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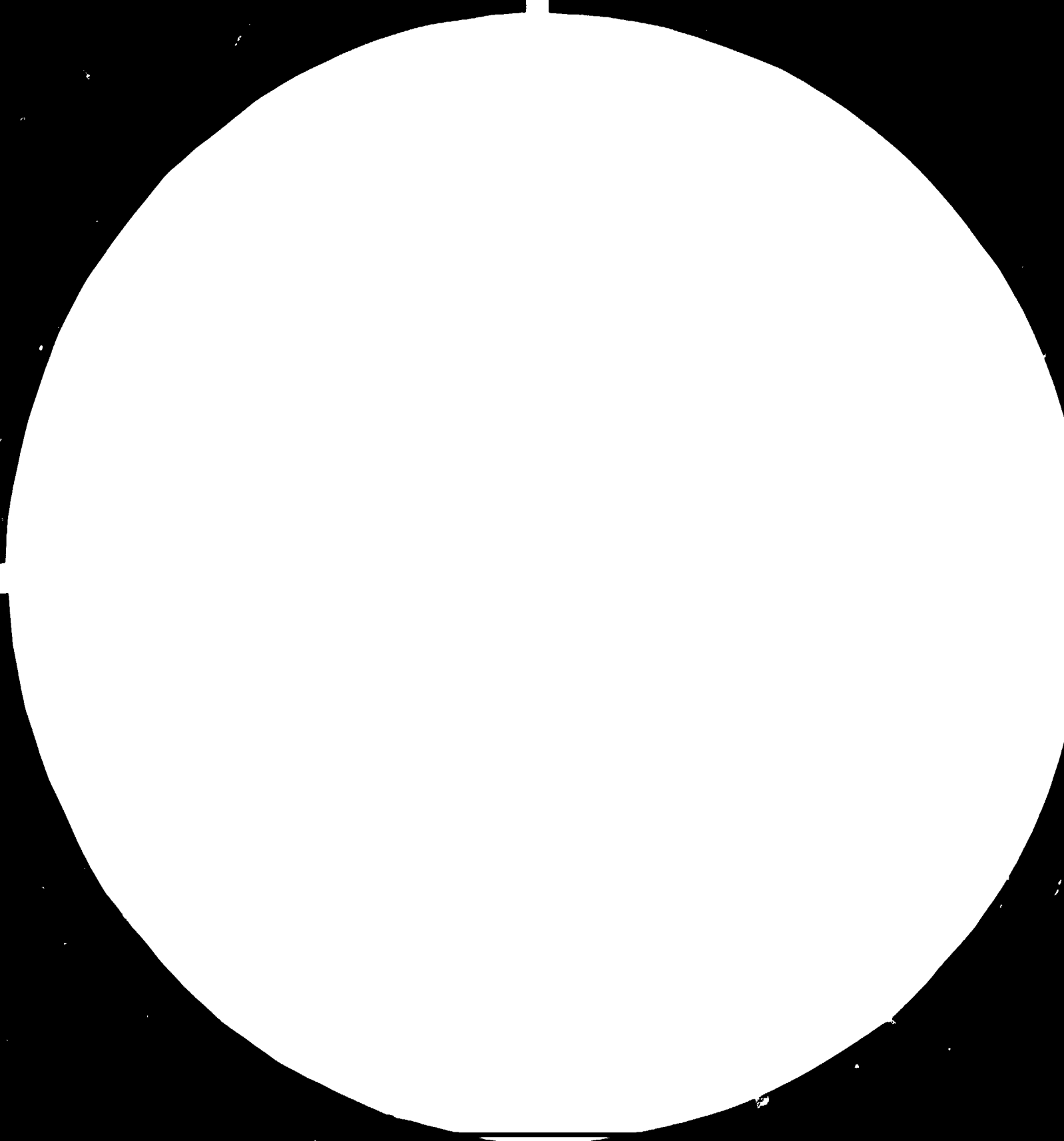

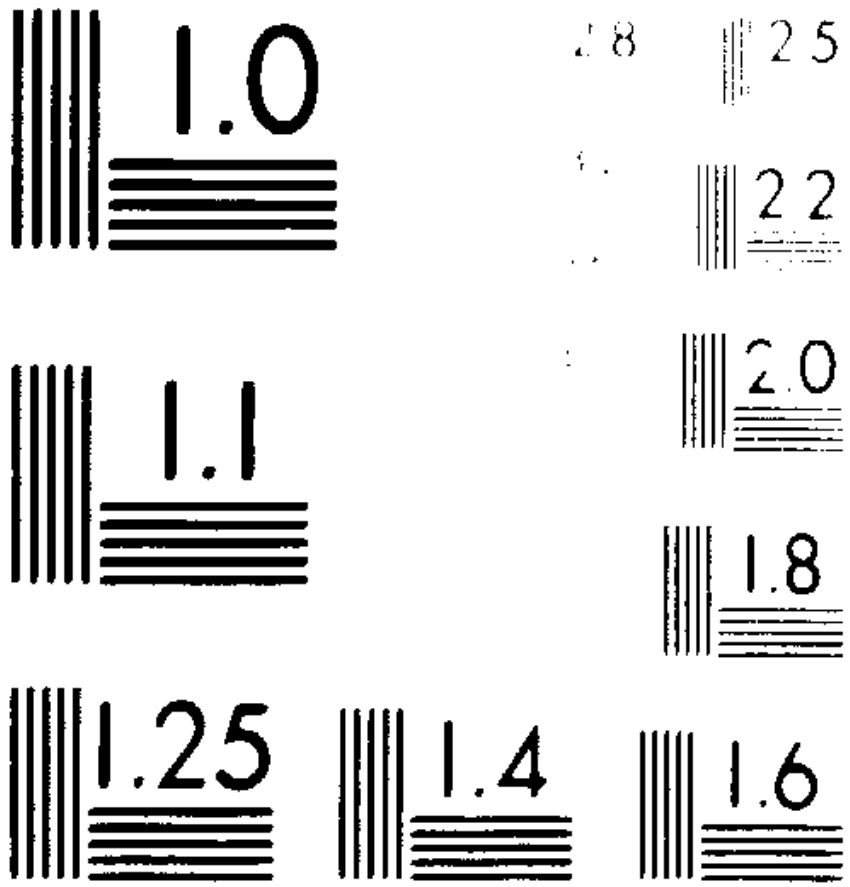
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BIS Marketing Research Limited

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1983.

REPORT

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THE CONSUMPTION OF PACKAGING MATERIALS IN BRASILIAN FOOD MARKETS.

FINAL REPORT. DP/BRA/82/030

Prepared By BIS Marketing Research Ltd

UNIDO CONTRACT NUMBER 82/78

Pru/31

AUGUST 1983

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

INTRODUCTION

This report contains the findings of an investigation into .....

THE BRASILIAN FOOD PACKAGING INDUSTRY

The essential objective of this report is to provide UNIDO with a detailed analysis of the current size and structure of the industry and what changes are likely in the period to 1990.

In preparing the report, we have been extremely conscious of two major forces which are directly influencing the present performance of the packaging industry in Brasil .....

Firstly, the economy; in addition to its own 'local' problems, Brasil has also suffered the adverse effects of worldwide recession. The packaging industry has, not surprisingly, been hit badly by the economic downturn and the demand for many packaging materials is currently well below the peak levels recorded in 1980. We are confident that this situation will be reversed in the near future. But, at the same time, our forecasts of material demand must inevitably be cautious and make some allowance for indeterminate shifts in Government policy which might arise as part of attempts to harmonize the consequences of both internal and external economic pressures.

Secondly, industry knowledge; the absence of any formal approach to the collection and reconciliation of industry data in Brasil has resulted in much confusion in many companies about such essential points as, for example, market size splits. This relates to the packaging industry as much as to packaging using markets.

A major problem influencing the duration of this investigation has been the longer than anticipated time required to reconcile the mass of data obtained - which on many occasions represented widely conflicting and diverging estimates and opinions. We are now happy that the information contained in this report represents a reasonably authoritative statement of the Brasilian food packaging industry.

The report is based on extensive fieldwork carried out between September 1982 and May 1983 comprising 205 personal interviews as follows:

Food Manufacturers	76
Raw Material Producers	36
Packaging Converters	65
Trade Association	19
Machinery Manufacturers	9

In addition to the above, a considerable number of telephone interviews (in excess of 700) were undertaken to clarify points of detail and expand market coverage where necessary.

We would like to record our appreciation of the help and assistance received from the numerous companies interviewed during the course of our undertaking this investigation.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

General

The Brasilian packaging industry was valued at US$ 3,767 million (approximately 3 million tonnes in total) in 1982, equivalent to 1.28% of the gross national product. The breakdown between the various packaging materials was as follows:

THE BRASILIAN PACKAGING INDUSTRY : 1982

	By Value	By Tonnage
Plastics	25.4	10.1
Paper & Board	29.2	47.5
Metals	29.7	19.4
Glass	7.7	20.8
Flexibles	8.0	2.2

The industry grew by 10.1% over the period 1978 to 1982, peaking in 1980 and dropping back in 1981.

Projections

Past trends and future developments in the major economic factors determining the growth of the packaging industry are contained in the following table.

	1978	1982	1990
Total Population			
Growth Index	89.6	100	121.1
Millions	116.4	129.9	157.3
Urban Population			
Growth Index	87.4	100	126.2
Millions	73.4	84.0	106.0
Gross National Product			
Growth Index	87.3	100	124.1
US$ x 10	257.2	294.6	365.6
All Packaging			
Growth Index	90.8	100	129.1
US$ millions	3421	3767	486.3

From the above it appears that growth for packaging in general follows the rate of urban growth rather than the gross national product which seems quite logical, since approximately 90% of packaging material usage is directly related to consumer sales, amongst the economically active segment of the population who live in industrial areas.

International Comparisons

Brasil's per capita consumption of packaging is very low compared with developed countries and indicates a large potential. However, if consumption is related to the economically active population of 43.8 millions, the figures relate quite well to those of Italy.

INTERNATIONAL CONSUMPTION OF PACKAGING MATERIALS
(kgs per capita)

	Brasil		USA	Benel.	France	Germ.	Italy	Neth.	UK
	Total Pop.	Ecnmcly Active							
Plastics	2.4	7.1	11	17	11	13	8	11	8
Paper	3.4	10.1	19	21	14	14	15	22	14
Fibre board	6.2	18.3	70	24	29	23	18	28	24
Paper board	1.8	5.3	33	7	11	12	7	12	12
Steel	4.7	13.9	30	16	10	8	7	17	18
Aluminium	0.2	0.6	4	1.5	1	1.5	0.7	1.2	1
Glass	4.7	13.9	47	40	39	41	28	34	35

In the forecast period all these consumption per capita figures are expected to increase, and there will be some alteration in the balance between them.

For example steel packaging, particularly tinplate, despite its relatively high cost has a high consumption per capita largely due to the harzardous

environment and relatively unsophisticated distribution systems. With improvements in transit handling and storage methods, metal packaging will decline in relative importance in favour of glass and plastics packaging.

- Recent and Future Changes In Food and Non-Food Packaging

The summary table shows consumption of the main packaging materials for food and non-food end markets in 1978 and 1982, with forecasts for 1990.

BRASIL: CONSUMPTION OF PACKAGING MATERIALS

Tonnes ('000)		1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Plastics	Food	131.5	160.9	+ 5	243.7	+ 5½
	Non-Food	105.6	137.3	+ 7	206.9	+ 5
	Total	237.0	298.2	+ 6	450.6	+ 5½
Paper & Board	Food	306.2	345.8	+ 3	442.6	+ 3
	Non-Food	848.8	1049.7	+ 5½	1389.0	+ 3½
	Total	1115.0	1395.5	+ 5	1831.6	+ 3½
Metals	Food	417.5	426.5	+ ½	452.8	+ 1
	Non-Food	151.6	144.0	- 1½	257.3	+ 8
	Total	569.1	570.5		710.1	+ 3
Glass	Food	457.5	491.8	+ 2	590.6	+ 2½
	Non-Food	97.3	118.2	+ 5	187.1	+ 6
	Total	554.8	610.0	+ 2½	777.7	+ 3
Flexibles	Food	46.5	46.2		56.0	+ 2½
	Non-Food	17.6	18.9	+ 1½	22.9	+ 2½
	Total	64.1	65.0	+ 1	78.8	+ 2½
TOTAL FOOD		1359.2	1471.1	+ 2	1785.7	+ 2½
TOTAL NON-FOOD		1220.8	1468.1	+ 5	2063.1	+ 4½
OVERALL TOTAL		2580.0	2939.2	+ 4½	3848.8	+ 3½

NB Figures may not add to totals owing to rounding.

- Future Developments

- Plastics

Plastics will show the fastest growth overall, substituting more traditional materials in a number of markets:

- Low density polyethylene will not be affected greatly by substitutions. Growth will come from increased use of shrink and stretch films.

- High molecular weight HDPE will gain most of the paper bag market.

- Polystyrene will tend to lose out to polypropylene in the preformed pot market, but not in the form-fill-seal market which represents 70% of the important yoghourt market. Polyvinyl chloride is well placed to take over part of the vegetable oil market.

- Polypropylene will gain in the rigid pot, flexible and injection moulding markets. Woven PP sacks have probably plateaued - their use is more or less determined by technical considerations or price.

- Polyester will grow considerably in the flexible market, but the total effect will be small. Polyester could however receive a considerable boost, of up to 7,000 tonnes, if the PET bottles were to be launched.

- Paper And Board

Paper bags and wrappings will have a considerable part of their market eroded by plastics, particularly LDPE and HDPE for both carrier bags and counter bags. For food markets eg. flour and sugar, paper bags are expected to retain their present penetration.

