CASSAVA

Processing and Storage
Proceedings of an Interdisciplinary Workshop, Pattaya, Thailand, 17-19 April 1974

Editors: E.V. Araullo
Barry Nestel
Marilyn Campbell
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AND STORAGE

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Production and Export Control in Thailand and the Marketing in Europe of Tapioca Pellets

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Abstract This paper contains a review of the most important results and conclusions of an investigation carried out in Thailand and Holland into the production, export control, and marketing of dried and subsequently pressed manioc (tapioca) roots. The investigation was carried out at the request of the Government of Thailand to find possible ways of improving the quality of the tapioca pellets, both from the technical and nutritional aspects. The International Technical Assistance Department of the Netherlands Ministry of Foreign Affairs assigned the execution of this investigation to Cehave n.v., Veghel, Holland, a large cattle feed factory.

During the investigation it was found that the quality and the cost price of the tapioca pellets could be greatly improved by making alterations in the drying and pressing processes and by introducing some new techniques. Cutting the roots to strips will considerably shorten the drying time and will result in a dried product that can be pressed with much greater ease and less wear on the machinery. Also it will open the way to effectively using steam during pressing and pre-drying before pressing. The use of steam during pressing will increase the capacity even more and will mean a great improvement in the pellet quality. Further investigations in this area with on-the-spot experiments and pilot production are recommended.

However, it is not to be expected that all opportune measures will be taken if the marketing of the native pellets remains unchanged. This is particularly so because the minimum quality control will perhaps not achieve the desired effect. A good solution would therefore be for the 10 or so large exporters to follow the example of the European shippers by deciding to supply a product under their own name, so as to benefit directly from the price advantages of a better quality product. This method of marketing should be initiated by the Thai exporters and it is recommended that they be advised by experts in this area.

In regard to quality control, recommendations are given for improving the existing standards, as well as the control of the stowage plant and the physical properties of the product.

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The dried roots of the tropical plant manihot (cassava, manioc, tapioca) have been used for more than 35 years as a source of starch for European animal feed. Initially this only occurred sporadically, but when European countries started to take measures to protect their agriculture, and grain prices were raised artificially, tapioca use increased rapidly. After World War II, ground and unground dried tapioca roots were imported mainly into West Germany because of the high grain prices prevalent there.

Holland and the rest of the European countries followed the world market prices for grains to a much greater extent, and the dried tapioca roots (hereafter referred to as tapioca) were consequently of merely incidental interest.

This situation changed completely when the European Economic Community (EEC) came into being. High gate prices for grains and low levies on tapioca (at present 6% on the CIF price) then made tapioca attractive for the Belgian and Dutch feed industries as well.

Consequently, the import of tapioca into the EEC has grown rapidly since 1964, especially due to the enormous increase in soya exports from the USA against prices that compare favourably with grains. Tapioca in combination with soya is an excellent grain substitute in feed and as such is especially important to pig farmers.

The tapioca that is being imported into Europe at present originates primarily from Thailand and Indonesia. In 1970, Thailand...
exported some 1.160 million metric tons (t) as compared with Indonesia's 200,000 t.

The Netherlands, the greatest producer of pig feeds in Europe, imports most of the tapioca. During 1970 nearly 1 million t of tapioca were consumed in the Netherlands, of which about 880,000 t came from Thailand.

The tapioca from Thailand is distinguished from tapioca from other countries by the fact that the roots that have been cut to chips are pressed into pellets after drying. As a result, the weight per volume unit increases and the transportation to Europe therefore becomes cheaper.

Although the import figures suggest the contrary, the feed industries have great objections to the use of tapioca pellets from Thailand. The problems involved in their use arise from the nutritional and technological properties of the product. From a nutritional point of view the problems are the high content of sand and cellulose and the high mould and bacteria standard plate count. These make the use of large quantities unwise and sometimes make radical and expensive changes necessary in the planned feed formulation.

Technologically the problems frequently concern the very high meal content of the pellets, which, particularly in automated factories, give rise to many technical problems and which increase the costs of unloading the seagoing ships and lighters.

The regular occurrence of high temperatures of the product, which indicates heating and makes storage over a longer period impossible, is also a serious drawback. These problems are clearly reflected in the price, which lies between Dfl. 1.00 and Dfl. 4.00 (Dfl. = Dutch guilders) per 100 kg below the nutritional value.

If the quality of the pellets were constant and optimal, that is to say if the composition of the product were equal to that of pure dried tapioca and if the pellets contained much less meal, almost three times as much tapioca could be used in Holland and the price of the product would approximate the nutritional value.

Cehave n.v. of Veghel (Holland) is the largest feed producer of the EEC (1.250 million t/yr) and uses a quantity of tapioca that equals about 10% of the total tapioca export of Thailand. The continual problems with which this company has been confronted in the use of tapioca finally led to an orientational study of the possibilities of improving pellet quality. The results were such that the government of Thailand asked the Dutch government to finance a more extensive study within the framework of development assistance. The Dutch government agreed to this and assigned the execution to Cehave n.v. The chief reason for this was the consideration that feed producers in the EEC tended to lend their support to groups wishing to impose duties on the import of tapioca as in the case of grains, and so to restrict, or even make impossible, such import in order to be relieved of the production problems. Such measures would mean a serious loss of foreign currency to the developing countries.

The assignment given to Cehave n.v. by the Dutch government was to study the production of tapioca pellets and their control at the time of export from Thailand and to indicate ways that might lead to an improvement of the situation. For this purpose a more thorough investigation was performed by Cehave n.v. into the problems of the pelletizing of dried tapioca chips, and I was sent to Thailand for 3 mo to carry out on-the-spot studies and experiments (January–March 1972). Since the investigation showed that, in view of the situation in Thailand, a certain change in the marketing situation in Europe could mean a great improvement, this aspect was also studied.

