# A Look at the Future

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## ABSTRACT

The crushing industry is in a period of overcapacity. Recovery from it will be quicker in Europe and in other countries in which government intervention improves margins. Long-term increases in protein and oil demand will balance the overcapacity with a more efficient industry resulting. Technological improvements will center on efficiency.


The oilseed crushing industry is an important cog in the conversion of raw agricultural commodities into food. The industry combines such features of commodity trading as hedging in the futures markets, buying and selling against them as a premium or discount to the price of a futures contract, and the requirement for financing large inventories with the large fixed expenses and high energy costs of a chemical processing operation. Because of these features, four main factors affect its economic outlook for the future. These are economical, political, nutritional and technological. I have tried to study how these factors might develop in the next few years.

This conference seems only to meet when the crushing industry is experiencing unfavorable results. When the last conference met in 1976, margins were bad. They slowly improved, fueled by strong export demand from Eastern Europe and the USSR helped by financing from Western sources and large US crops. Crop years 1978 and 1979 were particularly good years for the industry, caused in part by poor Brazilian crops where margins, of course, suffered.

Starting in 1981, a divergence of conditions has occurred in the various oilseed processing countries and we must look at each individually.

First, the USA. The USA, because of its large crop, efficient low-cost plants and efficient transportation system, used to be the primary export supplier of oilseed products, largely those produced from soybeans. However, since 1980, fueled by two very good years, world soybean processing capacity has risen to ca. 100 million tons per year. Currently, the amount of soybeans available for processing approaches 80 million tons annually. Someone has to be the residual supplier who, even if raw materials are locally available under these conditions, does not operate anywhere near capacity. During the last two years the residual supplier has been the USA.

Why the US? There are, in my opinion two reasons. First, world trade is not an entirely free market system. Many actions are taken by countries with processing plants such as differential export taxes, differential import duties, subsidized financing, quotas, various price controls, and direct subsidies of one sort or another. The net effect of these is to support the margins of local crushing plants.

Second, the US Government has taken a number of political actions which in the aggregate have given the country a reputation as an unreliable supplier. The export embargoes of 1973-1975 and the refusal of the USA in 1980 to let the USSR increase its purchases above the minimum called for in their bilateral agreement did the most damage. Brazil's emergence as a major producer of soybeans got a big boost from the 1970s embargoes. Argentina has greatly increased its grain and oilseed exports as a result of the 1980 action.

Other actions that have hurt the US oilseed processing industry are the support of the World Bank and Asian Development Bank's financing of palm oil production in Southeast Asia and a decline in PL-480 shipments from the USA. The resulting surplus of edible oils has driven the price of soybean oil down to ca. 17 cents on September 10, 1982, vs an average of 27 cents in 1975. At this price it is only contributing about one-third of a US soybean processor's income. Historically, oil must contribute at least 40% of revenues to generate acceptable margins.

US processors admittedly do have some advantages – such as the relatively lower prices of natural gas, fuel oil, and hexane. However, these are minor advantages compared to the impact of the negative conditions just mentioned.

Western Europe is a significant oilseed processor. There is ca. 17 million tons of soybean capacity in the area with perhaps another 3 or 4 million tons for other seeds. European crushers are doing quite well compared with the rest of the world. The reasons for this are:

- An EEC 10% import tax on edible oils, which allows these crushers to obtain more revenue for their oil.
- Many efficient plants able to receive beans and seeds in large vessels.
- Rapeseed restitution that keeps plants that could process soybeans crushing this crop.
- The benefits of USSR meal and compound feed purchases – particularly to their northern ports.
- Spain's domestic oil consumption quota.
- Portugal's price controls.

Brazil is the world's third largest soybean processor. Its problem can be summarized in one sentence. It has the world's second largest crushing industry. Capacity exceeds production by ca. 50%. This overcapacity came about primarily because the Brazilian Government offered low interest construction loans and too many plants were built. Following this, they reduced financial mechanisms for the expansion of soybean acreage. As a result, annual soybean production has plateaued at ca. 15 million tons.

Brazil's reaction to this has been to supply incentives to ensure that most of its beans, and more than a few imported ones as well, are crushed locally. They do this by export taxes that favor products over beans, offering subsidized working capital loans, and by income tax biases for futures transactions and exports.

The Far East has a rapidly expanding crushing industry based on attractive margins. Local governments try to ensure good margins by taxing meal and oil imports but not oilseeds.

Because of Argentina's recent difficulties, its economy has further deteriorated. At the moment, however, the crushing industry is doing fairly well. Policy changes in Argentina are abrupt and frequent. Traditionally, however, even the most populist governments have supported the crushing industry because their exports earn hard currency. Such is the case at the moment. There is a greater export tax on beans than on products.

Let us now look at the future. First we need to make some assumptions.