There is no current indication that shrink film is taking over from corrugated cases. Shrink film, at the moment, is used mainly for promotions and high value added products, and only one retail group, Makro, demands products in shrink film. However, within the forecast period it is

expected that there will be up to 50% replacement of corrugated cases by shrink film, despite the present price differential, which is the result of plastics being dependent on imported oil.

The poor growth outlook for cartons reflects the current economic situation Folding carton consumption in 1982 was 3% down on 1978 levels and there will be a tendency for folding cartons to be replaced by other materials such as plastics, and flexible laminates.

- Metals

The question with regard to steel is the possibility of vegetable oil switching to composite cans, PVC or PET bottles, or LDPE pouches. On the positive side, the use of beverage cans should grow, although they may switch to aluminium, and there will be developments in 2 piece cans of both tinplate and aluminium.

For food products, glass seems to be a more popular alternative.

Aluminium will be increasingly used in foil form in laminate materials and in the production of metallised films for quality food packaging where its particular barrier properties are required.

- Glass

Glass will continue to take over part of the tinplate can market for food products. The Brasilian consumer prefers transparent packaging and is apparently prepared to pay for it.

The risk to glass bottles is the launch of two piece aluminium or tinplate cans and PET bottles for carbonated beverages and beer, both of which will be introduced before 1990.

- Flexibles

Flexibles will change over increasingly to bioriented and cast polypropylene film from cellophane. Flexible laminates will continue to attract food markets from cartons and to a lesser extent glass and tinplate packaging forms, but prospects appear better for monowebs.

ECONOMIC OVERVIEW AND PROSPECTS

ECONOMIC OVERVIEW AND PROSPECTS

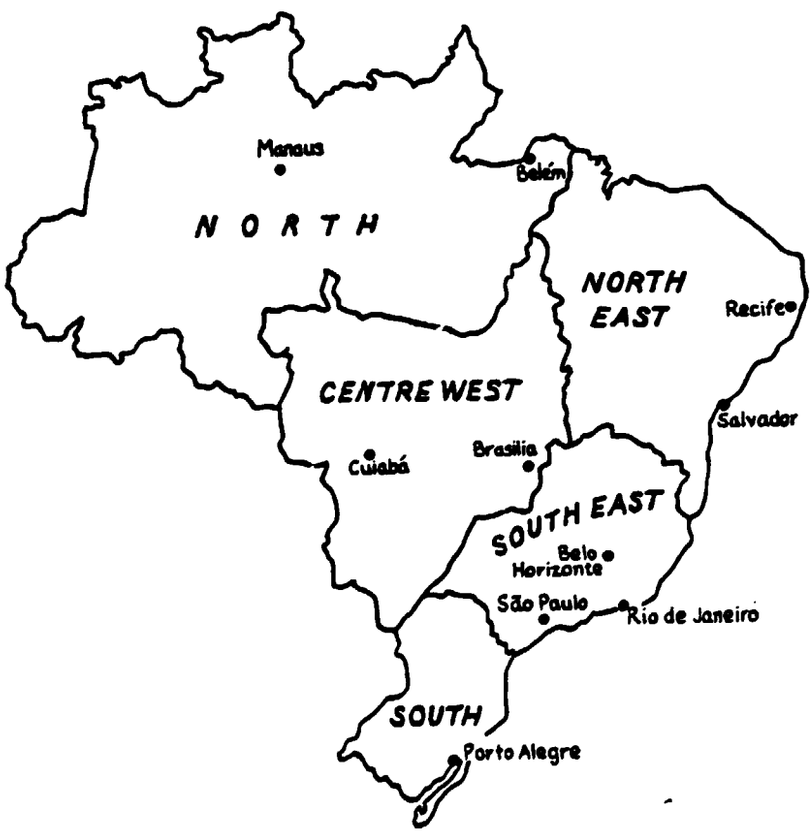
The Nation

Brasil, with an area of 8.5 million square kilometres, is the fifth largest country in the world extending from the Equator in the north to latitude 30° in the south. The nation comprises 22 states, 3 territories and the Federal District.

The country is divided into 5 regions:

North; North East; South East; South and Central West.

Geographic Regions



The most economically important region is the South East where 43% of the total population live and most industrial activity is concentrated.

In 1982 the population of Brasil was estimated at 129.9 million, 65% of which live in towns or cities. The total population is expected to grow by 14% up to 1987, while the urban population will grow by 18% over the same period.

Since most packaged goods are essentially bought by urban dwellers, this is a good indication of the potential growth available to the Brasilian packaging industry.

Another aspect of Brasil's population, which bears on the purchase of added value products, is the number of economically active persons.

The 1980 census showed that the economically active population amounted to only 43.8million (34% of total population). The breakdown of annual income by occupation of this group was:

ANALYSIS OF INCOME BY OCCUPATION

(% Of Economical Active Population)	Less Than US$ 1000	US$ 1-2000	US$ 2-3000	US$ 3-5000	Over US$ 5000	TOTAL
Farming/Fishing	20.3%	6.7%	1.5%	1.1%	1.0%	30.6%
Industry	3.1%	6.3%	2.9%	2.5%	2.7%	17.5%
Construction	1.4%	3.2%	1.4%	0.8%	0.5%	7.3%
Commerce	2.3%	3.1%	1.3%	1.3%	1.6%	9.6%
Transport	0.4%	1.2%	0.9%	0.9%	0.8%	4.2%
Services	7.9%	4.2%	1.6%	1.4%	1.5%	16.6%
Social Work	1.6%	2.1%	1.0%	1.0%	1.4%	7.1%
Government Service	0.6%	1.2%	0.7%	0.8%	0.9%	4.2%
Other	0.5%	0.6%	0.4%	0.6%	0.8%	2.9%
TOTAL	38.1%	28.6%	11.7%	10.4%	11.2%	100.0%

Not surprisingly, it is the economically active population which accounts for the largest proportion (greater than 90%) of national spending power. This group is also predominantly urban dwelling - again highlighting the inexorable dependence of the Brasilian packaging industry on the prosperity of the smallest population group.

The Economy

The Brasilian economy ranks eighth in the world with a Gross National Product amounting to 294,600 million in 1982.

Growth rates over the past five years have been very variable and, clearly, reflect Brasil's susceptibility to the influence of external events, such as the world recession.

1978	+ 4.8
1979	+ 6.7
1980	+ 7.9
1981	- 1.9
1982	+ 1.4

Given the many uncertainties currently surrounding Brasil's economic situation, projected growth rates in GNP to 1990 cannot be regarded as any better than 'best estimates'. Based, however, on the views expressed to us by local and international economic experts, the following scenario is seen as feasible.

(GNP at 1982 Values)	1982	1983	1987	1990
Gross National Product	100	+0.3	+14.9	+23.8
Urban growth	100	+3.5	+17.9	+28.6

The Brasilian economy is passing through an extremely difficult phase at the moment with inflation running at 130%. Brasil's export earnings, currently at an average of US$ 1,551 million per month for the first three months of 1983, are being absorbed by imports (58% of which are oil) leaving a trade surplus of US$ 844 millions which, although encouraging, will hardly be sufficient to meet the requirements of the IMF loan or to service the existing debt of US$ 80,000 million.

Comparative trade figures for the first quarter of 1983 and the corresponding period of 1982 are as follows:

US$ millions	1982	1983	% Change
Imports	4804	3809	- 21%
Exports	4959	4653	- 6%
Trade Surplus	155	844	+445%

When examining the Brasilian economy, it is important to remember that the external debt has very little direct effect on the consumer unless we consider that inflation is partially a consequence of that debt.

The more important issue would appear to be the internal debt which increased by 138.2% over the twelve month period to February 1983 and which appears to be the real generator of inflation. In the period to February 1983, the following changes occured in the various inflation monitoring indices.

Prices:	Overall inflation	+104.3%
	Consumer price index	+109.1%
	Consumer prices	+105.5%
Incomes:	Industrial	+114.3%
	Rural	+ 77.8%

From the above it would appear that the urban (industrial) consumer is still increasing income more quickly than the rate of inflation. Because of shortages in skilled labour, industry has tended to give more generous wage settlements than the minimum required as calculated against the consumer price index. There are, however, now signs that the government is attempting to tighten its control on wage settlements as one means of abating the increase in inflation. This is in response to the IMF requirement to de-index the economy.

If salary increases over the twelve months to February 1983 are weighted in accordance with spending power .....

	Increase	National Spending Power
Industrial (urban)	+114.3%	84%
Rural	+ 77.8%	16%
Overall	+108.5%	100%

... the resultant 108.5% is very close to the consumer price index which reflects overall inflation. Therefore, overall income growth will probably be minimal. However, the growth will not be equally divided; urban population will increase its proportion of spending power and the rural population will lose out.

All of this seems to indicate that the key to forecasting the growth of consumer products in Brasil is the urban population growth.

PART ONE

PRINCIPAL FOOD MARKETS FOR PACKAGING

INTRODUCTION

In the following sections of this part of our report, we provide as much detail as was obtainable on each of the main Brasilian food markets in which packaging is used.

The individual products are grouped in sections covering:

Meat, Poultry and Fish
Fruit and Vegetables
Milk and Dairy Products
Cereals and Pulses, Flour and Flour Products
Sugar and Chocolate Confectionery
Other Foods
Drinks and Beverages

For each product there is a brief discussion on current production and consumption, and details of the principal methods of packaging, including an analysis of materials used and predominant pack types. In addition, there is a discussion of the outlook covering movements in demand for the product and developments and changes in the packaging which are anticipated in the period to 1990.

MEAT, POULTRY AND FISH

SECTION 1 MEAT, POULTRY AND FISH

1.1 FRESH MEAT AND FISH

1.1.1 Production And Consumption

Fresh meat and fish are not freely available throughout Brasil at all seasons. Supermarkets in the large cities sell both prepared pre-packaged meat and fish and also have cut-to-order butchery departments. Other than these outlets and in the rest of the country, meat and fish are wrapped principally in paper wrapping.

1.1.2 Packaging

In the supermarket chains and large butcher shops in cities, relatively modern methods of meat packaging are used.

For prepared meat, expanded polystyrene or fibre trays are used with stretch film overwrapping. This overwrap is most frequently PVC film. It has not been possible to determine the quantity of film used solely for meat wrapping, but in 1982 it is reported that 15,700 tonnes of PVC film were used for overwrapping of meat, fruit and vegetables.

For other meat wrapping, both in butchers departments and shops, and for specialised sausage products, LDPE film is used. In 1982, 21,000 tonnes of LDPE film were used.

For cold cooked meats, almost entirely sold through supermarket outlets, approximately 570 tonnes of cellophane was used in 1982. In addition, there was also a limited demand for Polyester with less than 50 tonnes being used in 1982.

1.1.3 Outlook

It has not been possible to determine the quantity of paper wrappings currently used for meat and fish. But, within the period to 1990, it is expected that the majority of these will be replaced by either LDPE film or HDPE bags. To a considerable extent this change will be governed by changes in retailing and distribution patterns and the buying habits of the population. Taking account of this substitution, by 1990 we expect that 35,000 tonnes of LDPE film and 4,500 tonnes of HDPE bags will be used for fresh meat packaging.

There is also expected to be significant substitution of cellophane by polyester films and other flexible film laminates for the better presentation and preservation of cooked meats. This will result, by 1990, in a demand for 750 tonnes of polyester films and a reduction to almost nil of cellophane films for cooked meat wrapping.

In addition, 19,500 tonnes of PVC stretch film - for tray overwrapping of meat and also fruit and vegetables - will be consumed by 1990.

1.2 MEAT PRODUCTS

1.2.1 Production And Consumption

The canned meat market is dominated by exports of corned beef, which account for nearly 80% of total production. The meat market in 1982 was:

Corned Beef	106,500	tonnes	79%
Sausages	20,000	tonnes	15%
Luncheon Meat	7,800	tonnes	6%
Total	134,300	tonnes	100%

The principal manufacturers of corned beef are Frigorifico Anglo (Veste Group), Frigorifico Bordon, Swift Armour (Brascan/Atunes), who account for over 60% of the market.

The sausage market is more fragmented but the leader is Bordon, with Anglo, Swift Armour and Comabra also having significant shares.

1.2.2 Packaging

Corned beef is packed in the traditional trapezoidal can (with key) and large catering size cans. All cans are labelled.

Sausages are packed in lithographed or labelled round cans. Luncheon meat is packed in labelled rectangular cans.

The demand for the main can sizes used in 1982 was split as follows:

Corned Beef	340gm	251 million cans
	2720gm	8 million cans
Sausages	180gm	102 million cans
	250gm	6 million cans
Luncheon Meat	320gm	23 million cans
Total		390 million cans

1.2.3 Outlook

By 1990, the output of meat products is forecast to have grown as follows:

Corned Beef	117,150	tonnes	+ 10 %
Sausages	23,500	tonnes	+ 17½%
Luncheon Meat	8,400	tonnes	+ 7½%
Total	149,050	tonnes	+ 11 %

By 1990 the demand for cans will have increased to 420 million units representing a growth of approximately 7½%. This is slower than the growth projected for total product volume reflecting a substitution of cans by flexible packaging for sausages and some movement to larger size cans for corned beef.

There are unlikely to be any significant innovations in the packaging of corned beef and luncheon meat, other than the use of lighter weight tin-plate as this becomes available.

As indicated above however, more sausages will be transferred to flexible packaging and away from cans. The increased use of chiller cabinets at retail outlets and improvements in distribution will allow this switch to flexibles - particularly 'Cryovac' and similar constructions.