What follows are the most important results and conclusions to which the research led.

The Production Process in Thailand

The Cultivation of the Tapioca Plant

The present average yield of 6 t of fresh roots per acre of tapioca in Thailand is rather low. It appears, however, that the methods of agriculture that could lead to improvement of the yield of tapioca were fully known in the leading agricultural circles in Thailand.
The Agricultural Experimental Station, "Huay Pong," at Rayong, has been studying tapioca growth in Thailand for some years and has reached the conclusion that deeper plowing, the use of fertilizers, and more intensive weed control would mean a greater improvement. However, in the absence of any secondary conditions, this knowledge has not yet been applied.

Before fertilizers are regarded as an economically acceptable method of improvement, the high import duties at present imposed on fertilizers will have to be abolished or at least reduced.

In view of the shortage of manpower, mechanization is necessary for deeper plowing and better weed control, but the small farmers, who form the majority, lack the necessary capital. A possible solution would be for the farmers to unite into cooperatives, using their farm implements jointly. In this connection, it would be useful if more study were made of the problems relating to the farms of the tapioca growers. On the other hand, the quality of the tapioca roots at present delivered by the growers gives little cause for criticism and the reason for the poor quality of the pellets should not be looked for in the cultivation and harvesting of the plant.

Drying of the Tapioca Roots

The drying of the roots is done by a separate group of entrepreneurs who may also be engaged in other activities such as transportation and agriculture. By means of a mechanical cutter, the roots are cut into chips, which are then dried in the open air on cement drying floors. Our study of this process led to the following conclusions and recommendations:

1. Complete mechanical drying is far more expensive than the present drying method

The costs of drying tapioca roots to a moisture percentage of 15% by means of heating, with diesel oil as a source of energy, in a whizzer (capacity: 23 t/h) were calculated at around 22 Baht (20 Baht = US $1.00) per 100 kg dried product, if the roots were cut to fine strips beforehand. The costs of drying on the drying fields at Chon Buri are around 6.90 Baht per 100 kg dried product.

Mechanical post-drying of the product would appear to be more attractive. This costs 1.85 Baht per 100 kg (capacity: 10 t/h), and at the same time reduces the costs of the drying process on the drying fields by 1.40 Baht per 100 kg.

On the other hand, for post-drying in the cascade driers, the product has to be cut finer than the present chips, since otherwise the drying costs would be higher. The advantage of drying in a cascade drier is that the supply of the dried tapioca is much less dependent on weather conditions and that the pressing involves considerably fewer problems.

2. On the whole the driers receive far too little for their product to enable them to do the drying well.

The prices being paid for the dried chips bear no relation to the prices of the fresh roots and the costs of drying.

It was calculated that the following formula is a fairly good guide for determining the price of the chips produced at Chon Buri and delivered at Pra Padaeng with a moisture percentage of 15%:

\[ P = 1.95 \times Q + R \]

where \( P \) = the price of 1 picul chips (= 60 kg) at Pra Padaeng with a moisture percentage of 15%; \( Q \) = the price of 1 picul fresh roots (= 70 kg) at Chon Buri; and \( R \) = the costs of drying and transport per picul chips, roughly equal to 5.50 Baht at Chon Buri. The factor 1.95 represents the loss of weight through drying.

For example: in March 1972, the price of fresh roots per picul (70 kg) was 24 Baht and the price at Pra Padaeng 44 Baht per picul (60 kg). The formula would have led us to expect an approximate price of 51.50 Baht per picul.

Because of these low prices, the driers in the vicinity of Chon Buri-Rayong in particular are forced to maintain very short drying periods (in general, drying is not taken beyond a moisture percentage of approximately 19%), to mix in sand, and to add waste products like tapioca wood to the chips so as to keep the drying process payable.
The cause of the high bacteria and mould standard plate counts that are found in the tapioca pellets in Europe and that give rise to many objections from a nutritional point of view, besides causing marked heat in the product, must be looked for in the short drying times at the drying fields. Because of their high moisture content, the chips form an excellent breeding ground for bacteria and moulds during the period of storage. If dried to a moisture percentage of 15%, however, this could be prevented.

Another objection to the short drying times is that the pellets that result are soft, and this makes bulk handling difficult.

The objections to mixing in wood and sand are generally known. The high sand percentages in tapioca pellets are exclusively caused by the deliberate addition of sand by the driers. If nothing were added, the sand content would hardly ever be higher than 1%. The high crude fibre content in the tapioca pellets is not only caused by the driers' mixing in of tapioca wood, but also by the addition of foreign matter during pressing.

3. THE DRIED CHIPS ARE NOT A GOOD STARTING PRODUCT FOR PRESSING

The chips that are pressed into pellets at the present time are actually too large for this purpose. In the presses, the chips must first be ground before they can be pressed through the holes in the dies. This extra demand on the dies of grinding requires much energy and pressing capacity, since the presses were not designed for grinding but for compressing.

It is not satisfactory to grind the chips with a grinder, since too much fine meal is then formed, and this is difficult to form into pellets. It is therefore better to begin with a smaller starting product, especially since during the pressing of the fresh roots, hardly any of the fine particles that give rise to formation of meal will be produced. Pressing tests with dried, small chips and strips in Thailand have shown that these starting products give a 50% higher pressing capacity. Moreover, it may be assumed that the wear on the presses will be less when this finer, homogeneous product is used.

Another particular advantage of the strips is that they will provide a good starting product for pressing with prior steam injection. The advantage of the use of steam is that the product is heated before pressing, and this results in considerable improvement of the capacity of the press as well as of the quality of the pellet (see also “Pressing of the Dried Tapioca”).

