



SUMMARY

RESEARCH ON DIRT TARE IN THE NETHERLANDS

In the Netherlands (dirt) tare is an increasing evil for farmers and the sugar processor. It is expected the costs for handling (transport, cleaning, storage and marketing) will become unacceptably high. By introducing a "dirt tare contribution arrangement," by doing a lot of extension work and by doing research, Dutchmen try to harvest clean beets. In the research, attention is being paid to a series of new ideas to clean the beets during harvesting.

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Introduction.

As in most of sugar beet growing countries, Dutch growers are unable to deliver clean beets to the factory. With the sugar beet a lot of top- and dirt is delivered to the factory. In The Netherlands top- and dirt tare percentages of course depend on a whole range of different factors, such as soil type, weather conditions, type of harvester, quality of the driver of the harvester and so on. As an average the percentages of tare in The Netherlands are as mentioned in table 1.

Table 1: Tare percentages in The Netherlands (5-years average)

1958	15,9	1976	20,2
1959	15,8	1977	20,5
1960	16,1	1978	20,3
1961	16,8	1979	21,0
1962	16,8	1980	20,8
1963	17,7	1981	21,4
1964	17,4	1982	21,1
1965	18,1	1983	20,7
1966	18,1	1984	20,0
1967	18,6	1985	20,3
1968	19,1	1986	20,0
1969	19,3	1987	20,1
1970	19,3	1988	19,9
1971	19,0	1989	19,3
1972	19,1	1990	19,0
1973	19,3	1991	18,7
1974	20,5	1992	18,9
1975	20,4		

The tare averages about 19% and almost 7% of the total sugarbeet deliveries is top tare, the rest is dirt tare. With an annual delivery of about 7 - 8 million tons of sugar beet, Dutch sugar industry receives about 900.000 to 1.000.000 tons of soil. Costs for transporting of the dirt tare, for cleaning the beet at the factory and for handling, storage and sale of the tare are high. The Dutch Sugar Industry estimates a total cost of f. 35,- to f. 40,- per ton. This is an annual cost of f. 35,- to f. 40,- million, or about f. 300,- per ha of sugarbeets. It is about 6% of the gross financial yield of sugarbeet growing.

Future developments.

The Netherlands is a densely populated country, moreover we have a very intensive farming system with, for instance, many pigs and poultry, mostly fed with feedstuffs imported by bulk carriers via Rotterdam harbour. Due to this, in The Netherlands there is a great concern for environmental problems and in the last few years many new laws and rules have been written. We expect the Dutch authorities to keep a sharp eye on dirt tare in the sugar industry. It is possible that criteria controlling the sale of soil will become so strict that it will be difficult, or at least very expensive, to get rid of it.

In Germany, discussions are going on to charge every ton of dirt tare with DM 75,- and perhaps even with DM. 150,-. With these figures, profitable sugar beet growing and processing is nearly impossible and make it necessary to find a solution on the farm, or to be more precise, on the harvester.

Measures.

Of course the (dirt) tare problem has had the attention of our and other agricultural research institutes and of the Dutch sugar industry. Following measures are being taken:

a. *Dirt tare contribution arrangement*

The price of sugar beet paid to the farmer includes the includes the costs for tare-handling. Some years ago the Dutch sugar industry made a "dirt tare contribution arrangement". When framing this arrangement the farmer had to pay Dfl. 10,- per ton of dirt tare. From 1990 onwards, the contribution has increased to Dfl. 20,- per ton of tare with an allowance of 75 kg per ton of nett sugar beet. This 75 kg is about the amount of top tare. In future, the quality or fee will increase.

By introducing the "dirt tare contribution arrangement" the sugar, industry is encouraging farmers and machinery manufacturers to pay attention to the dirt tare percentage.

b. *Extension.*

Thans to the tare contribution arrangement, manufacturers of beet harvesters, contractors and growers of sugar beets have become much more interested in possibilities of reducing dirt tare. Machinery manufacturers have introduced improvements, whilst contractors and growers pay muych more attention to adjustment and use of the harvesters and loading machine so that as much tare as possible tare stays on the grower's land.

The IRS and sugar industry have encouraged this changed mentality by placing articles in agricultural publications, arranging meetings for contractors and growers and by organizing demonstrations to show how harvesters should be adjusted and

used to obtain the right compromise between the tare percentage, damage to the beet and harvesting losses. There is no doubt this information has led to an (otherwise rather small) reduction in the dirt tare percentage of the beet.