1.3 POULTRY

1.3.1 Production And Consumption

The poultry market in Brasil has expanded considerably in the past five years as shown by the following figures:

Million Units	1978	1979	1980	1981	1982
Poultry Production	321	411	555	672	746

In 1982, exports represented 25% of total production of over 1 million tonnes. The major producer and exporter is Sadia, with 20% of production and 25% of the export market. Sadia is claimed to have a production capacity of 650,000 birds per day.

Other important companies are Perigao, Copave and Avidel; the only foreign -owned company involved is Cargill with a capacity of 50,000 birds per day.

1.3.2 Packaging

All birds are individually wrapped in LDPE bags, and in 1982, 746 million bags were used (approximately 2,133 tonnes of LDPE).

For domestic bulk handling of frozen poultry, woven polypropylene sacks are used, containing 8 to 10 birds per sack. Approximately 50% of total poultry production is frozen, and this resulted in a demand for 36 million sacks or 3,400 tonnes of polypropylene in 1982.

For the export of frozen poultry, corrugated cases are most frequently used, and the trend has been as follows:

Tonnes (000)	1978	1979	1980	1981	1982
Corrugated Cases	5.5	7.6	11.8	15.0	16.8

1.3.3 Outlook

There is still considerable potential for exports although future growth will inevitably be slower than the 22% annual average in the past. In 1982,growth was only 8.6% and probably only 10% per annum growth can be expected from now in the market for poultry, as world trading conditions remain relatively stagnant.

Total production of poultry is expected to reach 1,400 million units by 1990, using approximately 4,000 tonnes of LDPE bags for primary packaging.

For frozen poultry, the requirement will be for 68 million woven sacks - assuming 8-10 birds in each sack. The bulk of material used will be woven polypropylene but it can be expected that woven HDPE sacks will also take some of this market.

1.4 FISH

1.4.1 Production And Consumption

There is a wide variety of fresh fish available in Brasil, but it is restricted principally to coastal areas, or where distribution and retailing are developed - that is in the states of Rio de Janeiro and Sao Paulo.

Some canned tuna is produced, but the main canned fish is sardines. The sardine market has declined in recent years due to a shortage of boats and a consequent drop in catches. During the period of government support for food production, agriculture was the main recipient of funds and the size and standard of the fishing fleet declined.

The market is dominated by Coqueiro (Quaker), but Metal Forty, Beira Alta and Palmeira all have a significant share; these four companies account for over 50% of the market.

A small amount of sardines is exported, (660 tonnes in 1982) but the chief market is the north east of Brasil.

1.4.2 Packaging

Sardines are usually packed in vegetable oil or tomato sauce. The main type of packaging is the 135gm drawn can with a key opening lid and these cans are usually made by the fish canners themselves. Smaller quantities of fish are also packed in 200gm and 375gm can sizes.

The production of sardines has been as follows:

	1978	1979	1980	1981	1982
Million Can Units	480	460	547	260	360

1.4.3 Outlook

In the period to 1990, there will be some recovery in the quantity of sardines caught and canned. But, it is unlikely that the 1978 level will be regained. A more realistic figure would be 460 million can units.

Canned sardines are a traditional product and no change is therefore expected in this packaging form. The can is ideally suited to both the product, and the distribution and retail chain.

1.5 FROZEN MEAT AND FISH

1.5.1 Production And Consumption

Frozen foods are a relatively small market in Brasil, largely due to the year round availability of fresh vegetables. As a consequence, a highly developed frozen food distribution chain and retail system has not yet been established. In addition there are prejudices based on unfortunate experiences with frozen meat, which is virtually all that is available between July and November.

Findus (Nestle) launched a line of frozen fish products some years ago and have recently added some meat products. Sadia are market leaders in frozen meat products and Comabra also participate in this market.

1.5.2 Packaging

Frozen fish and meat products are all packed in cartons, with total sales estimated at 15 million cartons in 1982, consuming approximately 700 tonnes of board. The board is mostly coated with wax or PE to withstand the damp conditions on the packing line and in freezer storage.

1.5.3 Outlook

In the period to 1990, consumption will expand to an estimated 20 million cartons, using approximately 900 tonnes of board. The growth is largely constrained by the slow penetration of freezing as a method of food preservation in Brasil.

FRUIT AND VEGETABLES

SECTION 2 FRUIT AND VEGETABLES

2.1 FRESH FRUIT AND VEGETABLES

2.1.1 Production And Consumption

Total figures for the production and consumption of fresh fruit and vegetables are not available for Brasil since, for large areas of the country, these products are handled by local markets and are hence not measured.

2.1.2 Packaging

The bulk of fruit and vegetables that use packaging are handled in woven HDPE sacks. Based on figures for the Sao Paulo central market - which it is claimed represents approximately 40% of Brasilian fruit and vegetable consumption - it is estimated that total consumption of woven HDPE sacks amounts to 22 million units, or 2,200 tonnes of HDPE. These woven sacks are produced by Fitesa, Jauense and Susuki.

The other 2,200 tonnes of woven HDPE materials is used for bags for oranges.

Many more exotic fresh fruits are transported in returnable wooden crates; the Sao Paulo market alone handles 2.6 million tonnes of fruit and vegetables.

Heavy Wooden Boxes	52 million units (67% oranges)
Light Wooden Boxes	36 million units

For some high quality fruit products and also flowers, corrugated cases are used; in 1982, approximately 11,000 tonnes of such cases were produced for these end-uses.

2.1.3 Outlook

For most low value products, the woven HDPE sack is expected to remain as the principal packaging form. And, by 1990 approximately 31 million sacks will be required, consuming 3,100 tonnes of HDPE.

Returnable wooden crates are likely to retain some of their current end-uses, but there is a large potential market for corrugated board cases as the Brasilian market develops. By 1990, it is forecast that up to 50,000 tonnes of corrugated board cases will be required for fresh fruit and flowers.

In addition there will be an expansion in the use of expanded polystyrene and fibre trays with PVC shrink film overwrap for pre-packaged fruit and vegetables as well as for meat.

Approximately 192 million of these trays and 15,700 tonnes of PVC film were used for a variety of applications in 1982. The foamed trays are produced exclusively by Spumapak but, unfortunately, it was not possible to obtain sufficient data to divide the total usage of trays and film into separate quantities for the various end-markets. Overall however, it is estimated that by 1990 approximately 300 million trays and 25,000 tonnes of PVC film will be used.

2.2 CANNED FRUIT AND VEGETABLES

2.2.1 Production And Consumption

Canned fruit is a small market in Brasil, largely due to the almost constant availability of fresh fruit and, consequently, the relatively high price of canned products.

The most significant canned vegetable is peas which are imported from North America in dried form and rehydrated during the canning process.

The main companies participating in the canned fruit and vegetable market include:

Fruit		Vegetables	
Cica Paoletti	60%	Cica J Alves Verissimo	65%
Beira Alta		Agape	
Swift			

The total market for canned fruit was 12,000 tonnes in 1982. This is a static market with little brand identification and therefore of little long term interest to the canners. The vegetable market amounted to 34,000 tonnes in 1982; canned peas account for over 65% of this latter market.

2.2.2 Packaging

Fruit is packed in "1 kilo" cans although the drained weight of the contents is usually 400-500gm. Vegetables are packed in 200 or 220gm cans which are either labelled or direct litho printed.

Consumption of cans in 1982 was as follows:

Fruit	458gm	30 million
Vegetables	200gm	174 million
Total	-	204 million

2.2.3 Outlook

In the period to 1990, there is not expected to be any change in the market size for canned fruit. However, canned vegetables will experience some modest increase to about 210 million units as the market for convenience foods expands. Both fruit and vegetable cans will move to lighter grade of plate and there will be a further use of direct decoration to enhance the attractiveness of the can to the consumer.

2.3 BOTTLED FRUIT AND VEGETABLES

2.3.1 Production And Consumption

This market includes palm hearts, olives and mushrooms. Since this is an extremely fragmented market, it was not possible to identify specific manufacturers.

The largest market is undoubtedly palm hearts; 40,000 tonnes are produced annually for domestic and export markets; olives, mushrooms and other vegetables are all relatively small markets due to the high costs of cultivation.

2.3.2 Packaging

Approximately 60% of the palm hearts produced in Brasil are packed in 550gm glass jars, a total of 44 million units.

In total, the glass industry estimates that the bottled fruit and vegetable market consumes 18,000 tonnes of glass, giving a market size of approximately 65 million jars per annum.

2.3.3 Outlook

The market for bottled fruit and vegetables is not expected to grow in the period to 1990. It is forecast that consumption will remain steady at about 65 million units per year. There is a possibility that in some markets - such as palm hearts - tinplate cans will become competitive. However, consumers in Brasil like to see what they are buying and there is a basic preference for transparent forms of packaging.

2.4 TOMATO PRODUCTS

2.4.1 Production And Consumption

Tomato products are the major canned food product in Brasil. The total market amounted to 112,000 tonnes in 1982, excluding ketchup and juice which are packed in glass bottles. Cica have more than 50% of the total market with Peixe and Paoletti sharing a further 20%. By type of product, the market was split as follows:

Tomato Extract	63%
Tomato Puree	16%
Tomato Sauces	21%
Total	100%

2.4.2 Packaging

Tomato extract is the traditional product which now has a stable market share of approximately 70,000 tonnes per year; approximately 70% of tomato extract is packed in cans, usually direct printed, in the following sizes:

140gm	171 million cans
350gm	67 million cans
Total	238 million cans

The remaining 30% of extract is packed in glass jars, amounting to approximately 136 million units in 1982. The share which is packed in glass has been increasing in recent years and this trend is expected to continue, despite the fact that glass is a more expensive form of packaging.

The breakdown of sizes of glass jars used in 1982 was:

100gm	-	77 million units
190gm	-	36 million units
270gm	-	15 million units
300gm	-	8 million units
Total	-	136 million units

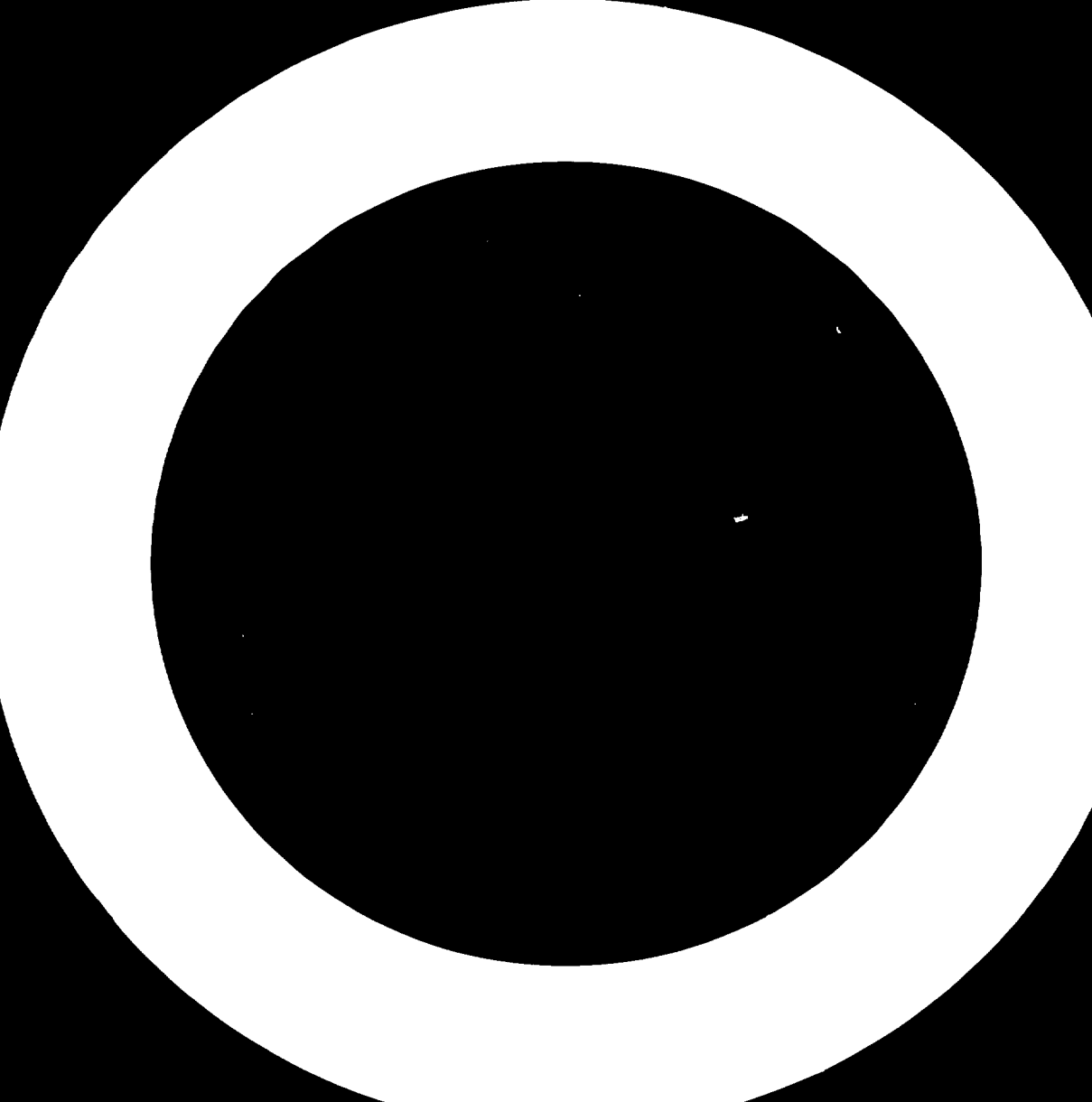
Tomato puree is a more recently introduced product, but had reached a market size of 18,000 tonnes by 1982. This is a high quality, convenience product with considerable potential for growth.

Around 80% of puree is packed in 350gm cans and demand for these was approximately 41 million units in 1982.

