

13. DEMAND AND REQUIRED QUALITY OF MAIZE AS INDUSTRIAL RAW MATERIAL IN JAPAN

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The rapid expansion of the livestock industry in Japan has brought about a tremendous increase in the demand for maize as feed, and more than three million tons of maize are imported annually for this purpose. On the other hand, the demand for maize as a general industrial raw material has also risen year by year, and currently some 800,000 tons of maize are imported and consumed annually.

I would like to take this opportunity to discuss various uses of maize as raw material in Japan for purposes other than feeds.

Use of Maize as Industrial Raw Material

In Japan, a major portion of the maize used as industrial raw material is imported. Therefore, the quantities of maize imported will give us some idea as to the present situation concerning uses and demand for maize.

Currently, the tariff-quota system is applied to imports of maize as industrial raw material. This system was put into practice in April, 1965 due to the necessity for regulating starch supply and demand in relation to cornstarch and domestic potato starch. That is, according to the plan for production broken down by uses, the basic tariff rate is applied to necessary quantities of maize imports, and a higher rate of tariff is applied to imports above the planned quantity.

Levels of the tariff quota, broken down by uses, are shown in Table 1. It shows that maize for cornstarch dominates, being 85% of the total.

Now, the uses for maize as an industrial raw material can be differentiated by means of the various processing methods used. One is the "wet process," in which maize

Table 1. Levels of the tariff quota on corn as industrial raw material.

	1965	1966	1967
1. Constarch	277,000	431,000	576,000
2. Corngrits	30,500	36,600	45,900
3. Brewing	24,100	35,200	43,600
4. Other			
(1) Cornflakes	1,900	3,300	5,910
(2) Confectionery	4,559	6,390	9,280
Total	6,459	9,690	15,190
SUM TOTAL	338,059	512,490	680,690

(Unit: ton)
(Fiscal year: April-March)

is soaked and softened before being processed. The other is the "dry process," where maize is physically processed without any prior steps. One product processed by the former method is cornstarch, and corn grits, corn flour, etc. are processed by the latter.

Since, in terms of volume, maize for cornstarch takes a large portion of the total, I would like to focus my talk on cornstarch, hoping that this will give us a fairly good outline of how maize is used as industrial raw material in Japan.

On Starch

1. *Demand for starch*

Starch, in Japan, has been supplied mainly from potatoes grown domestically. For farmers potatoes are a very important crop, second only to rice and wheat, and much of the potato crop is used to produce starch. Therefore, in order to stabilize the price of potatoes, the supply and demand of starch and its price are kept stable in conformity with the Agricultural Commodities' Price Stabilization Law. That is, when there is an oversupply of starch, and a resultant decline in its price, the Food Agency purchases starch: if prices become high, the Food Agency releases stocks of starch on to the market so that the starch market stays balanced. Consequently, the income of potato growers remains stable.

The current tendency in potato production, however, especially in connection with sweet potatoes is towards a decrease in both the acreage used and the amount of production. As a result, the annual production of sweet potato starch, which amounted to 740,000 tons until a few years ago, has dropped as low as 500,000 tons.

The present situation in supplies of starch is as follows;

Sweet potato starch	500,000 tons
Potato starch	200,000
Wheat starch	70,000
Total	770,000

The demand for starch, on the other hand, is around 1,250,000 tons. Thus some remaining 400,000 tons should be covered partly by imported starch and by the production of cornstarch.

2. *Production of and demand for cornstarch*

Production of cornstarch in the last few years has been:

1965 (April to March)	270,000 tons
1966 (April to March)	330,000
1967 (April to March)	390,000

This production was planned, with reference to supply of domestic potato starch to cover necessary quantities.

This year, a further increase in the production of cornstarch is expected, due to decreased production of potato starch despite increased demand for starch.

There have been eight firms manufacturing cornstarch, and these organized the Japan Cornstarch Association. Recently, however, about ten small firms outside the Association came on to the stage and caused problems for the planned supply of starch.

There is a wide demand for cornstarch products, for food, clothing and shelter. In fiber production, cornstarch is used as starch for woven fabric, for dyeing and for finishing. In paper manufacturing, it is used for sizing and coating. Furthermore, a large portion of it is supplied to meet the recent rapid

growth in demand for an adhesive for corrugated paperboard. Other industrial uses include using starch in fillers for dry batteries and foundry molds. The demand for cornstarch for brewing and confectionery is also growing.

Saccharified products such as millet jelly and glucose form a large part of the demand for cornstarch. This is because cornstarch supplements conventional potato starch of which production is declining. The supply of starch as raw material for saccharified products is planned to take account of both the rising price of potato starch and the stable price of cornstarch.

Current demand for cornstarch, broken down by uses, is shown in Table 2.

Table 2. Demand for cornstarch broken down by uses.

(Fiscal year 1967)

Uses	Amount (ton)	Rate (%)	Remarks
Saccharified products	140,790	36.1	
Fibers	17,550	4.5	
Paper-manufacturing	14,480	3.7	
Corrugated paper board	51,480	13.2	
Chemical processed starch	47,970	12.3	
Processed fish cakes	11,700	3.0	
Pharmaceuticals	4,680	1.2	
Brewing	42,120	10.8	
Monosodium glutamate	1,170	0.3	
Other food	36,270	9.3	
Others	21,840	5.6	
SUM TOTAL	390,000	100	

3. *Maize as the raw material for cornstarch*

White maize is favoured as raw material for cornstarch in Japan. Where yellow maize is used, products have slight yellow color when compared with the products of white maize. White maize is considered superior because of this whiteness of the finished products. For this reason, we import maize mainly from the Republic of South Africa, Mozambique and Mexico, as shown in Table 3. Since, in these countries, white maize is a staple food, the amount of production is large and supplies for Japan abundant.