Research.

In recent years the research programme of IRS has strongly featured research into growing methods-harvesting techniques and other possibilities to reduce the tare percentage at the farm. The research includes:

a. *Adaptations to beet harvesters.*

In co-operation with manufacturers and importers of beet harvesters, improvements to the machines have been made.

b. *Development of a low tare beet.*

Crossbreeding between a (round) red beet and a sugar beet is being tried to produce a beet with a round shape. As this type of beet seldom grows deep in the soil, it has a much reduced dirt tare percentage. The breeders are succeeding but the new product is not yet ready because the output per ha, the sugar content and the internal quality (by the presentday payment rules in The Netherlands) are insufficient. The breeders have also strived, with success, to produce a beet with a smoother skin and shallower grooves.

c. *Windrowing.*

In our country most beet is harvested with big 6-row (expensive) machinery. Research has been done to reduce the dirt by drying the beets in windrowing in the field for a while. In some circumstances this method was beneficial, mostly on clay soils where traditionally there is a high tare percentage when the weather is dry, usually before November 1st. In Dutch circumstances where most beet is harvested by contractors, the system has so many disadvantages that, in practice, it will seldom be used.

d. *Using a beet-beater*

Old research examined the use of a "beet-beater". With this machinery, the topped beet were beaten on the crown. This was supposed to break the hairroots of the beets and reduce the tare percentage. The effect on the tare percentage was small and the machinery too expensive.

e. *Using cleaning machinery.*

In The Netherlands research is being done to evaluate the use of different loading-cleaning machinery. From this research it appears that this equipment can reduce dirt tare by about 50%. However a difficulty is that most machines are so expensive that they only (in the presentday Dutch proportions) can be applied in an economical responsible way combined with a high nett loading-/cleaning capacity. When taking into account disturbances, movements of the machinery, not completely connecting transportation capacity etc., then again and again it appears the nett loading capacity is too low to justify a cleaner/loader.

It appeared that the cleaning effect of cleaning machinery can be improved if, for about a week, the beets to be shipped, are covered with plastic. For Dutch circumstances this method is unattractive because a big part of the beet is harvested just before shipping, and very little of the beet is protected against frost.

Future research.

Research in recent decades has helped to reduce dirt tare percentages of sugar beet. Nevertheless and in regard to future developments concerning the costs of dealing with dirt tare we need to find better solutions. We want a solution that gives clean beet during harvest without damaging the beet and without losses. At today's prices there is potential to improve the profits of beet growing by about 5 - 7%. To find solutions we contacted scientists from different disciplines with little or no knowledge of agriculture and sugar beet growing, but who were acquainted with cleaning various materials. Discussions with different scientists resulted in a large list of ideas. After screening, the ideas resulted in the following research projects:

a. *Round beets.*

Breeding stations in Europe are encouraged to continue their research work on round or low tare beets.

b. *Use of brushes.*

Some years ago brushes were installed in harvesters to clean the beets. At that time the quality of brushes was poor and the tare problem was not as serious as today. The possibility of using will be reevaluated in our research programme.

c. *New lifting techniques.*

In our research, it became clear that various metal parts of the harvester stick the soil to sugar beets in such a way that it is difficult to remove. After hand harvesting, the beets are much easier to clean. In our research we try to find techniques to simulate hand harvesting.

EFFECT OF SEED TREATMENTS AND THEIR CORRESPONDING
IMPACT ON SEEDLING EMERGENCE AND SURVIVAL

d. *New harvesting machines.*

Irish Sugar developed a six-row belt lift sugar beet harvester. This machine is used on stony soils but perhaps it can be used in our fight to improve the quality of the beet.

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e. *Use of water.*

To clean potatoes, a Dutch station introduced a technique in which potatoes are cleaned with about 50 litres of water per ton of product. The water is sprayed on to the product at high pressure. In our research programme this system is being considered for cleaning beet.

f. *Use of air.*

This idea is similar to the use of water. First results with hand harvested sugar beets show a cleaning percentage of 80-90. This encourages us to install a number of air nozzles in beet harvesters to be used next campaign.

g. *Growing conditions.*

In our research we are considering various crop growth conditions. Perhaps we can reach our goal by transplanting and paperpots. Also we are trying to find possibilities to minimize differences between plants (size, height of top, internal quality, etc.) on the same field.

We have to find a solution for the tare problem. We have several ideas. In our dreams we use a combination of round beets, harvested with belt lifters and cleaned in the harvester with water or air.

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