The remaining 20% of puree is packed in 700gm glass jars the usage of which amounted to just over 5 million units.

The tomato sauce market reached 24,000 tonnes in 1982. This is a real convenience food, packed ready to serve. Over 90% is packed in tinplate cans, and this market used 62 million 350gm cans in 1982. The balance of sauce is sold in 700gm glass jars; in 1982 approximately 6 million glass jars were filled with tomato sauce.

MILK AND DAIRY PRODUCTS



SECTION 3 MILK AND DAIRY PRODUCTS

3.1 LIQUID MILK

3.1.1 Production And Consumption

The production of liquid milk in Brasil was 9,900 million litres in 1982. However, 40% of this was not controlled and was sold direct in loose form.

Approximately 50% of controlled milk (2,970 million litres) sales are used for industrial purposes, and the other half (30% of total milk production) is sold as pasteurised or UHT milk. Not all pasteurised milk is of the same quality however, and only 11% is subject to rigourous hygiene standards.

Most of the milk in Brasil is marketed by co-operatives on a regional basis.

3.1.2 Packaging

All pasteurised milk is packed in LDPE pouches. Tetrabriks were tried for some time, but were found to be too expensive when compared with LDPE.

Production of pasteurised milk has been as follows:

Million Litres	1978	1979	1980	1981	1982
	2572	2947	2928	3143	3300

The consumption of LDPE pouches was 3,300 million units in 1982 - equivalent to 18,334 tonnes of polymer. At this level, the milk market represents 6% of total LDPE polymer demand.

UHT milk is a growing market in Brasil, although it only represents 2% of total liquid milk consumption. UHT milk has been gaining acceptance since it is of an assured quality, whereas pasteurised milk is variable.

UHT milk is packed in Tetrapack cartons comprising wax coated liner, base board and PVDC coated aluminium foil.

Total production of liquid cartons was 500 million units in 1982 of which 21%, or 105 million units, were used for UHT milk. A further 19% or 95 million units were used for other milk-based products (chocolate drinks etc). The balance of the 300 million units is used for fruit drinks.

3.1.3 Outlook

Total milk sales are expected to grow at approximately 5% per annum in the period to 1990 but price will be a major factor influencing the growth potential.

On these growth rates, pasteurised milk consumption should reach in excess of 4,800 million litres, and UHT milk 155 million litres by 1990.

However, it is expected that a greater proportion of total milk production will become controlled and require packaging,so growth rates for packaging materials will be more rapid than this 5% per annum indicates. In addition, a higher percentage of milk will be UHT processed as customers require a product of uniform quality not subject to health risks as is the case with pasteurised milk.

By 1990 we expect that more than 6,000 million litres of pasteurised milk will be packed in LDPE pouches, and approaching 500 million litres of UHT milk in Tetrapaks.

3.2 POWDERED MILK AND PRODUCTS

3.2.1 Production And Consumption

Powdered milk production, and hence to some extent the market size, depends on the availability of milk for processing. In 1980, for example, only 18% of total milk production was processed into powdered milk and only 7% for consumer packs, the remainder going for industrial food production.

In 1982, as indicated in the last section, total Brasilian milk production was approximately 9,900 million litres and powdered milk for consumer packs reached 11%.

The production of powdered milk-based products has been:

Tonnes (000)	1978	1979	1980	1981	1982
Powdered Milk	96	84	88	130	130
Defatted Milk	-	6	7	7	7
Baby Milk	15	19	19	17	17
Chocolate Drinks	-	-	-	24	24
Total	111	109	114	178	178

Nestle dominates the powdered milk market with 75% share, the remainder is held by Fleischmann & Royal. Nestle also controls over 60% of the defatted milk market, the entire baby milk market and also more than 60% of the chocolate drinks market.

3.2.2 Packaging

Powdered milk, baby milk and chocolate drinks are packed in lever lid cans. Around 25% of defatted milk is in cans, but the market leader, Nestle, uses cartons for this product. Consumption of cartons in 1982 was estimated at 10 million units.

The total number of cans used in 1982 was as follows:

	200gm	400gm	1kg	2kg	Total
Powdered Milk	-	245	30	1	276
Defatted Milk	-	4	-	-	4
Baby Milk	-	37	-	-	37
Chocolate Drinks	20	34	3	-	57
Total	20	320	33	1	374

3.2.3 Outlook

These products have stabilised and are expected to grow at only 2-3% per annum, with the exception of powdered milk which depends on the availability of milk for processing, and the consumer's confidence in liquid milk.

3.3 BUTTER

3.3.1 Production And Consumption

Butter is an expensive product in Brasil and has to some extent been replaced by margarine; the market has developed as follows:

Tonnes (000)	1978	1979	1980	1981	1982
	50.8	48.3	46.8	54.3	54.3

Butter is produced by dairy co-operatives and the market is very fragmented. However, Paulista, CCPL, Spam and Itambe have roughly 30% of the market between them, other significant producers are Danone, Leco and Vigor.

3.3.2 Packaging

Most butter is packed in aluminium foil/paper laminates, and in 1982 it is estimated that 800 tonnes of laminates were used for butter wraps.

The principal suppliers of butter wrappings are Bafema, Indupel, Santa Rosa, Itap, Shellmar and Itaipava.

In addition, about 200 tonnes of PS sheet are used for form-fill-seal butter packs. This is a small market accounting for no more than 5% of butter sales. There are two principal sizes:

10gm	15 million units
40gm	40 million units

These PS packs are closed with PE coated printed aluminium foil lids.

3.3.3 Outlook

There will be very little growth in the market for butter in Brasil; by 1990 it is estimated that the market will have reached only 60,000 tonnes.

3.4 CHEESE

3.4.1 Production And Consumption

The total cheese market in Brasil is difficult to estimate due to the large quantity (probably 50,000 tonnes) which is produced outside Ministry of Agriculture control.

Controlled cheese production has shown the following trends:

Tonnes (000)	1978	1979	1980	1981
	136.1	125.6	137.8	143.5

The market shares of the main types of cheese can be broken down as follows:

Prato	34%
Mussarella	20%
Minas	19%
Sophisticated Cheeses	15%
Cheese Spread	7%
Parmesan	5%
Total	100%

Prato is a semi-hard cheese with virtually no growth over the past five years. Mussarella is a cooking cheese which has grown 17% in the same period. Minas, a fresh cheese, is static, and Parmesan has dropped nearly 50% since 1978 due to high price, while sophisticated cheeses have grown by 50% in the same period. Cheese consumption is dependent on price. The more sophisticated cheeses have done better because they are restricted to higher income groups who have not suffered so badly from the recession. Mussarella has probably been used as a substitute for Parmesan in cooking.

3.4.2 Packaging

The bulk of cheese is packed in flexible materials; Prato, Mussarella and Parmesan in Cryovac, sophisticated cheeses in aluminium/paper laminates, and Minas in LDPE mono film. In 1982 it is estimated that 1,000 tonnes of aluminium/paper laminates and 900 tonnes of nylon/PVDC (Cryovac) were used for packaging hard and semi-hard cheese, and about 500 tonnes of LDPE film for basic Minas-type cheese.

The supplier for Cryovac is Darex, and other laminates and flexible materials are supplied by Shellmar, Indupel, Edea and Bafema.

Cheese spread or "requeijao" is a typical Brasilian production which has maintained its 7% share of the cheese market since 1978. In 1982 approximately 10,000 tonnes of cheese spread were produced and this was packed in 18 million 250gm and 18 million 330gm glass pots. These pots are closed with crimped aluminium lids, the glass pots being designed for use as drinking glasses when empty.

3.4.3 Outlook

The total market for cheese is forecast to grow to 175,000 tonnes by 1990, the bulk of this growth being in Mussarella and sophisticated cheeses. Cheese spread will grow steadily at 2-3% per annum. No significant innovations are foreseen in the packaging of cheese, although there may be some transfer of cheese spread to PP tubs or transparent PVC containers.

3.5 MARGARINE

3.5.1 Production And Consumption

Margarine is a utilitarian product which has benefitted from the relative cost of butter, and the introduction of soft margarine in 1970. More recently though the market has declined.

The total market for margarine has developed as follows:

Tonnes (000)	1978	1979	1980	1981	1982
	198	210	264	254	242

This total is broken down:

Soft	42%
Hard	39%
Industrial	19%

The principal manufacturers, Van den Berg (Unilever), Anderson Clayton and Sanbra, have the total market more or less equally divided between them. However, in the soft margarine market, Van den Berg is leader with over 50% alone.

3.5.2 Packaging

Margarine has been a success story for polypropylene, and PP has absorbed all the growth there has been in the market.

Soft margarine was originally packed in PS and PVC but, in 1974, Sanbra launched a PP pack which achieved 10% of the market by 1978 and, by 1982, PP had 62% of the soft margarine total.

The soft margarine market has developed as follows:

Tonnes (000)	1978	1979	1980	1981	1982
	62	82	112	107	107

Soft margarine is packed in 250 and 500gm pots split as follows:

Million Units	250gm	500gm	Tonnes Of Material Used
Polypropylene	195	84	3528
PVC	148	31	2140
Total	343 (75%)	115 (25%)	5668

Hard margarine represents 39% of total margarine sales, or 99,000 tonnes in 1982.

The market for hard margarine was:

Tonnes (000)	1979	1980	1981	1982
	82	102	99	99

Around 43% of hard margarine is distributed in 100gm tablets, wrapped in aluminium foil/paper laminate. In 1982, 420 million 100gm blocks were sold using 93 tonnes of material.

Some of these 100gm tablets (24% of all hard margarine) are then sold in cartons of 4 tablets. In 1982 consumption was estimated at 60 million cartons, equivalent to 1,500 tonnes of board.

In addition 17 million 500gm tinplate cans of hard margarine are produced each year, mainly to serve distant markets in the interior of the country. The distribution chain involved in servicing these markets requires a

higher standard of product protection, hence the need for tinplate containers.

Finally 19% or approximately 46,000 tonnes of margarine are produced for industrial purposes. There are no separate figures for the packaging of industrial margarine, as it is added in with shortening products. Approximately 700,000 cans each containing 16.5kgs are used for these industrial fats. In addition, some of these products are packed directly into lined cases, but it has not been possible to estimate the number of cases or tonnage of board involved.

3.5.3 Outlook

Margarine is a mature product in the Brasilian market and there is unlikely to be spectacular growth in the period to 1990. Soft margarine will grow to approximately 135,000 tonnes, and further specialised dietary products will appear on the market, but these will only be small in comparison with the total. The hard margarine market will expand to 120,000 tonnes.

Depending on relative price movements of the materials, it is unlikely that PP will take over a larger proportion of the total margarine market, particularly soft products. Hard margarine will continue to be distributed primarily in aluminium foil/paper laminate wrappers.

3.6 EGGS

3.6.1 Production And Consumption

There are no reliable figures on the production and consumption of eggs in Brasil, since a significant quantity are sold locally and do not get packaged in a formal sense. However, the development of food supermarkets has resulted in a packaging requirement.

3.6.2 Packaging

Foamed PS trays account for about 60% of the packed egg market. The remainder are packed in fibre trays.

220 million PS trays were used in 1981, dropping to 210 million in 1982, consuming approximately 960 tonnes of PS.

These trays are produced exclusively by Spumapak, who also manufacture supermarket trays for prepacked meat, fruit and vegetables.

In addition about 130 million fibre trays were used for eggs in 1982.

3.6.3 Outlook

Growth is expected to be 4-5% annually, so by 1990 the total market will be in the region of 500 million tray units.

3.7 YOGHOURTS AND DESSERTS

3.7.1 Production And Consumption

This market grew very rapidly to 1980, when there was a 10% drop in sales. The total market has the following composition:

Tonnes (000)	1978	1979	1980	1981	1982
Yoghourt	53.6	61.2	74.9	67.0	76.5
Desserts	10.6	13.4	15.0	11.3	11.9
Petit Suisse	8.1	10.2	12.7	13.8	18.8
Total	72.3	84.8	102.6	92.1	107.2

There are many companies producing yoghourt in Brasil but most are regional and have small market shares. Danone are market leaders in all segments and together with Chambourcy (Nestle) and Paulista, control 60% of the yoghourt market, 90% of the dessert market and 85% of the petit suisse market.

3.7.2 Packaging

Both Paulista and Batavo (a regional producer) use some injection moulded goblets for yoghourt, the quantities however are not substantial - approximately 40 million annually.

The bulk of these products are packed in thermoformed polystrene pots; 70% of all yoghourt and all of desserts and petit suisse are packed in form-fill-seal pots. The remaining 30% of PS yoghourt pots are bought in ready formed from specialist companies such as Brasholanda, Itap and Dixie.

In 1982, the consumption of PS pots was:

Yoghourt	(140gm)	546 million units
Desserts	(90gm)	133 million units
Petit Suisse	(45gm)	414 million units
Total		1,093 million units

A total of 6,850 tonnes of PS was used for these products.

3.7.3 Outlook

This total market is expected to grow at approximately 4% per annum on average to 1990 with individual product figures as follows:

	1990 Tonnes (000)
Yoghourt	107.1
Desserts	13.9
Petit Suisse	25.7
Total	146.7

Of principal concern is whether PS will be substituted by polypropylene in these markets since PP is expected to gain an increasing cost advantage in the next few years.

However, it is very unlikely that most yoghourt or any desserts or petit suisse will change over to PP since these are produced on form-fill-seal machines which are not suitable for PP, a much more difficult material to thermoform. The 30% of yoghourt pots which are bought in from thermoformers, could however transfer to polypropylene which would mean a reduction of about 1,000 tonnes in PS usage per annum.

It is doubtful if HDPE, which is only used for a small part of the market, will be used to any additional extent. Injection moulding is relatively expensive when compared with thermoforming and does not fit in with form-fill lines.

