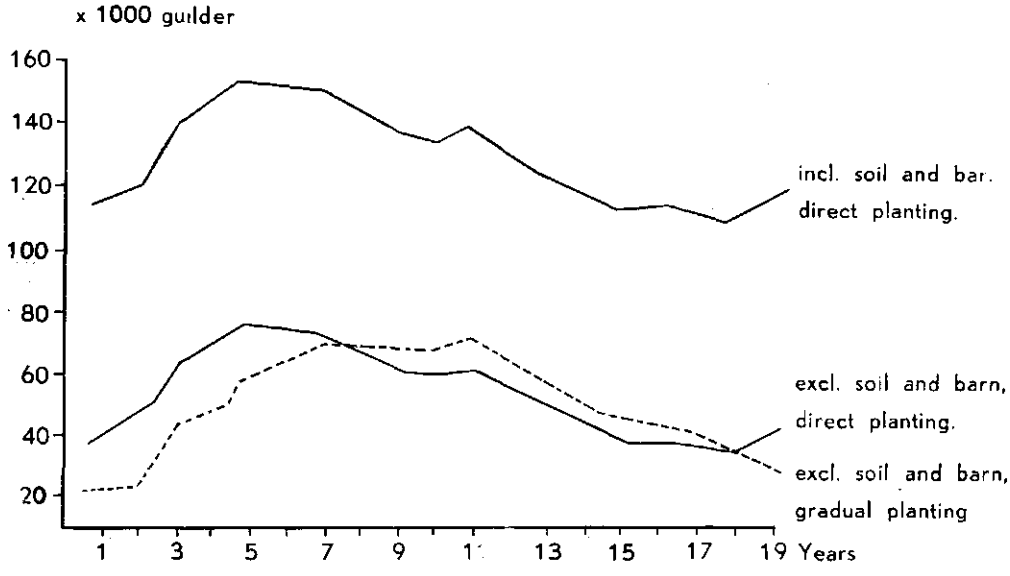
The rise in the capital requirement is small, which indicates that in the near future the capital requirement is not likely to rise very much as a result of changes in plantings and/or equipment. This may, however, increase the returns and reduce the labour requirement.

Further, table 2 shows that the capital requirement for fruit growing is mainly due to the land and the plantings (73 % of the total). As this requirement (land and plantings) does not vary in direct proportion to the size of the holding, we may not expect the capital requirement of large fruit farms to be much smaller per hectare than that of small farms, as the capital requirement is mainly affected by the equipment. A calculation showed that the capital requirement on a farm of 3 ha was only Dfl. 2.000 per ha greater than that of a farm of 8 ha, with a corresponding equipment.

Finally, it may be mentioned that the capital requirement of a fruit farm falls by more than 35 % when the land is leased instead of bought.

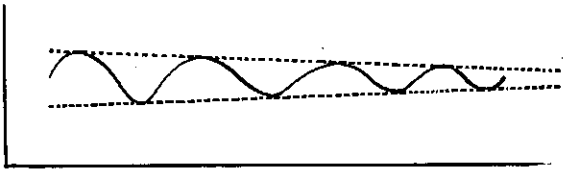
A more real idea of the capital requirement is given in graph 1, which shows the course of the capital requirement of a fruit farm of 7 ha net cultivable. From this graph it appears that with immediate planting (first year 6 ha under apples, seventh year 1 ha under apples) the maximum requirement is higher than with gradual planting (first, third and fifth year 2 ha and seventh year 1 ha under apples). In the latter case the capital requirement decreases much more slowly afterwards. The minimum requirement sets in after 17 or 18 years. This graph again shows that the capital requirement is much higher when the land cannot be leased.

The difference between the maximum and the minimum capital requirement is much smaller with a well-balanced plantation that is regularly replaced. This appears from graph 2, which shows that the differences between the maximum and minimum requirements heavily decrease after some planting cycles. The permanent (minimum) capital



GRAPH 1. — Progress of capital requirement of a fruit farm with 7 ha net cultivable during 19 years, exclusively the not permanent part of the circulating capital (first cycle)

requirement of a well-balanced fruit farm, in which plantings and equipment are replaced very regularly, is therefore, very great. This means that the greater part of the required capital should be permanently available.



GRAPH 2. — Schematical progress of capital requirement of a fruit farm during several planting cycles

The heated glasshouse holding

Table 3 gives a survey of the capital requirement of a heated glasshouse holding with 6.000 m_2 of heavily heated dutch-light houses. Just as with the fruit farm the capital requirement has risen by 60% as a result of the depreciation of the guilder (compare column 1 with column 2).

The capital requirement of an average glasshouse holding established in 1961 is only Dfl. 5.500 greater than in 1948 (compare column 2 with column 3). This, however, does not mean that the holding was laid out and equipped in the same way as was customary in 1948. The 1961 glasshouse is not more expensive but better (higher, lighter built). In 1961 heating is done with an automatic oil burning plant and in 1948 with a number of sectional boilers (coal). Owing to this the 1961 heating plant is Dfl. 9.000 higher. The investment in the other permanent productive means is nearly Dfl. 10.000 higher as a result of a better watering plant and garden lorries and the introduction of a sprinkling plant and a weighing apparatus. On the other hand, the change from coal to oil firing has decreased the capital requirement by Dfl. 10.000. As a result of all these changes the yield has risen from $\pm$ 7 kg to $\pm$ 9 kg per m^2 (period of harvesting April 1-August 1).