Chips are less suited for pressing with prior steam injection since heat penetration of the chips takes too long. The manner in which the small chips and strips are made and the further advantages of these products are dealt with below.

4. THE DRYING TIME MAY BE SHORTEST CONSIDERABLY

Experiments on the drying fields have shown that with another method of cutting the roots, the drying time can be shortened considerably. The tapioca roots were cut to strips with the aid of Königsfelder blades (Fa. H. Putsch und Co., Hagen, West Germany). In Europe these blades are built into cutting machines frequently used for cutting sugarbeets for sugar extraction. The blades appeared to be strong enough for tapioca roots and the cutting itself caused no great problems. The chips dried almost twice as fast as the present chips, although the treatment on the drying field remained the same. In the dry season the strips were dried to a moisture content of 14% in about 9 h.

An objection to the Königsfelder blades is that when built into existing Thai cutting machines, their cutting capacity is too low, whereas the profitable cutting machines in which Königsfelder blades are customarily used have capacities of 80 t/h and higher. However the benefits of faster drying, easier pressing, and mechanical post-drying of the strips make it advisable to continue to experiment with these blades. It is also recommended that a complete cutting machine as now used in Europe with a capacity of around 80 t/h be introduced for experimentation under sound technical guidance. It would probably not be difficult to find a cheap, second-hand machine.

However, the existing cutting method could also be considerably improved. If the pressure
of the roots on the die plate is increased, and if the flow of the roots to the die plate is improved, it would be possible to cut small chips with reasonable capacities.

The successive notches in the die plate must then be moved up some distance. When this distance is 0.5 cm, for example, and the height of the notch is 1 cm, chips with a diameter of 0.5 cm and a width of 1 cm are cut. The pressure on the cutting plate could be increased and the flow could be improved by building a bunker with its bottom slanting down to the die plate, above the existing table of the cutting machine. All this could be done with a very small outlay and in addition would save a great deal of labour if the flow of the roots to the bunker were to be supplied by a small conveyer belt.

Our experiments showed that the small chips (diameter 0.5 cm) do not dry as fast as the strips, but dry faster than the present chips. Capacity was considerably higher when using this product.

5. THE PRUSSIC ACID CONTENT OF THE DRIED CHIPS IS VERY LOW

Our investigations showed that either as a result of the tapioca variety, or as a result of the open-air drying method, the prussic acid content in the tapioca pellets is very low and does not present any danger to livestock. This has eliminated a misconception about tapioca that has been prevalent for years and that has served as an argument for having many measures to restrict its use in feeds. However, research into prussic acid content has only been done on tapioca from Thailand.

The Pressing of the Dried Tapioca

The bulk of the dried tapioca is at present pressed into pellets in Thailand, about 25% being done in factories belonging to German tapioca shippers, who work together with Thai tapioca exporters, and 75% in Thai factories.

The pelletizers of the German importers are equipped with European pressing installations and the pellets from these factories, which, as far as nutritional value is concerned, are good, are sold under the name of the German importers in the EEC (“Brand” pellets, viz. Cremer, Krohne, and Wünsche pellets).

The Thai pelletizers operate with pressing machines that were manufactured in Thailand by local engineering works. The pellets from these factories, of which there are some 90 in Thailand, are bought by certain Thai exporters, who resell them to the European shippers in Bangkok.

The shippers sell the pellets in the EEC, not under the name of the Thai factory or Thai exporter, but as a standard product called “native pellets.” An exception to this has been the pelletizer of the Thai firm of Trakulkam, which is equipped with California Pellet Mill pressing machines and whose pellets have been sold since early 1972 in the EEC under the brand name of “Trakulkam.”

The feed industries in the EEC generally object to the native pellets, which are not only of inferior quality (soft and containing much meal) but are also highly variable and of poor composition (containing much sand and crude cellulose). Moreover, these pellets often have such a high temperature at delivery that storage over a longer period is considered too dangerous.

The latter consideration also poses a problem during sea transportation, since the high temperature of the product at loading, the sometimes excessive moisture content, and the universally excessive bacteria and mould standard plate counts often cause heating of the product. The composition of most of the brand pellets is good, and they do not show any rise in temperature during transport and storage, though they often have the drawback of containing a great deal of meal and of being soft. The results of our investigation into the causes of the present situation and into possible means of improving it are set out below.

1. IN GENERAL, THE NATIVE PRESSERS ARE BEING PAID TOO LITTLE TO BE ABLE TO DO THE PRESSING WELL

Although the costs of pressing are well known to the Thai exporters, the presser is often underpaid. Many native pressers in the surroundings of Chon Buri–Rayong are being paid the price of the dried chips plus about 6.7 Baht per 100 kg pellets on delivery of the pellets in Pra Padaeng, whereas the actual production and transport costs amount to
about 12.40 Baht per 100 kg. The latter figure allows for a 6% loss of weight. This underpayment has much to do with the bad quality of the native pellets.

Some of the consequences of this are:

- The native pelletizer is keenly interested in the price of the dried chips, but hardly at all in their quality. The consequences of this for the drying process have already been described (mixing in of sand and wood and excessive short drying times).
- The native pelletizers do nothing to improve the quality of the starting product, such as sieving out sand, as is done by the brand pressers. Even the native pelletizers who possess a sieving machine do not use it, since it would be too expensive and, besides, nobody is going to pay them extra for this step.
- There is a great deal of mixing in of foreign matter, such as ground corncobs, tapioca wood, tapioca waste (offal of the starch industry), and other cheap materials with a high crude fibre content.
- The native pressers press with very cheap locally made dies and rolls. These are not tempered, and the boring of the dies is irregular. Moreover, the dies and rolls are allowed to wear quite a bit before they are replaced.

For all these reasons, the quality of the pellets is adversely affected, and especially so because of the shortness of the pressing canals in the dies.