3.8 ICE CREAM

3.8.1 Production And Consumption

This is a highly seasonal product in Brasil, very dependent - as everywhere - on summer weather. Sales peaked in 1980 at 100 million

litres, but dropped to 75 million litres in 1981 and 60 million litres in 1982. The market is expected to stabilise at about 70 million litres.

The market is dominated by Kibon (General Foods), with over 70% share; Gelato (Unilever) and Yopa (Nestle) account for the remainder.

The total market can be split:

Impulse Purchase	49%
Take-Home	23%
Bulk (Catering)	28%

3.8.2 Packaging

Sticks or ice lollies account for 85% of the impulse market (42% of the total); in 1982, 460 million sticks were consumed equivalent to 690 tonnes of PE coated paper. The remaining impulse purchase ice cream is sold in PS thermoformed pots for use in cinemas and other catering establishments.

Take home sales represent 23% of the total market; in 1982 consumption of ice cream in bricks (cartons) was estimated at 6 million 500gm bricks, using approximately 120 tonnes of cartonboard. Other take home packs are 1 and 2 litre polystyrene tubs and general line tinplate cans with replaceable lids, which are used for speciality varieties. However none of these are particularly large markets.

Catering packs, which account for nearly 17 million litres of ice cream a year are predominantly fibreboard drums; approximately 750,000 20 litre drums are used in this market. The remainder, and an increasing percentage,is being distributed in tinplate pails and plastic (principally HDPE) tubs.

3.8.3 Outlook

By 1990 the total market for ice cream will expand to 73 million litres. The only expected change in packaging is an increase in the use of plastics for all end market segments particularly take-home and bulk, but it has not been possible to measure the rate of these changes.

CEREALS AND PULSES - FLOUR AND FLOUR PRODUCTS

SECTION 4 CEREALS AND PULSES - FLOUR AND FLOUR PRODUCTS

4.1 RICE

4.1.1 Production And Consumption

Rice is a Brasilian staple food, with per capita consumption steady at 37kg annually. Rice is mostly grown in Brasil, but an import supplement of up to 13% is required to meet domestic consumption.

In 1982, approximately 9.7 million tonnes of rice were grown in Brasil, but 50% of weight is lost in the polishing process.

The total market for polished rice has grown as follows:

Tonnes (000)	1978	1979	1980	1981	1982
	4350	4508	4888	4830	4859

4.1.2 Packaging

Approximately 70% of rice is sold in consumer packs, mainly packed by the supermarket chains themselves and Cobal, the Government food distribution system, which accounted for 5% of the market in 1981.

The breakdown of packaging in 1982 in terms of weight of rice packed in bags was as follows:

Pack Size	% Of Total Rice Packed	No. Of Bags (Millions)	('000) Tonnes Of Rice
1kg LDPE	54	1802	1802
2kg LDPE	11	187	374
5kg LDPE	22	149	745
2kg singlewall paper	3	51	102
5kg multiwall paper	10	68	340
	100	2257	3363

In 1982, consumption of raw materials was; 15,246 tonnes of LDPE and 8,256 tonnes of kraft paper for rice packaging.

4.1.3 Outlook

Rice consumption will grow in relation to population growth, and by 1990 total annual consumption will be in excess of 5,900,000 tonnes. Being a basic commodity, there is unlikely to be any significant change in the type of packaging used for this product.

4.2 PASTA

4.2.1 Production And Consumption

The market for pasta has declined in recent years, mainly due to a reduction in wheat subsidies, but there is still a wide variety of types and product qualities. The overall market trend has been:

Tonnes (000)	1978	1979	1980	1981	1982
	410	400	480	390	300

Adria are the market leader, but Petybon (Hershey Foods), Pitar, Orion, Piraque, Nestle and Vulcania (Suntory) have significant participations. Together these companies account for about 50% of the total market; Adria as market leader has been particularly badly affected by the drop in sales.

4.2.2 Packaging

Originally most pasta products were packed in PE coated cellophane, but this is now down to only about 570 tonnes of film a year. The bulk is now packaged in cast polypropylene film; in 1982 PP film consumption was estimated to be 8,900 tonnes.

In addition, certain cheaper lines, accounting for 24% of sales, are sold in 220gm LDPE bags; approximately 428 million bags, consuming 1,318 tonnes of LDPE were used in 1982.

4.2.3 Outlook

Annual growth in the pasta market is now expected to average only 1% per annum; as a consequence, total consumption will be approximately 325,000 tonnes by 1990. But, this depends on whether the government re-introduces wheat subsidies. If these are re-introduced, growth will be faster.

It is likely that the 24% of pasta packed in cellophane will transfer to LDPE or PP depending on the market position of the product. Some top quality lines will change from cast to bioriented PP film to take advantage of the additional clarity of the material.

4.3 PULSES/BEANS

4.3.1 Production And Consumption

This is the other Brasilian staple, which together with rice makes the popular daily diet for a large part of the population.

There are a wide variety of different beans grown in Brasil, and there are some imports to supplement the national crop. Beans are dried before packaging and distribution.

In 1981, the total market was 2,338,000 tonnes, which grew to 2,907,000 tonnes in 1982. With continued economic austerity, more people will become dependent on beans as their principal food.

4.3.2 Packaging

Beans are mainly packed by supermarket chains, who often control stocks of basic food commodities as a hedge against inflation. About 70% of the total production is sold in consumer packs.

In 1982, the consumption of LDPE for beans packaging was 10,652 tonnes split;

1kg size	78%	1,586 million bags
2kg size	22%	223 million bags
Total	100%	1,809 million bags

4.3.3 Outlook

Because beans are central to the basic needs of Brasil's poorer people, the market is expected to expand in relation to the growth in population.

By 1990, the total tonnage of beans will, therefore, be in excess of 3,600,000 tonnes.

Packaging requirement, taking account of both the increased percentage of beans packed and the expansion of the total market, will be approximately 13,000 tonnes of LDPE. There is unlikely to be a substitution by other packaging forms, since LDPE is ideally suited to this product.

4.4 FLOUR

4.4.1 Production And Consumption

Wheat is grown only in the south of Brasil where the climate is more suitable, but not in sufficient quantities to supply the whole market, and approximately 60% has therefore to be imported.

There is also a 22% loss in the milling process to produce flour.

The total market for flour has developed as follows:

Tonnes (000)	1979	1980	1981	1982
	5100	4900	5070	4630

The market is dominated by the Bunge and Borne Group, which includes Moinho Santista, Moinho Fluminense and Grandes Moinhos, with over 60% of the market between them.

4.4.2 Packaging

Approximately 85% of flour is packed in woven polypropylene sacks for bakeries and industrial uses. In 1982, the consumption of these PP sacks was 79 million units, using an estimated 8,600 tonnes of PP.

The remaining 15% is packed in 1kg single-wall and 5kg multi-wall kraft paper bags for the consumer market. In 1982, 700,000 tonnes of flour were packed in consumer packs:

1kg	285 million	-	kraft bags
5kg	79 million	-	2 ply kraft bags
Total	364 million		

4.4.3 Outlook

Following the removal of wheat subsidies, the consumption of flour has fallen, and this trend is expected to continue into 1983 and 1984. Thereafter, the market is expected to recover, and by 1990 will have reached 4,600 tonnes again, the 1982 level.

Packaging methods for consumer sales are unlikely to change, paper being the ideal medium for small quantities of flour. For industrial purposes, since most bakeries are small, supplies will continue in the 50kg woven PP sacks, although there may be some substitution to multi-wall paper sacks as these become more available and therefore cheaper. To a limited extent, larger users will transfer to larger quantity deliveries using intermediate bulk containers, but it has not been possible to quantify this development.

4.5 CORNFLOUR AND BABY CEREALS

4.5.1 Production And Consumption

This market is stable at 70,000 tonnes, having grown 8% since 1978. The principal producers are Refinacoes de Milho (Corn Products), with their Maizena or Cornflour. Nestle have second place, and Quaker have a smaller share.

4.5.2 Packaging

The packaging for cornflour is currently split 60% in cartons and 40% in tinplate cans, and composite containers.

The consumption of cartons was estimated in 1982 to be:

100gm size	-	2 million units
200gm size	-	77 million units
500gm size	-	49 million units
Total		128 million units

This is equivalent to 4,100 tonnes of board.

The remainder of the cornflour and baby cereals is packed in lever-lid tinplate cans and composite containers.

4.5.3 Outlook

In the period to 1990 the market for these products is forecast to expand to 85,000 tonnes in total. There is no clear indication that the types of packaging will change to any significant extent.

4.6 CAKE MIX

4.6.1 Production And Consumption

In 1982, 27,000 tonnes of cake mixes were consumed in Brasil - 4% up on 1978 sales. The two principal companies are Moinho Santista and Sadia.

4.6.2 Packaging

All cake mixes are currently packed in folding cartons. In 1982 carton usage was estimated at 60 million units, equivalent to 1,300 tonnes of board.

4.6.3 Outlook

Market growth is forecast to be 3% per annum on average for the period to 1990. The bulk of these products will continue to be packaged in folding cartons, although for some less expensive lines, flexible forms will be used.

4.7 BREAD

4.7.1 Production And Consumption

Wrapped bread is a very small market in Brasil, accounting for only about 3% of total bread consumption. The bulk of bread is freshly baked daily and sold by thousands of small bakers.

The wrapped bread market is dominated by Pao Americano and Seven Boys, who have 90% of the market between them.

4.7.2 Packaging

The consumption of LDPE bags in 1982 is estimated at 165 million bags accounting for approximately 1,335 tonnes of LDPE.

4.7.3 Outlook

Wrapped bread sales in Brasil are expected to expand at approximately 2.5% per annum on average. On this basis, by 1990 over 200 million LDPE bags will be required, consuming 1,640 tonnes of LDPE.

4.8 BISCUITS

4.8.1 Production And Consumption

The biscuit market peaked at 260,000 tonnes in 1980, and had dropped to 250,000 tonnes by 1982.

The market is very fragmented; 15 substantial biscuit manufacturers were identified, but the principal companies are:

Confianca
Piraque
Pilar
M Dias Branco
Nestle

These account for 65% of the market.

4.8.2 Packaging

Packaging in this market is split:

PE Coated Cellophane Wraps	52%
Polyethylene Wraps	26%
Polypropylene Wraps	22%
Total	100%

Approximately 74% of biscuits are packed in 200gm coated cellophane or BOPP packs. BOPP is gradually taking over from coated cellophane. Currently, biscuit packaging consumes 5000 tonnes of cello/PE (but this is diminishing in favour of BOPP) and 2,150 tonnes of BOPP.

LDPE is used for cheaper products which represent 26% of the market. The consumption of LDPE in 1982 was 1,430 tonnes, equivalent to 130 million 500gm packs.

4.8.3 Outlook

This is reported to be a buoyant market and there is anticipated growth of 5% per annum on average for the outlook to 1990, reaching 370,000 tonnes.

In that period there will be a complete switch from cello/PE to BOPP for the bulk of the market. For less expensive, fast-moving products where shelf-life is not so critical, LDPE will continue to be used. It is possible that PVDC coated LDPE could be used to overcome problems of oxygen permeability and rancidity, but this would require a new technology in Brasil.

4.9 BREAKFAST CEREALS

4.9.1 Production And Consumption

The market peaked at 24,000 tonnes in 1980, and has since dropped by 10%. Breakfast cereals have never made much impact in Brasil despite the presence of Kelloggs, who are the market leader. Quaker also have a significant share.

4.9.2 Packaging

Breakfast cereals are mainly packaged in folding cartons with waxed paper bag liners. The consumption of cartons in 1982, when the market was down to about 21,600 tonnes, was 110 million units, equivalent to 5,800 tonnes tonnes of board.

4.9.3 Outlook

This market is expected to grow at about 5% per annum, reaching 37,000 tonnes by 1990. This will require 163 million cartons, using 8,600 tonnes of board.

SUGAR AND CHOCOLATE CONFECTIONERY

SECTION 5 SUGAR AND CHOCOLATE CONFECTIONERY

5.1 BOILED SWEETS/SUGAR CONFECTIONERY

5.1.1 Production And Consumption

This market is estimated at 250,000 tonnes in 1982 and is extremely fragmented.

Major manufacturers include Q Refresco, Confianca, Campineira and Bela Vista, but these only account for about 15% of the market.

5.1.2 Packaging

The bulk of these products are wrapped in PE coated cellophane. In 1982 it is estimated that 7,700 tonnes of PE/Cellophane were used for sweet wrappings.

5.1.3 Outlook

Very little growth is expected in this market. The packaging of sugar confectionery will probably be transferred to polypropylene film, which has greater strength and clarity than cellophane and is not so subject to humid conditions.

5.2 CHOCOLATE

5.2.1 Production And Consumption

The chocolate market was 60,000 tonnes in 1982 and is expected to drop by 5% in 1983.

The principal companies are Nestle, Lacta, Garota, Tobler and Neugebauer. Nestle and Lacta control 75% of the market between them.

5.2.2 Packaging

Most chocolate bars are wrapped in aluminium foil with a printed paper sleeve. In 1982 it is estimated that 920 tonnes of paper and aluminium foil were used for packaging chocolate.

In addition a further 24 tonnes of polyester film were used for chocolate packaging, and 56 tonnes for Easter Eggs. Much of this PE film is metallised for enhanced product promotion.

5.2.3 Outlook

This market is expected to recover in 1984 and grow by an average of 3% per annum thereafter. Methods of chocolate packaging are not likely to change significantly. However there will be an increase in the usage of metallised films and paper, and pearlised films which give the product more sales impact.