Most importantly, it seems that we are not on the brink of a worldwide depression similar to the 1930s. We may have come close during 1982 but the recent fall in US interest rates, the revival of its stock market, and the situation in industrial production and housing starts indicate that the US economy is starting to grow again, or at least starting to turn around. Lower interest rates in the USA should help

to strengthen Western European economies, reducing the chances for actions that would precipitate trade wars. Incentives will not change much either.

The USSR and its European friends will increasingly need feed to ease their populations' economic problems and, with periodic weather problems, will generate ever-increasing needs for imported protein.

It is not likely that the American political environment will move from its more or less centrist position. President Reagan is, I think, not as conservative as his detractors paint him. The political facts of life, that is, the US Congress, and a multitude of special interest lobbies, keep any US administration in the economic middle.

Another important assumption we need to make concerns petroleum. The world presently has an excess of it. I think there is enough potential increase in production in Saudi Arabia, Nigeria, and other various Middle East countries to allow reasonable growth in the world economies. At the same time, petroleum users have learned to react quickly now to supply restrictions to adjust their driving, auto purchases, and fuel burning to the available stocks. Unless instability results from the Iran-Iraq war or a permanent disruption occurs in Saudi Arabia, it is a safe assumption that adequate petroleum will be available.

The oilseed industries are always dependent on the weather. It seems to me that in any 5-year period, the USA can expect a weather problem in one of those years to affect its major crops. The drought in the southeast in 1980 is a good example. Likewise, South America seems to have a significant drought about two years in five and the USSR runs more like three out of five. It is assumed that weather problems will continue at these frequencies.

Lastly, nutritional factors could change the future of the industry. I do not think they will, but this will be discussed later.

If all of these assumptions are correct, then there will probably be no abrupt unforeseen changes from present trends. Experts that I have consulted in the field generally think that on this basis oilseed production will continue to grow, but at a slower rate – say, less than 3%, vs 4% in the 70s. Soybeans will do better than other oilseeds, maintaining a 4% growth. This is because it is primarily a protein source providing ca. 70% of the world's supplies and can also produce less oil while meeting protein demand. World food oil consumption is rising ca. 2 million tons/year and palm oil is only supplying 25% of this increase. This benefits soybeans at the expense of other seeds. As exemplified by the large crop now being harvested, most of this growth will occur in the USA. Two other countries that could increase soybean production probably will not. Brazilian farmers do not have the private incentive to clear forests to increase acreage. Also, the Brazilian Government's debt situation probably prevents their financing it. Argentina's exchange rate structure appears to be once more moving towards using it as a vehicle to transfer export income to the urban population as it did from 1940-76, so grain and oilseed production is not likely to continue to grow at its present rate.

It looks then like the US processor, the soybean processor in particular, will continue as a residual supplier earning poor margins. This could last for as long as three years while world demand catches up with world supply. Better margins could come more quickly if the present possibility of small oilseed crops in the USSR and India, due to weather occurrences, materialize. Also, last year a Malaysian insect is reported to have stimulated high palm oil production. If in reaction this causes a compensating decrease in palm oil in the near future, and the USSR and India increase imports of oils, causing oil prices to recover more quickly, the turnaround could be considerably accelerated.

Unless demand unexpectedly increases, we will, I fear, see a number of years of underutilization of the industry in the USA, occurring mostly in the March-September period when Brazil is an active exporter. As a result, it is unlikely that the industry will invest much in added capacity, but will instead put what funds it can into improving efficiency. The probable result will be that the industry will continue its trend towards financially strong, geographically dispersed, efficient, integrated participants.

On the other hand, Western Europe taking advantage of East European and other export markets probably will maintain its favorable margins. Most other parts of the world will crush profitably while only Brazil's excess capacity overproduction, causing poor margins until increasing production and the abandonment of inefficient facilities, creates a balance.

One aspect of nutritional considerations could change the prospects of the industry. So-called genetic engineering is possible in both soybean production and in bacterially produced amino acids. Researchers I have consulted feel that the geneticists' effect on oilseed yields, protein, fiber and oil levels will be much slower than the possibility of producing "synthetic" or bacterially produced amino acids. Computer runs we have made show that if lysine were to be made available at ca. $1.80/lb or ca. $4/kilo, it would allow more corn in a poultry broiler ration and two-thirds the amount of soybean meal. In the USA, where the consumption of soymeal by poultry is approaching half the production, this is a sobering prospect. When and whether it occurs remains pure speculation at this time.

I mentioned above that processors, particularly in the USA, would have an incentive to invest in efficiency improvements in their plants. What could they accomplish? Four areas seem most likely (Table I).

**TABLE I**

**Efficiency in Processing Plants**

| | Present industry average | Potential minimum | Percentage improvement possible |
|---|---|---|---|
| Solvent loss | 0.15% | 0.06% | 60 |
| Steam usage | 600 lb/ST | 450 lb/ST | 25 |
| Power consumption | 50 KW/ST | 40 KW/ST | 20 |
| Number of personnel: | | | |
| Plant | 55 | 40 | |
| Supervisory | 15 | 10 | |
| Administrative and sales | 15 | 10 | |
| Total | 85 | 60 | 30 |

First, solvent loss: the industry average is now ca. 0.15%. Some plants, using oversized desolventizers, condensers and mineral oil systems have run for extended periods of time at 0.06%.