Although the low prices paid for the native pellets are not the sole cause of the shortcomings referred to above, currently they often force the pelletizer to adopt his present practices. Other causes include the quite natural desire of the pelletizer for more profit in return for less labour, and the low quality standard set for tapioca in the present export control (see "Export Control"), which permits the mixing in of foreign matter, though not to the extent often found today.

On the other hand, it would be no problem for the Thai exporters who buy the pellets from the native pressers to have the pellets produced without any foreign matter being mixed in. There are factories that for certain reasons do press a pure product for the Thai exporter.

2. The moisture content of the chips pressed is generally too high

The chips produced at the native pressers' had a moisture content of about 20%, whereas moisture levels of around 18% were frequently encountered at the brand pressers'. As a result of their high moisture content the chips provide an excellent medium for bacteria and moulds during the storage period. The consequences of this for the bacteria standard plate count of the pellets were discussed in the preceding section.

Other objections are that, when the moisture content of the chips is higher than about 17%, the pellets are of a very inferior quality. They are soft and have an unfavourable weight per volume unit.

Again, when the moisture content of the chips is higher than 19%, which is usually the case with the native pressers, mixing in of foreign matter, such as tapioca waste and rice bran, is necessary if the product is to be turned into pellets at reasonable pressing capacities.

Thus one deficiency leads to another still greater deficiency. In a way, the native pelletizers are forced to add ground corncobs, which contain very little moisture, to the chips to bring the moisture content of the pellets to a reasonable level. Since the native pressers do not possess or have access to cooling installations, it would be difficult to attain this otherwise.

3. The native pressers do not cool the pellets sufficiently or correctly

The cooling of the pellets after pressing at the native pressers', through gradual cooling of the pellet-filled bags, which stand separated from each other in the godowns (warehouses), is usually inadequate and the process too slow. The consequences of this are:

- The still hot and therefore soft pellets are crushed in the bags, and this produces a great deal of meal.
- The moisture content of the pellets is higher than necessary. Proper cooling means a proper loss of moisture. With a proper cooling installation it is no problem whatever to reduce the moisture content by 4% where the moisture content of the pellets is higher than 13%.
- The native pellets are often loaded into ocean-going vessels when temperatures are still
high (40–50°C), and this greatly increases the risk of heating, which causes great moisture migrations in the cargo.

Cooling before bagging to the temperature of the surroundings by means of a cascade cooler or band-cooler is therefore necessary. There are already a few native pressers who own such cooling installations, but who do not use them because they receive hardly any extra payment for doing so. The background to this situation will be dealt with in detail in the sections on “Marketing” and “Export Control.”

4. The Present Chips Are Not a Good Starting Product for Pressing

See the preceding section “Drying of the Tapioca Roots.”

5. The Capacity of the Presses and the Quality of the Pellets May Be Considerably Improved by Heating the Starting Product with Steam

To produce good tapioca pellets, it is necessary, apart from pressing, to heat the product to over 70°C to make the chemical reactions possible that give the pellets its strong structure. Were there no heating during pressing, the tapioca pellets would crumble immediately afterwards. In the present tapioca pellet industry, this heating takes place exclusively during pressing in the dies, as a result of the friction inside the die holes. This mode of heating is very expensive and the principle behind it is also wrong.

The capacity of the presses is very low (an average of 1.8 t per hour at 150 hp), and as a result of the strong heating of the tapioca in the dies their wear is considerable. Moreover, the principle of heating the pellets through friction is wrong, since the outside of the pellets is heated much more than the inside, with the result that the necessary chemical reactions take place mainly on the outside, and, as a result of the differences in temperature, the pellets burst after leaving the holes of the dies.

By heating the product to a temperature of around 65°C before pressing, the friction of the product in the dies is kept to a minimum (rise in temperature about 15 degrees C) so that the die is used solely for compression, the purpose for which it was actually designed.

The costs of the steam installation and the extra energy costs are, comparatively speaking, not high (about 4 Baht per metric ton of pellets) and are amply offset by much reduced wear of the dies and the sharp rise in capacity (about three times greater).

The quality of the pellets would also be much better as a result of better distribution of heat during pressing and, moreover, the weight of the pellets per volume unit will be much more favourable than is the case at present.

In comparison with the present starting product, the starting product that would be required for pressing with steam would have to undergo some important changes:

- The moisture content has to be 13% or lower, since during the steam injection some 4% extra water is added. With higher moisture levels, the product could get stuck inside the dies.
- With a proper cooling installation the moisture level after pressing can be reduced to 14% or lower without any problems.
- The starting product would have to be considerably smaller in size than the present chips so as to achieve good heat and moisture distribution in the product after steam injection and before pressing.
- Fine meal and fine particles in the starting product should be avoided as far as possible since they absorb a disproportionate amount of moisture during steam injection and may then cause clogging of the die.

These requirements regarding the starting product are based on experiments carried out at the pilot plant of Cehave n.v. It is quite possible that they are less important for the pressing factories in Thailand, in view of the far greater capacities and the different boring of the dies there. For this reason, it is not considered likely that during pressing with steam in Thailand, oil or fat (or products that contain oil) would have to be added, although in the pilot plant the capacity of the press was greatly improved by such an addition.

As the grinding of the chips is at present accompanied by much meal formation and as reduction in size without the formation of fine meal is only possible with a slowly rotating
breaker-cutter specifically designed for the purpose, it would be better to begin with a smaller starting product. The strips, and to a lesser degree the small chips, which have been discussed in the preceding section ("Drying of the Tapioca Roots"), would be a suitable starting point for steam pressing.