5.3 CHEWING GUM

5.3.1 Production And Consumption

The chewing gum market, currently 30,000 tonnes, has dropped by 14% since 1979.

The market is divided between Kibon (General Foods), Warner Lambert, and Q. Refresco. Kibon and Q. Refresco have 65% of the total, and Warner Lambert the remainder.

5.3.2 Packaging

Kibon and Q. Refresco use varnished paper, and Warner Lambert pack in small folding cartons which they make themselves.

In 1982, the consumption of packaging was:

Varnished Paper	640 tonnes
Cartons	500 tonnes

5.3.3 Outlook

This market is forecast to grow by 3% per annum in the period to 1990. In that time, the carton packs will be phased out in favour of flexible materials, which are cheaper and more versatile.

OTHER FOODS

SECTION 6 OTHER FOODS

6.1 VEGETABLE OIL

6.1.1 Production And Consumption

The vegetable oil market is dominated by soya oil with 95% of the market; corn oil represents only 3%. There is considerable excess crushing capacity. Oil is considered to be a by-product of the crushing process as meal represents 60% of soya bean crushing output. Oil is only marginally profitable to the crushers, and many companies enter or leave the market depending on price.

The total market output for vegetable oil has shown the following trend:

Million Litres	1978	1979	1980	1981	1982
	1040	1090	1140	1200	1200

There are over 100 companies operating in this market, but the principal producers are, Cargill, Olvebra, Sanbra, with over 30% of the market between them.

6.1.2 Packaging

The standard pack for soya oil is the 900ml round tinplate can; 900ml rectangular cans are used for corn and sunflower oil; 500ml cans are used for olive oil.

In 1982, vegetable oil packaging was as follows:

Soya Oil	900ml size	1073 million cans
Corn Oil/Sunflower Oil	900ml size	40 million cans
Olive Oil	500ml size	48 million cans
Soya Oil	18 litres	10 million cans
Total		1171 million cans

All oil used to be packed in the rectangular cans, but the bulk oil - soya - is now in round cans, leaving only the premium vegetable oils in the rectangular containers.

6.1.3 Outlook

The total market for vegetable oils is forecast to grow at 3% per annum on average, reaching 1,520 million litres by 1990.

This is however, a product area where there is considerable scope for packaging innovation. The tinplate can is relatively expensive, and despite the recent availability of lighter grades of plate will remain so. During the period to 1990 there will be a considerable impact from plastic forms of oil packaging. In the first instance PVC bottles will be used, owing to the ready availability of PVC in Brasil, and later on in the forecast period there will be the introduction of PET bottles. There are experiments involving various other packaging forms being conducted in order to make oil - an essential commodity - less expensive for poorer people. One basic pack type would be the LDPE pouch, but there would be problems of pack integrity in the distribution chain, and rancidity owing to the oxygen permeability of LDPE film. Given the present filling lines, it would be more economical to transfer to a bottling system than to a flexible pouch system. In addition, both PVC and PET have high levels of clarity which enhances the product presentation.

6.2 COFFEE

6.2.1 Production And Consumption

Consumption of coffee is virtually static at 438,000 tonnes in 1982, up 1% from 1981. 20% of coffee by weight is lost in the roasting process and 3% goes for soluble coffee.

6.2.2 Packaging

The bulk of coffee is packaged as follows:

Prepacked (compensated vacuum)	65%
Ground at point of sale	30%
Vacuum packed	5%

Coffee is packed in 250 and 500gm packs. Consumption of packs in 1982 was:

	Million Packs		Tonnes Of
	250gm	500gm	Coffee
Compensated vacuum	299	278	213,750
Ground at point of sale	158	118	98,500
Vacuum packed	30	18	16,500

The coffee ground at point of sale is for the most part packed in coated paper bags, using 3,050 tonnes of material in 1982.

Vacuum packed coffee uses 440 tonnes of polyester coated aluminium foil for primary packaging; these are then packed in folding cartons and in 1982, 48 million cartons were used, equivalent to 1,000 tonnes of board.

The remaining 65% of coffee is packed in a variety of flexible forms. PE coated cellophane is used for much of this coffee -in 1982 around 2,050 tonnes were used. However,bioriented polypropylene film is gaining ground, and it is estimated that BOPP accounts for 35% of the compensated vacuum packs, equivalent to 1,090 tonnes of material.

About 3% of the total coffee market, or 10,000 tonnes of roasted coffee, is made into soluble coffee. This market has been static since 1980 and will probably grow only slowly.

Nestle dominate the soluble coffee market with 90% share, and Cacique, the major exporter of soluble coffee, has the remainder.

Soluble coffee exports accounted for 42,000 tonnes in 1982 but these were bulk packed in 20kg polyethylene bags.

Soluble coffee for the internal market is packed in glass jars:

50gm	37 million units
100gm	28 million units
200gm	23 million units

6.2.3 Outlook

The market for coffee is forecast to grow 4-5% on average from 1984 onwards reaching more than 620,000 tonnes by 1990.

During this forecast period, cellophane/PE packs will give way almost

entirely to a PET/metallised/PE material. Ground coffee has to be protected against the absorption of moisture, and the oxidation of essential oils; the high light reflectance and excellent WVTR of metallised PE allows much longer shelf-life and hence wider distribution.

6.3 SUGAR

6.3.1 Production And Consumption

Sugar is a major agricultural product in Brasil; in 1982 184 million tonnes of sugar cane were grown, yielding 8 million tonnes of sugar. Of this total, 2.5 million tonnes were exported leaving 5.5 million tonnes for the domestic market, split as follows:

Refined (consumer packs)	36%
Crystallised (consumer packs)	23%
Crystallised (industrial)	41%

The market is dominated by the Copersucar-Uniao Cooperative. Copersucar is the producer and Uniao the refiner. Sales by this combine are restricted to the South and South East, but this represents 80% of national sugar sales. Other producers include Perola, Guarany, De Barra, Docula, Diana and Alvinho.

6.3.2 Packaging

Sugar exports are mainly packaged in cotton or PE lined jute sacks. It is estimated that 50% of exports were in jute, resulting in an LDPE consumption of 2,500 tonnes of sack liners in 1982.

The crystallised sugar for industrial markets is packed in 30kg sacks, 20% of these are made from LDPE; 15 million units in 1982 accounting for 3,000

tonne of LDPE.

The remainder of the industrial market is packed in 60 million multi-wall paper sacks (2-ply), using 12,000 tonnes of kraft.

Consumer packaging for sugar is as follows:

Refined Sugar (approximately 2 million tonnes)

1 kg size	-	50%	1000 million single wall kraft bags
2 kg size	-	8%	80 million single wall kraft bags
5 kg size	-	42%	168 million two-ply kraft bags
Total		100%	1248 million units

These markets used about 18,000 tonnes of kraft papers for bags in 1982.

Crystallised Sugar (1.25 million tonnes)

LDPE (75%)			
2 kg	-	64%	300 million bags
5 kg	-	36%	67 million bags

Total LDPE consumption was 4,774 tonnes in 1982.

Kraft Bags (25%)			
5 kg	-	100%	62 million two-ply bags

Kraft paper consumption was approximately 2,300 tonnes in 1982.

6.3.3 Outlook

In the period to 1990 domestic sugar consumption is forecast to grow to over 8 million tonnes, an average of 5% per annum. It is unlikely that there will be any significant change in the types of packaging used for sugar in this period.

6.4 SALT

6.4.1 Production And Consumption

Brasil is a major producer of solar salt in salt pans, "salinas", in the north-east of the country. In 1980, over 3 million tonnes were produced.

The market for human consumption was 400,000 tonnes in 1982, and this has been growing at 2% annually.

Cisne accounts for 50% of the market and five other companies a further 20%.

6.4.2 Packaging

Of the salt for human consumption, around 50% is used in industrial food processing and is packed in 30kg multi-wall kraft paper sacks.

In 1982 consumption of sacks was approximately 7 million, using 1,000 tonnes of kraft paper.

For consumer packaging, the bulk of salt is packed in 1kg LDPE bags, and 196 million bags, consuming 1,013 tonnes of LDPE were used in 1982.

6.4.3 Outlook

By 1990 the market for salt is forecast to grow to 476,000 tonnes. No significant change in packaging methods is expected.

DRINKS AND BEVERAGES

SECTION 7 DRINKS AND BEVERAGES

7.1 BEER

7.1.1 Production And Consumption

The beer market has been stable since 1980, at 2,900 million litres.

The market is dominated by two major brewers Brahma and Antartica, with 98 of the market between them. Cerpasa and Inglesinha (Coca Cola) have a very small participation, Cerpasa being located in the South.

Both Brahma and Antartica are national, with a distribution system covering all of Brasil. Brahma is Rio based and hence stronger there, and Antartica is Sao Paulo based, where it is market leader.

The bulk of beer is consumed in bars, with supermarkets accounting for only 10% of sales. However, the bars for the most part sell bottled beers, only 7% of the total market is draught.

7.1.2 Packaging

The principal packaging for beer in Brasil are 300ml and 600ml returnable amber glass bottles.

The breakdown of consumption for 1982 was as follows:

	Million Litres	Million Units
Total Beer Sales	2900	-
Draught Beer	205	-
Bottled & Canned Beer	2695	-
of which: 600ml bottle	1887	3146
300ml bottle	741	2472
350ml can	67	193

The bottles do an average of 10 trips, and the generally accepted rate of replacement is 4% per annum. Bottle demand each year is therefore approximately:

600ml bottles - 126 million units
300ml bottles - 99 million units

Historically, beer or bottles have been in short supply during the summer period, when sales peak. The situation has recently improved partly due to increased brewing and glass bottle making capacity, and partly due to recession. No overall growth is expected in 1983 although there may be some changes in market share as new products are launched.

In Brasil there is also a very high premium on glass bottles, which relates back to a period of intense shortage, to the extent that bottled beer was then imported in order to obtain more bottles. The stock of bottles are largely owned by the distributors and retailers who must return empty bottles in order to secure supplies of filled bottles. In addition there is a deposit charge, which is refundable, when buying bottled beer at supermarkets.

A significant, but uncountable, number of beer bottles are lost to the aguardente market (see later section) hence the need for a close control on the return of empties.

As an experiment, Brahma recently launched a non-returnable bottle for beer, but it is too soon to evaluate its success.

All returnable beer bottles are closed with plastic lined tinplate crown corks.

Beer in cans was originally launched by Skol, now part of Brahma who also have their own brands in cans. Antartica also recently launched beer in cans.

Canned beer has not made much impact (2.5% of non-draught beer sales), due to the high cost of the can - a 350ml can of beer costs as much in total as a 600ml bottle. The cans are traditional 3-piece with an easy-open aluminium end. There have been difficulties in the past with supplies of suitable tinplate, but since the beginning of 1983 when CSN (the state steel combine) commissioned a double reduction line, there is now ample capacity for the market.

7.1.3 Outlook

After the present lull in demand, beer consumption is forecast to start rising again during 1984 and should reach 3,740 million litres by 1990.

In this period, many changes are expected to take place in the distribution system. There will be no new companies established, but Inglesinha will undoubtedly gain market share at the expense of the major brewers due to Coca Cola's nationwide distribution system.

The proportion of beer in draught will increase to approximately 15%.

For bottled beer, there are likely to be further experiments with non-returnable bottles, including plastic-coated types. However the principal innovation will be the introduction of the PET bottle. Now well established in many countries, this new material has sufficient superiority of performance to overcome the conservatism of the brewing industry. Whilst returnable bottles will continue to be used in restaurants and bars, the 10% of sales through supermarkets will, by 1990, be largely transferred to PET. Even if sales through supermarkets remain static at 10% of the total, this will mean over 350 million litres of beer in PET bottles by 1990.

Another innovation which could substantially alter relative packaging costs is the 2-piece can in either aluminium or tinplate. Either of these will put the can on a more competitive basis with glass and, being non-returnable, will increase the percentage of beer being sold from supermarkets.

7.2 WINES

7.2.1 Production And Consumption

The Brasilian wine harvest has continued to expand over the years and the quality has improved considerably to the point where Brasil is now exporting wine to Europe.

The total production of wine has been:

Million Litres	1980	1981	1982
	180.1	177.1	217.0

The principal wine producers and their market shares are:

Companhia Vinicola Aurora	10%
Garibaldi	5%
Vinicola Riograndanse	2%

These three producers account for 64% of the quality wine market. In addition, there are several multinational companies operating in the top quality market including; Martini, Henblein, Seagram and Cinzano, but none of these produces significant quantities in relation to the total market.

7.2.2 Packaging

Wine is packaged, according to quality in various capacity glass bottles as follows:

Million Litres	1980	1981	1982
720ml bottles	45.0	42.0	47.0
1 litre bottles	83.0	87.0	105.0
2 litre bottles	7.2	6.8	9.0
3 litre flagons	8.4	7.8	10.5
5 litre flagons	36.5	33.5	45.5
Total	180.1	177.1	217.0

The better quality wines are usually bottled in 720ml bottles in Rio Grande do Sul, and about 60% of them can be considered as top quality.

Other wines, of not such good quality, are usually sent in bulk or barrels to the major consuming markets where they are filled in 1 litre bottles.

The 2, 3 and 5 litre flagons, or "garrafoes", of popular wines are mainly filled by the producers.

The 1 litre bottles are recycled through door-to-door collection by bottle merchants or "garrafeiros", who resell through middle men to the popular wine bottlers. It is estimated that 50% of these bottles have to be replaced each year. The 720ml bottles are filled new and are not re-used for quality wines.

The flagons have a plastic "straw" cover and are returnable, but it has not been possible to estimate the annual replacement.