Second, steam usage: the most promising areas seem to be in onstream drying of beans and more efficient drying of meal. The result may not show as reduced steam usage, it may be reduced drier fuel. The cost of fuel can be reduced by converting to coal.

Third, power consumption: power can be saved by controlling demand charges and turning off unneeded equipment, particularly rolls and grinders.

Fourth and last, numbers of personnel: This has to come

through computers both in the office and as process controllers, automated start-ups and shut-downs and programmable controllers.

Let us consider what that means to the operating cost of a plant (Table II).

**TABLE II**

**Operating Costs of a Processing Plant (Proforma Cost/Ton in US Dollars/Million Tons)**

| | Present industry average | Potential minimum | Percentage improvement possible |
|---|---|---|---|
| Capacity: 2000 million ton/day | | | |
| Solvent @ $1.40/USG | 0.88 | 0.35 | 60 |
| Steam usage: present natural gas @ $3.50/MCF, potential coal @ $50/ST | 2.89 | 1.25 | 55 |
| Drier fuel @ 3000 BTU/bushel/% $H_2O$ | 1.00 | 0.55 | 45 |
| Power consumption (5¢/kWh) | 2.50 | 2.00 | 20 |
| Personnel: | | | |
| Hourly | 2.11 | 1.52 | |
| Supervisory | 0.81 | 0.54 | |
| Administrative and sales | 0.81 | 0.54 | |
| Total personnel | 3.73 | 2.60 | 30 |
| Other cash costs | 2.00 | 2.00 | – |
| Total cash costs | 13.00 | 8.75 | 33 |
| ¢/bushel | 33.6 | 22.6 | 33 |

Consider a 2000 metric ton/day plant. The solvent loss was calculated on the basis of its current US price of $1.40/US gallon; for steam usage at present natural gas at $3.50/thousand cubic feet and for potential minimum – coal at $50/short ton. For drier fuel – the same price as boiler fuel which means it is assumed that grain driers can be run on steam generated from coal; for personnel – present US wages, salaries and benefits were used. All other cash costs, which primarily are maintenance and insurance, were assumed to be ca. $2.00/metric ton. The result is that cash costs excluding depreciation today probably average ca. $13.00/metric ton or 33.6 cents/bushel for a large, reasonably efficient plant. I think that the potential minimum operating cash cost is $8.75/ton or 22.6 cents/bushel – a one-third reduction. Will we reach this? Probably not in most plants but every plant will, I am sure, do some of these things and reach the minimum in some areas. If they do not, they may not be in business for long.

While we are discussing operations, I would like to discuss new solvents. There are two that show promise. Carbon dioxide's real challenge, it seems to me, is to determine how, at the high capacities at which we operate, to get flakes in and out of a high pressure vessel while keeping $CO_2$ losses to econonical levels.

Isopropyl alcohol (IPA) concerns me because I believe that any commercial system will have to blow down some alcohol. There will also be some spillage. In both, the challenge here is to keep IPA, a flammable solvent, reliably miscible in water out of sewers.

Let us now turn to the possibility that our assumptions are wrong.

What if we do develop a worldwide depression with extensive trade wars? We do not really need to deal with this question. The industry, relying as it does on export trading and increasing meat consumption, would be devastated.

A severe worsening of USA-USSR relations would not greatly affect the picture. The USA is exporting little oilseed or its products to the USSR now anyway. If the USSR, in its next generation of leaders, should decide to make a turn to reward performance in its workers, it would have worldwide impact on the crushing industry. Improved agricultural practices, higher yields, less grain left in the field, and a more efficient crushing industry would probably develop over time. The USSR and its friends, however, would import lots of products for a long time. In short, everyone would be bullish.

In the petroleum section, if indeed we have not learned our lessons and cannot prevent large increases in oil prices, or if severe disruptions occur, this would probably be helpful to the relative situation of the USA. Our natural gas supplies are ample, we are partially self-sufficient in oil and we have huge reserves of coal.

# Summary of Discussion Session A-1 on Solvent Extraction

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Discussion session chaired by Roger Leysen; the panel consisted of Messrs. Christensen, Carr (for Becker), Myers, Mangold and Lusas.

The following issues were raised:

- Darkening and loss of agglomerating capacity of cottonseed meal in desolventizing. The panel and also the audience do not know which measures should be taken to prevent abovementioned problems.
- Availability of computer programs for solvent extraction plants. Several instrument manufacturing companies are able to supply these computer programs.
- Extraction with supercritical $CO_2$.

In experiments so far to extract rapeseed with supercritical fluids, the extracted meal has not been thoroughly investigated as regards thioglucosides.

The technical problems in the implementation of the method for a continuous multithousand ton per day soybean extraction plant have not yet been solved.