6. THE WEIGHT PER VOLUME UNIT OF THE PELLETS IS SOMETIMES SO LOW THAT WHERE BRAND PELLETIZERS ARE CONCERNED, THE PRESSING IN PARTICULAR IS NO LONGER PROFITABLE

The dried chips are pressed to increase the weight per volume unit of the product and thereby make sea transport cheaper. However, our investigation showed that the cost of pressing is often higher than the saving on the costs of sea transport. There are two reasons for this:

(a) It proved possible to cut the tapioca root with a simple chaff-cutter in such a way that the weight per litre of the dried product is more than 500 g (at a moisture percentage of 14%). The weight per litre of the present chips is 400 g and all calculations so far, which show the high return of pressing, have been based on this latter weight.

(b) The weight per litre of the pellets sometimes appears to vary considerably from the generally accepted weight of 680 g. As a matter of fact, even a weight per litre of 495 g was recorded at a brand pressers' immediately after cooling. Such a weight would increase still further as a result of the reduction in size of the pellets and the pressure of incumbent loads, but it is not likely that it would exceed 600 g.

Given a weight per litre of 500 g of the dried unpressed product and a weight per litre of 680 g of the pressed product, it was calculated at what costs of overseas transport to Europe pressing would no longer be profitable. The same was done for a weight per litre of 620 g of the pressed product. The cost of pressing was taken for this purpose to be 1.15 DM (deutsche mark) per 100 kg for the native pressers and 1.80 DM for the brand pressers. These costs assume that the chips pressed have been well dried and that no foreign matter has been mixed in. The results of the calculation are given in the following table:

<table>
<thead>
<tr>
<th>Wt/litre of the pellets</th>
<th>Pressing is no longer profitable if transport costs/100 kg are lower than</th>
</tr>
</thead>
<tbody>
<tr>
<td>680 g</td>
<td>5.00 DM</td>
</tr>
<tr>
<td>620 g</td>
<td>7.50 DM</td>
</tr>
</tbody>
</table>

Example: If the weight per litre of the brand pellets is 620 g and the costs of overseas transport 5.00 DM, it is cheaper to transport tapioca with a weight per litre of 500 g rather than to press it.

During 1970–72, the costs of overseas transport varied between DM 4.80 and 7.00 per 100 kg. It follows, then, that brand pressers in particular must watch the weight per litre of their pellets closely, since where weight per litre is low, pressing would entail a loss. Unfavourable weights per litre from pressing are caused by pressing chips that are too moist (moisture level higher than 17%) or chips that were bought with high moisture levels and dried in the godowns.

The brand pressers are often forced to follow this practice. This makes the chips tough, and also adversely affects the quality of the pellets. The weight per litre of the pellets could be improved considerably by pressing with steam.

Marketing

The Marketing of Tapioca Roots, Chips, and Pellets in Thailand

Tapioca products are traded in Thailand in a completely free market, in which prices are decided by supply and demand. The trade is in no way controlled or coordinated and no price agreements exist. The products are not subject to any official control prior to export. Competition between the buyers of the various products is keen and monopoly situations are nonexistent.

The fresh tapioca roots are offered to the driers by the growers or middlemen by the
truck load. This is done on an individual basis but often also on a market where growers, dealers, and driers meet. Sometimes the driers collect the product from the growers (sometimes they even do the harvesting themselves) and provide their own transport.

The dried chips are offered to the pressers, packed in bags, and loaded on trucks. This is done by the driers themselves or by the middlemen. It frequently happens that the pressers, who usually own trucks, collect the product themselves from the driers.

The chips are always offered to the brand pressers at their own premises. In Thailand there are some 90 pressing factories and about 500 driers. The native pellets are bought up by Thai exporters. The transport of the native pellets to the large godowns in Pra Badaeng and Bang-Bakong is by truck and is done by the pressers themselves. Agreements do exist between the native pressers and the exporters, but no binding contracts are concluded.

At present there are 10 Thai exporters, namely (in order of importance): Willing Trading Co. Ltd., Lo Ching Seng Co. Ltd., Thai Bamrung Thai Ltd. Part., Lee Tang Seng Ltd. Part., Thai Long Ltd. Part., Thai Wah Co. Ltd., Trakulkam Co. Ltd., Union Eastern Produce Ltd. Part., Poon Phol Co. Ltd., and Jack Hong Co. Ltd., all of whose offices are established in Bangkok. The first five exporters named handle 80% of total native pellet production. Some of these exporters have their own pelletizers. In this respect, Trakulkam Co. Ltd. should be singled out, because since early 1972 it has been operating a large American pressing installation and its pellets have been sold in Europe mostly under a brand name.

The Thai exporters sell their product to the European shippers in Bangkok. This usually takes place only a short time before the product is shipped. Long-term contracts between exporters and importers are hardly ever concluded. The native pellets are always loaded into the vessels from the godowns of the Thai exporters.

The brand pellets, which comprise 25% of the total pellet export, are produced by European exporters (Krohn und Co. Ltd., and Peter Cremer Ltd.) and by a combination of a European and Thai exporter (Ludwig Wunsche und Co., Thai Bamrung Thai Ltd.). The brand pellets are imported into Europe by the shippers (Waren Import Gesellschaft Krohn und Co., Peter Cremer, Hamburg, and Ludwig Wunsche und Co.) or by importers who buy from the shippers.

Export of the Tapioca Pellets to Europe, and Marketing in Europe

The European shippers in Thailand buy the tapioca pellets from the Thai exporters on terms laid down by the “Verein der Getreidehändler der Hamburger Börse E.V.” With regard to the composition of the product these terms stipulate that, if the product does not meet certain established standards, the exporter must repay part of the calling price according to a fixed system (penalty system).

At the time of writing the standards were: minimum 62% starch (EEC method); maximum 5% raw cellulose; maximum 3% sand; maximum 14% moisture (14.3% during the period 1 June–30 September). Should the moisture content be higher than 14% (14.3%) the shipper has the right to refuse the cargo.