At present, the countries where quality standards for export are set by the United States of America, the Republic of South Africa and Kenya. The standards set by each country are shown in Table 4. As is clear from this table, South African maize contains less moisture than American maize and presents better separation of protein the manufacturing processes. Consequently, it yields more starch and is therefore favoured.

The international price of maize is decided on the basic of Chicago maize market prices (yellow maize) and South African tender prices (white maize). The recent c.i.f. price for white maize in Japan has been 60 dollars per ton. If, in future, good white maize for cornstarch is produced in South East Asia and supplied at international market prices, it will be most welcome for Japan, since there is the advantage of a shorter distance of transportation.

Table 3. Qualities of clearance of maize by countries.(Unit : ton)
(Fiscal year : 1967)

Imported	Uses	Feed	Industrial material	TOTAL
Korea		10,907	549	11,456
China		61,957	0	61,957
Thailand		509,564	3,246	512,810
Indonesia		89,096	7,647	96,743
Cambodia		14,562	2,578	17,140
Rumania		62,420	0	62,420
U.S.A.		1,722,736	32,198	1,754,934
Mexico		62,374	282,880	345,254
Brazil		54,171	0	54,171
Argentina		48,922	0	48,922
Kenya		0	14,159	14,159
Mozambique		13,271	190,245	203,516
Republic of South Africa		654,186	320,848	975,034
Others		1,035	1,912	2,947
TOTAL		3,305,201	885,505	4,190,706

Table 4. Quality standard for export of maize.

(1) U.S.A. (for both yellow and white)

	Pound per bushel	Moisture	Broken corn & foreign matter	Damaged kernels	Head damaged kernels
	above	below	below	below	below
No. 1	54	14.0%	2%	3%	0.1%
No. 2	53	15.5	3	7	0.2
No. 3	51	17.5	4	5	0.5

(2) The Republic of South Africa

	Moisture	Defective kernels	Other coloured kernels	Foreign matter	Total of three columns
White Dent	below	below	below	below	below
No. 1	12.5%	7%	2%	0.3%	7%
No. 2	12.5	13	3	0.5	13
Yellow Flint	below	below	below	below	below
No. 1	12.5%	9%	2%	0.3%	9%
No. 2	12.5	20	5	0.5	20

(3) Kenya

	Moisture	General condition	Foreign matter	Defective maize	Other coloured grain & foreign matter
	below		below	below	below
K. 1	13%	Free of mud	0.5%	8%	3%
K. 2	13	Wholesome and dry	1.0	13	5
K. 3	13	Good	1.5	20	8

On Corn Grits

The processes for producing corn grits are as follows; selecting and tempering the maize, separating the embryo, crushing, and granulating. The resultant products are about 70 meshes, and those over 100 meshes are called corn flour. The standard yield of corn grits from maize is 60%, and that of corn flour is around 5%.

The import quota on maize for corn grits is above 40,000 tons annually, and thirty firms deal in it. Among them, the six largest account for some 70% of total production.

As to the uses of corn grits, 60% is used by breweries, 20% conventional food "miso" (bean paste), and 10% for confectionery, etc.. In particular, the consumption of corn grits as the raw material for brewing is growing because corn grits are being substituted for imported crushed rice. Since the uses for corn grits are similar to those of rice, white maize is generally favoured for corn grits.

On Liquors

The import quota of maize for liquor is about 45,000 tons annually. The raw materials used for alcohol for liquor have in the past been of the following proportions: domestic potatoes 80%, imported molasses 10%, and other materials 10%. Lately, however, due to a decrease in potato production and a decline in prices of molasses, the proportion has become: imported molasses 70%, potatoes 10%, and other materials 20%. "Other materials" in this case include maize.

The annual production of alcohol for liquor is between 250,000 and 280,000 kilolitres. 55% of this is used for "sake," 25% for "shochu" and 20% for whisky.

Molasses is a cheap raw material for alcohol. Thus the price of maize should be sufficiently cheap so as to be competitive with that of molasses. The quality of materials for this purpose does not have to be the best.

On Cornflakes, Confectionery, etc.

Cornflakes are made in the following manner. First, embryo and skin are removed, and each grain is crushed into three or four grits. These grits are steamed, cooked and pressed, and then dried, with or without flavour.

Two firms are manufacturing cornflakes, with an annual production of 5,000 tons. As materials for this purpose, seasoned corn grits are imported, or else imported maize is processed into grits and used. The maize used for cornflakes is either from the United States of America or from the Republic of South Africa, and is yellow.

90% of cornflake production in the United States is used for breakfast food, but in Japan, 80% is used for between-meal snacks and 20% for breakfast food. The annual increase in consumption, in the next few years is estimated to be between 10% and 15%.

Apart from the fore-mentioned, 4,000 tons of maize are imported annually for pop-

corn and another 6,000 tons for confectionery.

Discussion

P. Phit, Thailand: In Table 3—What is the reason why corn from Rumania, Brazil, and other countries is not used as industrial material?

Answer: In Japan, corn for industrial use has been imported only from South Africa and Mexico because these countries have been able to supply it in sufficient amount of the corn with superior quality in reasonable price. So we do not intend to import them from Rumania, Brazil, etc..

V. R. Carangal, Philippines: Do you use waxy corn in the industry? If so how much?

Answer: The amount of waxy corn for industrial use is only in the order of thousand tons. The importing price is fairly expensive than other types.

A. Senanarong, Thailand: What kind of maize were introduced from South Africa, dent, flint, or waxy corn? Which kind do you prefer in corn starch production?

Answer: The imported corn from South Africa is dent corn. We prefer dent corn because it has high starch yield in processing and is easier in deproteinization than other types of corn.