The estimated consumption of wine bottles is:

720ml	65 million units
1 litre	52 million units

In addition some quality bottles wines and spirits are packed in folding carton outers for special promotions and Christmas sales. Consumption of cartons for quality wines and spirits in 1982 was 30 million units, equivalent to 1,600 tonnes of board. However, it has not been possible to split this carton usage between wines and spirits

The majority of wine bottles are closed with corks but these are increasingly being replaced by plastics closures and overseals for popular wines.

7.2.3 Outlook

The growth trend in production of wines is expected to be nearly 5% per annum on average in the period to 1990, giving total output that year of 315 million litres.

Breakdown of packaging is forecast to be as follows:

720ml	bottles	85	(million litres)
1 litre	bottles	158	
2 litres	bottles	16	
3 litres	bottles	16	
5 litres	bottles	40	
Total		315	

The estimated consumption of wine bottles will be:

720ml	118 million units
1 litre	158 million units

There will be considerable emphasis on the upgrading of wines to produce quality products suitable for export, hence the relative increase in smaller sizes.

The principal packaging innovation here will be the introduction of the 3 litre bag-in-box packaging system for the middle range wines for domestic consumption. By 1990, it is estimated that 20 million units of bag-in-box will be used for wine packaging in Brasil.

7.3 SPIRITS

7.3.1 Production And Consumption

For the purpose of this report, spirits have been taken to include whisky, liquers, rum, vodka, gin and vermouths, because the sales and distribution system is similar for all of them. The principal spirit in Brasil - aguardente - is discussed in the following section.

In total, the spirits market has stabilised due to relatively high prices compared with alternatives such as aguardente.

Sales of spirits in 1981 and 1982 were:

(Cases x 12 x 1 litre bottles)	1981	1982
Whisky	2500	2500
Rum	1100	1000
Vodka	650	750
Gin	110	110
Vermouth	5500	5000
Licquers	80	110
Total	9940	9470

The spirits market is dominated by multi-national companies. Heublein dominate the whisky and vodka markets, while Seagram and Bacardi control the rum market. Stock and Cinzano have 65% of the gin market, and Cinzano and Martini share the vermouth market. There are a number of cheap imitations, particularly in the vermouth market.

7.3.2 Packaging

Except for promotions and a limited amount of 1½ litres, the bulk of these products are packed in one litre glass bottles of various shapes and colours according to brand.

The consumption of bottles for spirits in 1982 was:

1 litre bottles - 113 million

Some promotions and Christmas packs use folding cartons and, in 1982, 30 million cartons were used for quality wines and spirits.

The majority of spirits bottled are sealed with roll-on tamper-evident closures.

7.3.3 Outlook

The market for spirits is expected to grow only slowly at up to 2% per annum on average to 1990, when the total market will be 10,600 cases of twelve bottles. The growth of the various products will be mixed; for example gin and rum are in relative decline while vodka is an expanding market.

In total, it is forecast that 127 million 1 litre bottles will be required for spirits in 1990.

7.4 AGUARDENTE

7.4.1 Production And Consumption

Aguardente, also known as cachaca or pinga, is a traditional Brasilian alcoholic drink distilled from sugar cane. It is normally drunk neat in bars or served mixed with fruit juices in politer society.

Owing to the large number of producers and the lack of excise control over sales, the total market can only be estimated. However the concensus opinion regarding 1982 sales was:

Bulk	220	million litres
Bottled	1280	million litres
Total	1500	million litres
Duty Paid	960	million litres

The implication is that up to 30% of sales evade duty payments.

There are allegedly 30,000 producers, of whom the principal are:

Tatuzinho	13%
Pitu	6%
Pirassununga	4%

Tatuzinho and Pirassununga have 30% of the quality market between them.

7.4.2 Packaging

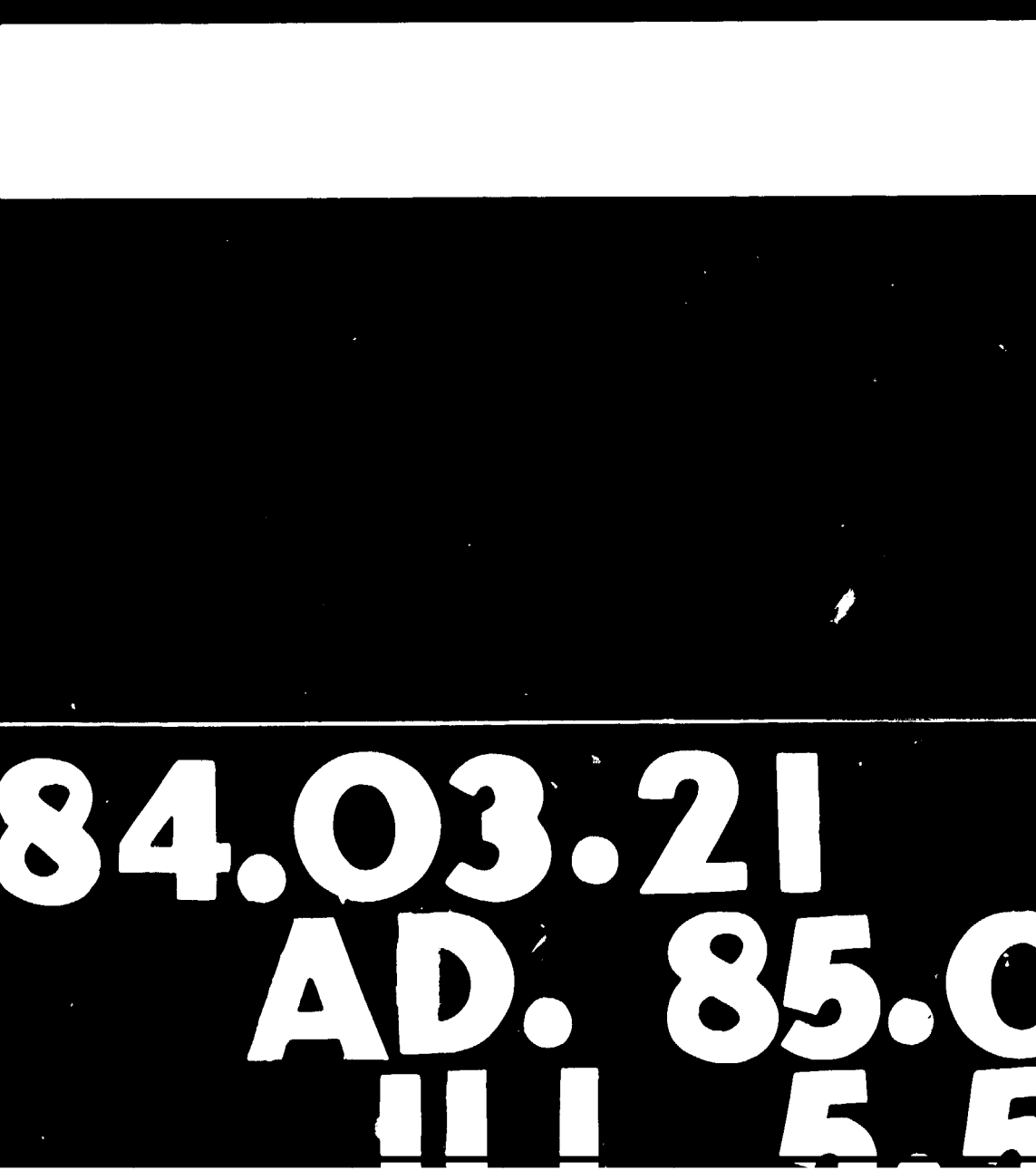
The market for bottled aguardente is divided into two segments: quality, which is bottled in 930ml or 1 litre bottles and normally has duty paid on it, and 'popular' which is bottled in 600ml bottles similar, but inferior to beer bottles. This is a returnable bottle market although part of the replacement 600ml bottles come from the beer market. The 600ml bottles are closed with tinplate crown corks, other bottles have roll-on aluminium closures.

The 1 litre bottles are also returnable due to the high proportion of sales through bars, which facilitates their collection for re-use.

The sales of bottled aguardente in 1982 were split as follows:

600ml	75%	-	1,600 million units
930ml/1 litre	25%	-	320 million units

The rate of replacement for 600ml bottles is 2%, which is kept low by the diversion of bottles from the beer market. For the 930ml/1 litre bottle the replacement rate is estimated at 20%.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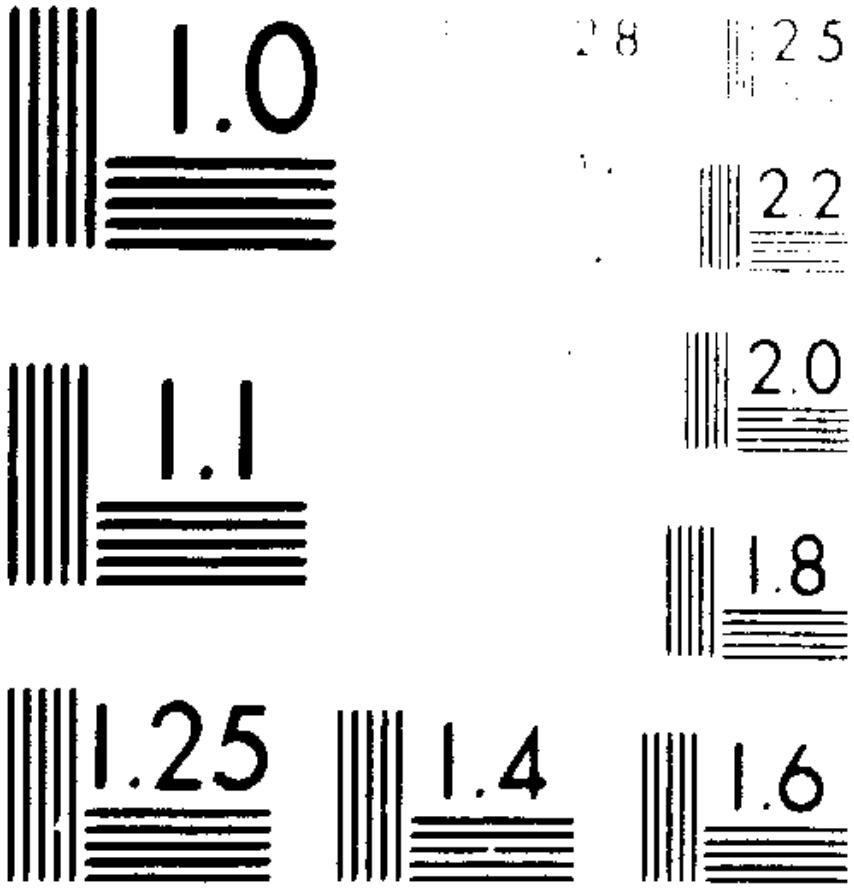
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The demand for bottles in 1982 was:

600ml	32 million units
930ml/1 litre	68 million units

7.4.3 Outlook

The market for aguardente is growing very rapidly at between 5% and 6% per annum, and this is expected to continue to 1990. There are not expected to be any developments in the packaging of aguardente.

7.5 MINERAL WATER

7.5.1 Production And Consumption

The total market for mineral water has been:

Million Litres	1978	1980	1981	1982
	314	418	398	324

The principal companies are Minalba (Nestle), Petropolis (Perrier), Poa and Lindoya, and together they account for 75% of the market.

7.5.2 Packaging

Mineral water is traditionally bottled in 500ml re-used fruit juice bottles, which still account for 46% of sales (by volume of water). These are still used for aerated mineral water and are closed with crown caps.

However mineral water in PVC bottles was introducted some years ago by Minalba, who installed a Sidel bottle blower at the source in Campos de Jordao. Others followed suit, including Petropolis, Poa and some of the Lindoya sources.

The PVC bottle was a great success and reached 190 million litres in 1980 or 45% of total sales. These bottles are sealed with a tamper-evident plastic closure.

The consumption of PVC bottles in 1982 was 100 million units, equivalent to 5,200 tonnes.

The remaining 9% of mineral water is packed in 200ml polystyrene cups with coated aluminium foil lids. Sales peaked at 150 million pots in 1981 and dropped to 120 million in 1982. There is a tendency to replace polystyrene with polypropylene due to the disagreeable taste which PS gives to water. The mineral water bottlers do make some of their own pots, but the majority are bought in. 1982 consumption of PS was 920 tonnes.

7.5.3 Outlook

Mineral water is another buoyant market which is expected to grow at an average of over 5% per annum up to 1990.

During this period the major immediate change in packaging will be the complete substitution of PS by PP for cups. In the longer term, glass bottles will give way to plastics, despite the availability of second-hand fruit juice bottles. Bottled fruit juice is an expanding market so bottles will be available. However, the water bottlers will wish to present their product in a more attractive way.

In the longer term it is forecast that PVC will give way to PET for much mineral water bottling. The glass replacement plastic bottles will probably be PVDC coated PET in order to retain the aeration in the water.

7.6 CARBONATED BEVERAGES

7.6.1 Production And Consumption

Sales of carbonated beverages have been adversely affected by the recession, and the trend in the total market has been:

Million Litres	1980	1981	1982
	4000	3600	3500

The market is dominated by Coca Cola with over 50% of the market. Antartica is the leader with "guarana" - a Brasilian tropical fruit drink - which accounts for 37% of sales compared with 4% for colas.

Coca Cola and Pepsi Cola work mainly through franchises and have a better control over sales compared with Brahma and Antartica who work entirely through independent distributors.

Coca Cola have the strongest national coverage while Antartica and Brahma are most established in Sao Paulo and Rio de Janeiro respectively. Pepsi Cola has made substantial gains in Rio Grande do Sul, but little more than 5% elsewhere.

Sales are mainly through bars and corner bakers shops with supermarkets accounting for 15% of the total.