The sampling during loading of the vessel and the subsequent prescribed analysis are at present carried out exclusively by the Office of Commodity Standards of the Ministry of Economic Affairs. This government authority is also solely responsible for the implementation of the “Export Standards Act” for tapioca, which imposes certain minimum quality requirements with regard to goods exported (see “Export Control”).

The European shippers who deal in tapioca pellets are: Peter Cremer Hamburg, Waren Import Gesellschaft Krohn und Co., Ludwig Wunsche und Co., Deutsche Tradax GmbH, Alfred Toepfer, Louis Dreyfus und Co., and Claud H. Schuback. All of them, with the exception of Louis Dreyfus und Co., are members of the “Tapioca Committee” of the Hamburg Börse.

The sea transport of the tapioca pellets is arranged by the following ship charterers: Peter Cremer Ltd., TETS Ltd. (Krohn und Co.), Alfred C. Toepfer and Tradax Ltd.
Shippers, who do not themselves charter ships but use the services of these ship charterers. Occasionally a Thai exporter will act as a shipper, but this rarely happens.

Since the brand pellets are traded in Europe under a brand name, they are always kept quite separate from other tapioca cargoes by loading them into separate holds in the vessels. For a long time this was not the case with the native pellets of the various Thai exporters, which were often loaded in the same hold of the ship next to each other. The Thai exporters' pellets were hardly ever separated or only very poorly, with the aid of bamboo or gunny mats.

Since 1970, this has changed. Since the number of Thai exporters has decreased considerably, and since they are exporting such large quantities (some even 15,000 t per month), and since the shippers wanted to be rid of the difficulties connected with weight control, the various "native brands" (Exporters) are now usually loaded in separate holds as well.

The shippers sell the tapioca pellets either direct to consumers (feed industries), wholesale dealers, or importers, or through the intermediary of a broker (CIF agent). The major feed industries mostly buy direct from the shippers, and the small feed industries from the wholesale dealers or the importers.

The trade with Europe is a typical speculation trade. The shippers sell on the spot, during actual transportation, as well as on long term, although most buying is on the spot or on short term.

The EEC regulations for the import of tapioca pellets stipulate with regard to the composition of the product that a maximum of 3% of the weight may consist of a binding agent (molasses, starch-containing components). If the percentage exceeds 3%, Customs considers the binding agent as part of a compounded product, in which case a higher percentage of agricultural levy has to be paid (6.6% up to 15%). No other requirements regarding the composition of the product exist in the EEC.

Recently an exception has been made by Belgium, which requires that the total ash content of the tapioca be not higher than 3%. If the ash content exceeds 3% of the weight, the product may not be imported. The result of this measure is that at present hardly any tapioca from Thailand is imported into Belgium.

The following observations result from the investigation of the marketing situation in Thailand and Europe:

1. The Thai exporters have no incentive to deliver a good product

In Europe the native pellets, in contrast to the brand pellets, are not traded under the name of the exporter but as a standard product called "tapioca pellets native." As a result, the price of the native pellets in Europe is independent of the exporter who delivers the product.

The same is true of the requirements regarding the use of native pellets in feeds imposed by the various control agencies of the feed industries in Europe. Both the price and the nutritional value fixed by the controlling authorities are largely based on bad experiences that consumers and controlling authorities have had with native pellets and not on the occasionally good experiences.

In such a situation, the exporter of native pellets has no particular incentive to deliver a good quality product since he will seldom if ever obtain a better price than his less careful fellow exporters. Yet the Thai exporters would certainly be in a position to deliver a good product. The European shippers in Thailand are known to have sometimes paid more for a better cargo of native pellets, but since in Europe its selling price was the same as that of a bad cargo, they have never been able to do this to any satisfactory degree.

As a consequence, careless handling of the product and mixing in of foreign matter have become habitual and prices are sometimes so low that there is no alternative.

In such a situation, the introduction of new pressing and drying techniques is impossible. This is also proved by the fact that the native pressers who have installed a cooling installation and sieves often do not use them, since it simply does not pay.

The situation could have been avoided if only export control had been more adequate,
and if the quality standards applied during control had not deteriorated to such an extent in the course of time. The standards are now so low that the mixing in of foreign matter during production is always possible.

All exporters of native pellets try to supply a product that meets the bare requirements and no more. Some exporters regularly export below standard. Consequently, the formulation of feeds in Europe is based on a starch content in native pellets that is lower than the standard laid down for export by law in Thailand (60% starch EEC method).

The most obvious way to remedy this situation would be to improve export control and to raise the standards. However, improvement of control in Thailand would be very difficult, given a situation where all exporters want at best to export a product that meets the absolute minimum requirements. The best course of action would therefore be as follows:

- The anonymity of the Thai exporters as far as consumers in Europe are concerned should be removed. This means that the consumers must receive accurate information regarding origin of the native pellets, and this information should be confirmed by a reliable guarantee (Stowage Plan and Bill of Lading). The exporters of better quality products, who undoubtedly exist, would be freed from the bad reputation that they at present share with their less scrupulous fellow exporters. This will bring the situation regarding the native pellets into line with that of the brand pellets sold in Europe at higher prices. This should not be difficult to realize, since for some years now the number of Thai exporters has been severely limited, and since as things stand the pellets of the various exporters are shipped to Europe in well-separated holds. The initiative for this could be taken by the various feed manufacturers associations in Europe. A government directive stipulating that the name of the exporter must be made known to the user of the native pellets is highly recommended.

- A study should be made of the analyses results and other properties of the various native brands arriving at ports of import. The results of these analyses should be sent regularly to the consumers and controlling authorities and should serve as a basis for the purchasing policy of the buyers.