Just as with the fruit farm the last column gives the capital requirement of a very modern glasshouse holding. As compared with the average holding it shows a considerable rise, which is as to 35 % the result of better dutch-light warehouse construction (thermally zinked iron roof instead of a wooden one), as to 15 % of a somewhat heavier heating plant and as to 50 % of better equipment including an automatic airing plant (Dfl. 8.000), an automatic sprinkler (Dfl. 5.700) a rotary hoe (Dfl. 4.000), a concentration meter (Dfl. 3.000), high pressure pump for disease control (Dfl. 2.000) and some further small improvements. In contrast to the fruit farm the figures of the very modern glasshouse holding indicate a rather great rise in the capital requirement in the near future. These changes are mainly reflected by an earlier crop and also by a somewhat higher yield in kg and less labour requirement.

Finally, table 3 shows that the composition of the capital requirement differs widely from that of the fruit farm. The land is of little account, the great capital requirement is caused by the glasshouse and the heating plant.

TABLE 3. — Capital requirement (establishment value) heated glasshouse holding with 6.000 m² under glass

	Capital requirement 1948		Capital requirement 1961/1962	
	price level 1948	price level 1961/1962	average holding	very modern holding
Land	8.500	15.000	15.000	15.000
Dutch-light houses	68.500	108.000	105.000	123.000
Heating plant	47.000	66.400	75.300 (1)	82.800 (1)
Other permanent productive means	7.700	12.800	22.600	49.600
Working capital	16.200	33.600	23.400	23.400
Total	147.900	235.800	241.300	293.800
Permanent labour in man-years	3 ½	3 ½	3 ¼	3
Returns in kg/m²	7	7	9	9 ½

(1) Incl. soil steaming plant. — *Source:* Agr. Ec. Research Institute

TABLE 4. — Relation between capital requirement (establishment value) and size of holding of heated glasshouse holdings. Price level 1961/1962 (3.000 m² = 100)

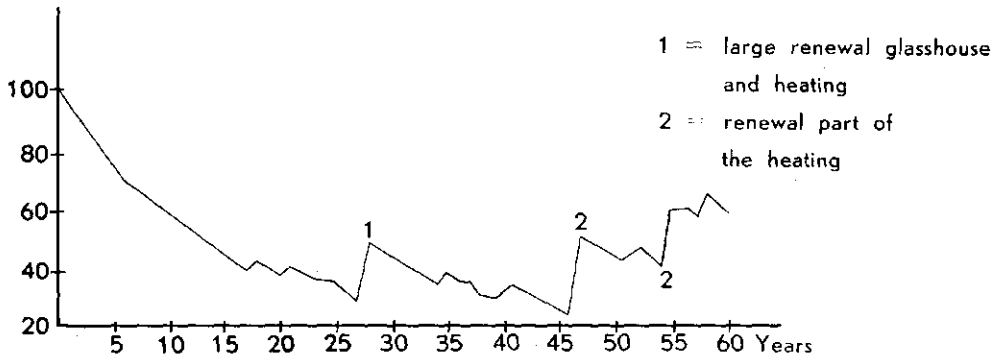
Area of heated glass	Capital requirement average holding	Capital requirement modern holding
3.000 m²	100 %	100 %
6.000 m²	83 %	80 %
12.000 m²	76 %	71 %

Source: Agr. Ec. Research Institute

The effect of the size of the holding on the capital requirement is shown in table 4. From this table it appears that with the average holding the capital requirement per 1.000 m² decreases rather much when the area under glass increases. This especially applies to the modern holding. This decrease in costs is mainly due to the fact that the heating plant is cheaper per 1.000 m² when the holding is enlarged. With an average holding of 12.000 m² the investment in the heating plant is nearly 30 % lower per 1.000 m² than with a holding of 3.000m². This also applies to other equipment. It applies least to the dutch-light houses.

That with the modern holding the effect of the size of the holding is even greater, results from the fact that the automatic airing plant, the automatic sprinkler etc. require less capital per 1.000 m² on larger holdings and this effect will increase according as central firing and automation will increase.

It will be clear that the size of unheated glasshouse holdings hardly affects the capital requirement, which is here mainly determined by the glasshouses.



GRAPH 3. — Progress of capital requirement of a heated glassholding with 6.000 m² tomatoes under glass over 60 years, in a percentage of the maximum (Dfl. 218.000,—), exclusively the not permanent part of the circulating capital

Graph 3 gives the capital requirement of the above-mentioned glasshouse holding of 6.000 m² for 60 years. As the principal capital elements, namely the glasshouses and the heating plant are replaced at long intervals, the difference between the maximum and minimum capital requirement on this type of holding is much greater than with the fruit farm, where replacements are generally made more regularly. Even if the glasshouse holding is established over a longer period and is replaced in smaller parts, replacements will generally be made more abruptly. This means that the need for permanently available capital (minimum requirement) is relatively much lower than with the fruit farm in which plantings are regularly replaced.