- A system should be devised by which subsequent payment is made to exporters whose deliveries are of good quality. On the other hand, the “penalty system,” by which the Thai exporters must refund part of the sales price if his product does not meet the standards required by the contract, could also function well if good bank guarantees are given. Once the European consumers and the Thai exporters have agreed upon the company to control it, the necessary sampling and analyzing could very well be carried out at Bangkok.

The implementation of these proposals would certainly need support both in Thailand and Western Europe from experts who were well informed about the market situation.

2. ON TAPIOCA PELLETS Pressed WITH STEAM, NO EXTRA LEVIES SHOULD BE IMPOSED ON IMPORT INTO THE EEC

The first pressing factory in Thailand, which was installed by Krohn und Co. in 1967, was equipped with an installation that made it possible to heat the tapioca with steam before pressing. Officials of the German government, who were charged with controlling the import of raw materials for feeds, visited this new installation and declared that tapioca pressed with the help of steam was more digestible than the starting product, and that the pellets therefore could be used directly as feed. For this reason, higher agricultural levies would be imposed on pellets from this factory on import into the EEC than on unpressed tapioca or on tapioca pressed without the aid of steam. As a consequence, the steam installation was removed from the factory and all the pelletizers subsequently built had no steam installation.

The following objections may be raised against the arguments of the officials of the German government:

(1) It is impossible to press pellets without heating the tapioca. At present, the tapioca is heated by friction of the product in the pressing holes of the die. This has the same effect as heating with steam, only it is much more costly.

(2) It is true that heating the tapioca by steam or by friction inside the pressing holes of the die makes the product somewhat more digestible, but this still does not mean that a
good feed is being produced. In fact, steamed tapioca pellets have the same nutritive value as tapioca chips.

It is therefore recommended that an investigation of the import rules for tapioca pellets be instigated and should the above-mentioned restriction still be in force (which seems very unlikely), steps be taken to have it withdrawn.

In Thailand, the extra wear-and-tear and energy costs resulting from heating by friction in the pressing holes during pressing are enormous. Moreover, the poor quality of the pellets must largely be attributed to this basically incorrect method of heating.

### Export Control

In 1963 dried tapioca was declared by the Thai Ministry of Economic Affairs to be a “standardized commodity,” which means that since that time certain conditions have been laid down by the Thai government regarding the quality and packing of the product at the time of export. At present these conditions are as follows:

1. **Composition:**
   - min. 60% starch (EEC method)
   - max. 5% crude cellulose
   - max. 3% sand
   - max. 14% moisture (14.3% in the period 1 June–30 September)

2. **Outward characteristics:**
   - colour and smell must not be abnormal;
   - foreign matter must not be mixed in;
   - putrefaction and mould are not allowed;
   - product must look and feel dry.

3. **Packing:**
   - (unless shipped in bulk) the product must be packed in well-sealed clean gunny bags.

   The product is checked twice, viz. on application for an export license (pre-loading control) and during loading on board the ocean-going vessel (loading control). The sampling at the pre-loading control is done by random sampling of a number of bags from the stock, after which the stock is sealed.

   During the sampling at the loading control a sample is drawn from each bag (±90 kg) that is taken to the vessel. The weight of the bags must also be regularly checked. During the loading check the product can only be rejected if its outward characteristics and the packing do not meet the requirements. The composition can only be known a few days later and can no longer affect the export of the product.

   If the product is passed during the pre-loading check, a certificate is made out specifying the quality. The same happens during the loading check. Both certificates are shown when the product is being traded.

   Prior to January 1971 the effectuation of export control was in the hands of private control organizations licensed by the government (Office of Commodity Standards). Originally these organizations were the Far East Superintendent Co. Ltd. and R. Schaller Ltd., and later the Far East Superintendent Co. Ltd. and the Universal Surveying Co. Ltd., all established in Bangkok.

   Exporters and shippers were free to decide by mutual consent which control organization would control their transactions. Since, in view of the marketing situation (see preceding section), many major exporters are not particularly interested in the quality of the product, and since the shippers are greatly dependent on the exporters as they must be in a position to load their vessels in time and they too have no particular interest in the native pellets being of good quality, in many instances the less careful control organization was preferred.

   The result was that the situation in 1970 had deteriorated to such an extent that the Thai government decided to take control itself. Consequently since January 1971, the entire tapioca control has gradually been taken over by the Office of Commodity Standards (ocs).

   This has made dried tapioca (which includes tapioca pellets) the only Thai export product that is fully controlled by the ocs. By far the greater part of all other export products are controlled by private control organizations.

   The following observations result from the investigation of export control:

1. **The Standards Set with Regard to the Composition of Tapioca Pellets for Export are Too Low**

   The present standard set with regard to the composition of tapioca pellets for export is
lower than need be. From our experiments on the drying fields it appeared that the following composition could always be attained without any difficulty, provided no foreign matter had been mixed in (calculated at 14% moisture): moisture 14.0%; starch (EEC method) 63.0%; sand 1.5%; total ash 4.0%; crude cellulose 4.0%. This composition cannot be attained if very bad roots are dried and pressed.

The best composition measured by us was (calculated at 14% moisture): moisture 14.0%; starch (EEC method) 69.0%; sand 0.3%; total ash 2.4%; crude cellulose 2.6%.

The moisture content could, without qualification, be fixed at 13% if the product were better dried before pressing and certainly so if after pressing the product were cooled sufficiently.

The objection to too low a standard is that mixing in of foreign matter is always possible without departing from the norm.

In the market situation relating to the native pellets, in which quality is attuned to the lowest possible standard, this means that mixing in foreign matter has become a normal part of the production process, with all its consequences.

It is typical that the brand pellets surpass the standard by far, since these pellets are traded in Europe under the name of the producer.

2. THE CONTROL SYSTEM IS BASICALLY GOOD BUT NEEDS TO BE ALTERED

During an investigation of the composition of native pellets from Thailand reaching Holland in the months of September and October 1971, it was found that more than 80% of the 28 samples taken at random from seven different shipments failed to meet the minimum export requirements set in Thailand. In 21% of the cases the crude cellulose content was higher than 6.5%, in 46% of the cases the sand content was higher than 4.5%, and in 46% of the cases the starch content was lower than 60%.

During a minor orientation study made in the Netherlands in May 1972, it appeared that the situation was no better. Even the moisture levels were too high and excessive heat was found.

Although, therefore, the control exercised by the OCS functions badly, it may be said that if the system drafted for the control were executed properly, there would be no question or regular departures from the established norms.

From an investigation carried out jointly with the OCS, in which a number of samples chemically analyzed by the OCS were reanalyzed in the Netherlands (Rijkslandbouwproefstation, Maastricht), it appeared that the small differences in the methods of chemical analysis between Thailand and Europe are not responsible for the often great differences in the results obtained in Thailand and Europe.

The cause of the unsatisfactoriness of the control must therefore be looked for in the execution of the sampling. The root of the problem here is that relatively low paid officials have to take decisions involving very large amounts of money.

3. IT IS SUFFICIENT FOR THE OCS TO RESTRICT ITSELF TO THE CONTROL OF THE MINIMUM QUALITY REQUIREMENTS

As already explained, prior to 1971 the exporters and importers could in consultation with each other decide which control organization was to control their transactions. Since the exporters are usually not interested in the quality of the product (in view of the marketing situation) and since for the shippers speedy transport is of greater importance than good quality of the native pellets, the export control was carried out with less and less care. It is therefore understandable that in 1971 the OCS took control itself. However, it would be sufficient if the OCS were to restrict itself to control of the minimum quality export requirements so as to protect the reputation of Thai tapioca abroad. It would not be right to extend the jurisdiction of the OCS without the consent of the parties concerned to control of contracts in which certain norms regarding quality have been laid down.

Buyers and sellers must be free to decide on the control organization by which they wish the fulfillment of their contracts to be controlled, as indeed is common business practice.
Besides, it would seem that the difficulties that the OCS is at present experiencing in upholding a minimum export standard are still so great that there can be no question of the OCS taking over all control activities in relation to tapioca pellets.

4. Control of the Stowage Plan is Necessary
   As explained under “Marketing” it would benefit the trade in native pellets if consumers in Europe obtained a reliable guarantee regarding the origin of a cargo. To this end the Stowage Plan, which is at present submitted by the shippers only when ocean-going vessels are unloaded in Europe, ought to be controlled during loading of the ships in Thailand as well. The Stowage Plan ought to be indicated on the Bill of Lading and on the loading certificate. Control of the Stowage Plan could be carried out by the OCS without any difficulty.

5. Control of the Temperature of the Product during Loading is Necessary
   It is of great importance that the temperature of the pellets during loading into the oceangoing vessels be as low as possible. The reasons for this are that the permissible moisture percentage of 14% may be said to be marginal from the point of view of preservation, and that differences in temperature in the cargo at such a moisture percentage are the cause of moisture migrations that may result in “sweating” and heating.

   Temperatures in the product of 5 degrees C above environmental temperature are in fact too high. At present native pellets loaded into the seagoing ships repeatedly have temperatures of 50–55°C (as measured in the bags coming on board the ships).

   It is therefore advisable that apart from the quality norms that already apply, restrictions be also imposed relating to the temperature of the product being exported.

6. The Meal Content, the Wear Resistance, and the Hardness of the Pellets are Important Quality Norms for Major Consumers in Europe
   The brand pellets are much better than the native pellets as far as composition, moisture, and temperature are concerned. Because of this, the price of brand pellets in Europe is on the average DM 1.50 per 100 kg higher than that of native pellets.

   Yet even in the case of brand pellets the true nutritional value, which is mostly DM 1.00–2.00 per 100 kg higher, is seldom paid for. This is partly so because tapioca is an extra raw material, which consequently involves extra costs, but also partly for the important reason that the pellets often contain a great deal of meal and are soft, which gives rise to many problems in the large automated compounding factories. Moreover, as a result of the bad pellet quality, loading and unloading in Thailand and Europe are greatly hampered.

   As has been previously discussed, there are many ways that lead to improved pellet quality and it would therefore be advisable to start devising norms with this end in view. Only if generally accepted and representative norms exist will it be possible for better pellet quality to be better paid and in greater demand in Europe.

   Good objective information concerning pellet quality at the time of loading could be obtained by:

   - measuring the meal content by means of a simple sieve of set mesh.
   - measuring the wear resistance with apparatus developed by Pfost. In a rectangular metal tank of a certain construction a certain quantity of pellets is rotated at a constant speed for a prescribed period of time. Wear is induced by the pellets' colliding against each other and against the wall of the tank. The loss of weight of the pellets provides a measure of wear resistance.
   - measuring the hardness of the pellets by means of a simple hardness gauge.

7. The Chemical Analysis for the Determination of the Composition of Tapioca Pellets Being Exported Could be Simplified
   The starch, moisture, and sand contents must be known if the quality of the tapioca is to be determined. To this end, the crude cellulose content should also be known, although this is actually superfluous if the first three mentioned factors are known, since in that
case the quality of the product is already sufficiently established.

Any mixing in of foreign matter that has a high crude cellulose content has only negative consequences for the starch content. This is not true for the sand content, since sand also gives rise to technical problems in the use of tapioca by the feed industries. The wear of the presses is in fact strongly increased by high sand levels. So actually it is not necessary for the costly and time-consuming crude cellulose analysis to be made during the export control.