7.6.2 Packaging

The breakdown of the total carbonated beverage market is as follows:

Million Litres	1980	1981	1982
Post Mix	300	500	700
Bottles Or Canned	3700	3100	2800
Total	9000	3600	3500

The fastest growing market is the postmix semi-bulk system. Currently, stainless steel cannisters of concentrate are distributed to bars and restaurants for dispensing in mixer/chiller cabinets. The convenience and economy of this method over the traditional returnable bottles has speeded its introduction. Coca Cola have the largest part of the post mix market.

The traditional pack for carbonated beverages is the returnable glass bottle. In 1982 the split of sales by size was:

		Million Litres	Million Units
290ml bottles	57%	1596	5503
1 litre bottles	40.7%	1140	1140

(The balance of 2.3% is packaged in cans).

Coca Cola use much stronger bottles than other companies and replace at 1%; the rest replace at 4%. Factory breakages account for 1%, the remaining 3% are "lost" or broken in the distribution chain, or sold to customers as initial or increased stocks. The aggregate replacement rate is estimated at 3% and the consumption of new bottles in 1982 was:

290ml	165 million units
1 litre	34 million units

Coca Cola and Pepsi Cola both use branded bottles and Brahma has almost entirely changed to them. Antartica is in the process of changing. The principal advantage of branded bottles is that they do not require re-labelling at each filling.

There is also a large number of small local carbonated beverage manufacturers, not covered by the national statistics, who have very small market shares. These producers almost all use reclaimed 600ml beer bottles.

One remarkable point about this market is the very high trippage rates:

290ml - 20-30 trips
1 litre - 10 trips

This together with the very slow rate of rotation (up to 20:1 in the interior compared with 5:1 in Sao Paulo), has made the bottlers very cautious about non-returnable packaging, since it is the distribution chain which accounts for the bulk of the existing investment in bottles, and not the bottlers themselves.

These 290ml and 1 litre glass bottles are currently all closed with plastic-lined tinplate crown corks.

Carbonated beverages in cans like canned beers have not made much impact in Brasil, mainly because of the relatively high cost of the can to the product. Returnable glass appears to be a much cheaper form of packaging at present, due to the high trippage rates. Originally launched by Skol, now part of Brahma, carbonated beverages are marketed by both Brahma and Antartica. Coca Cola recently installed a canning line at their plant in Rio de Janeiro.

However, none of these products has performed very well, and canned carbonated beverages account for only 2.3% of total bottled and canned sales.

7.6.3 Outlook

The total market will start to grow again after 1983, but at a slower rate; nevertheless, by 1990 consumption will have exceeded 4,500 million litres.

Of this total, post mix will take a much larger percentage as more bars and restaurants install the dispensing system and eliminate the returnable bottle. By 1990, 1,750 million litres could be handled in this way.

For consumer packaging of carbonated beverages, there are similar opportunities for innovation as there are with beer. In the forecast period a substantial quantity of these products will transfer to 2-piece aluminium or tinplate cans with easy-open ends, and to PET bottles.

7.7 FRUIT JUICES

7.7.1 Production And Consumption

This section deals with tropical fruit, and excludes orange juice, which is discussed in the following section. Passion fruit or "maracuja" is the most popular, but other fruit juices include pineapple and grape juice.

The market has shown a trend as follows:

Million Litres	1978	1981	1982
	38	32.5	34.5

The market leader is Maguary with a 75% share; other producers include Jandala and Cica.

7.7.2 Packaging

The standard form of packaging is the 500ml clear glass bottle, closed with a crown closure. Although officially this package is non-returnable, it is re-used for mineral water in Brasil. The mineral water bottlers thus have a cheap source of bottles. Consumption of bottles for fruit juice was 69 million units in 1982.

7.7.3 Outlook

The growth in this market is expected to be 4% per annum on average in the period to 1990, requiring almost 95 million bottles in that year, if there is no substitution. However it is likely that a considerable portion of the fruit juice market will be transferred to liquid cartons containers of the Tetrapak variety. By 1990 it is estimated that 300 million cartons will be used for fruit juices in Brasil.

7.8 ORANGE JUICE

7.8.1 Production And Consumption

The large scale production of oranges in Brasil is only relatively recent, and projections for internal demand are uncertain. The predominant state is Sao Paulo, and the number of new orange bushes increases by 7% per annum. There are real problems of over-production, to the extent that a substantial portion of the crop is given away to schools by Cobal (a Government agency) as part of the food distribution efforts, or sold at a cost to bulk distribution sites.

Orange juice as a packaged product is not common in Brasil, since most families buy oranges and make their own. However there is a considerable and growing export to the UK and Western Europe of orange juice in bulk.

7.8.2 Packaging

For export, 75% orange juice is packed in 200 litre steel drums with a heavy duty LDPE film liner. In 1982 approximately 1.5 million of these drums were used for the export of orange juice.

Packaging for the consumer is in Tetrapaks; using approximately 200 million units in 1982.

7.8.3 Outlook

The export of fruit juices and orange juice in particular is a success story for Brasilian agriculture particularly since this product has not proved very susceptible to the recession. Markets in US and Western Europe have continued to expand during recent years, with a decline in 1982.

The future for this product will depend on the development of new markets, for example in the Middle East and South East Asia. In addition, the maximisation of existing markets should be pursued through the development of adequate packaging in Brasil, rather than exporting in bulk. Orange juice could be exported to a greater extent in consumer packs eg. glass jars with screw lids, tinplate containers, or ultimately in liquid cartons. Any of these approaches would add value to what is presently a basic agricultural commodity export.

Currently, exports are approximately 530 thousand tonnes. By 1990, this is expected to be approaching 850 thousand tonnes.

7.9 POWDERED DRINKS

7.9.1 Production And Consumption

This market is divided into two qualities:

Koolaid	36%
Tang	64%

The market is shared by Kibon (General Foods) and Q. Refresco who have now formed a joint company to produce and market the powder although retaining the different brands. The total market in 1982 was 630 million packs.

7.9.2 Packaging

Koolaid uses a simpler form of packaging although basically all powdered drinks are packed in aluminium/paper/PE laminates; the different qualities of product requiring different specifications of constituent materials.

In 1982, approximately 1,200 tonnes of laminate were used for powdered drinks sachets.

The principal suppliers of these packaging laminates are Toga, Empax and Panbrasil.

7.9.3 Outlook

These products have made a surprising impact on the market in Brasil, considering the ready availability of fresh fruit drinks. However currently the market is reported to be static and only low growth, in the 2-3% range is expected in the forecast period. There is not likely to be any change in the packaging materials used.

PART TWO

PACKAGING MATERIALS PRODUCTION AND CONVERSION

PLASTICS

SECTION I PLASTICS

1.1 INTRODUCTION

Until the mid seventies the plastics industry in Brasil was essentially privately owned but, with the advent of the government's decentralisation plan, and the construction of the northern petrochemical pole in Bahia, companies with mixed foreign, state and private national capital were formed - usually approximately one third each. This enabled Brasil to take advantage of foreign technology while retaining control over the projects. A similar structure was used for the southern pole in Rio Grande do Sul.

Companies which set up before this policy was adopted, such as Dow, Monsanto and Electrocloro (Solvay) were not affected by the change.

The principal polymers now used for packaging are:

low density polyethylene
high density polyethylene
polystyrene
polyvinyl chloride
polypropylene
polyester

These are discussed separately in the following sections.

1.2 LOW DENSITY POLYETHYLENE (LDPE)

LDPE was in short supply in Brasil until 1981 when increased installed capacity coincided with the recession creating an excess of supply over demand. This situation stabilised in 1982 but with the new petrochemical pole starting up in Rio Grande do Sul in 1983 excess capacity will probably reach 120,000 tonnes.

Brasil is one of the few countries to manufacture LDPE starting from ethyl alcohol and Union Carbide reactivated their 40,000 tonne alcohol plant in 1981 to cope with the anticipated shortage until the southern pole came on stream.

- **Raw Material Supply - LDPE**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal capacity	168	268	268	312	312
Production	218	290	307	324	345
Imports	32	11	32	12	3
Exports	6	5	9	66	50
Apparent consumption	244	296	330	270	298

Considerable destocking took place in 1981 and thus actual consumption was probably higher than apparent consumption.

- **Market Share 1982**

The three suppliers of LDPE granules in Brasil are:

Poliolefinas (National Distillers)	33%
Politeno (Sumitomo)	33%
Union Carbide	33%

Both Poliolefinas and Union Carbide have plants in Sao Paulo while Politeno's plant is in the northern petrochemical pole in Bahia. Poliolefinas commissioned a new 115,000 tonne plant in the southern pole in early 1983 and Petroquimica Triumfo will start up a 100,000 tonne plant in 1984.

- **Breakdown Of Consumption For Packaging**

It is estimated that 74% of total LDPE is used for packaging, representing almost 220,000 tonnes in 1982.

The principal applications for LDPE in the packaging industry are:

Extruded films	75%
Blowmoulded bottles	11%
Injection moulded closures	9%
Extrusion coating	2%
Other	3%

Of these, Extruded films is the only sector of relevance to food packaging; the remaining applications cover non-food packaging of such items as deodorants, toothpaste tube caps, etc.

- **Conversion**

There are a very large number of converters of LDPE film but the major companies are

Itap	10%
Electro Plastic	5%
Polifilm	3%
Edea	3%

- **Packaging End-Use Markets - LDPE - Films**

PACKAGING FILMS CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Milk Pouches	14300	18330	+ 6½	33300	+ 7½
Poultry Bags	920	2130	+23	4000	+ 8
Sugar Bags	3340	4770	+ 9	7060	+ 5
Pasta Bags	1810	1320	- 7½	1410	+ 1
Rice Bags	13730	15250	+ 2½	18520	+ 2½
Bean Bags	8520	10650	+ 5½	13000	+ 2½
Salt Bags	920	1010	+ 2½	1200	+ 2
Biscuit Wraps	1490	1430	- 1	2120	+ 5
Bread Wraps	1180	1340	+ 3	1640	+ 2½
Other Wrapping Films	14700	21000	+ 9	40450	+ 8½
Industrial Sacks (sugar)	1700	3000	+15	4500	+ 5
TOTAL	62610	80230	+ 6½	127200	+ 6
Non-Food					
All Applications	64150	84680	+ 7	140200	+ 6½
OVERALL PACKAGING TOTAL	126760	164910	+ 7	267400	+ 6

- **Trends In Demand For LDPE Food Packaging**

No miracles can be expected from this market. Many of the products which are packed in LDPE are basic necessities and will grow as a function of urban growth (3.8% per annum on average over the past 10 years) with a few exceptions, such as poultry, where exports are important.

1.3 HIGH DENSITY POLYETHYLENE - (HDPE)

HDPE was in short supply in Brasil until 1979 when Polialden commissioned its plant in the northern petrochemical pole in Bahia. Production and demand reached equilibrium in 1980 but with the onset of the recession in 1981, 25.1% of production was exported.

• Raw Material Supply - HDPE

(tonnes 000)	1978	1979	1980	1981	1982
Nominal capacity	50	110	110	120	120
Production	53	119	129	114	135
Imports	24	18	4	2	3
Exports	-	2	9	27	27
Apparent consumption	77	135	124	89	111

Polisul (Hoechst), a 60,000 tonne plant, is planned to start up in the southern petrochemical pole in 1984.

• Market Share In 1982

The two suppliers of HDPE in Brasil are:

Polialden (Mitsubishi)	60%
Electrocloro (Solvay)	40%

• Breakdown Of Consumption For Packaging

In 1982, 27% of HDPE consumption went for packaging applications, accounting for nearly 30,000 tonnes.

The principal applications for HDPE in the packaging industry are:

injection moulding	- crates	31%
	- thin walled containers	29%
extrusion	- woven (rafia)	21%
blowmoulding	- bottles)	
	- drums)	19%

Of the total, 7850 tonnes were utilised for food packaging; the bulk of the remaining HDPE is used in blow-moulded bottles for liquid cleaners, fabric softeners and other household materials, blown drums for chemicals and injection moulded crates.

- **Conversion**

The principal manufacturer of thin walled containers is Brasholanda who consumes approximately 2,000 tonnes of HDPE annually. It is mainly used for yoghourt and individual jam portions but a considerable quantity must go for disposables and non-packaging items.

Open weave rafia sacks for fruit and vegetables are produced by Fitesa, Jauense and Susuki.

- **Packaging End-Use Markets - HDPE**

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Thin-Walled Containers	1050	1500	+ 9	2100	+ 4½
Rafia Sacks	3860	4200	+ 2	5660	+ 4
Other Wrappings/Bags	1250	2150	+14½	7500	+17
TOTAL	6160	7850	+ 6	15260	+ 8½
Non-Food					
All Applications	17960	22120	+ 5	25830	+ 2
TOTAL PACKAGING TOTAL	24120	29970	+ 5½	41090	+ 4

- **Trends In Demand For HDPE Food Packaging**

Although yoghourt production will grow at 5% annually, this will mainly benefit thermoformed PS containers, which are cheaper than injection moulded HDPE thin-walled containers.

Woven Rafia Sacks will probably grow as a function of urban growth.

There will be rapid development in use of low molecular weight HDPE films for bags and wrappings, which will be very price competitive with traditional paper-based packaging for fresh meat, fish, fruit and vegetables. By 1990 this will be the most important food packaging for HDPE.

1.4 POLYSTYRENE (PS)

Styrene monomer is produced by Companhia Brasileira de Estireno (CBE), controlled by Monsanto, EDN and Petroflex.

Styrene monomer production has developed as follows:

(Tonnes 000)	1978	1979	1980	1981	1982
	145	198	193	187	203

Styrene was imported in large quantities until 1978 when EDN commissioned their 100,000 tonne plant in Bahia. Brasil is now self sufficient in styrene monomer and exported 26,000 tonnes in 1982.

Up until 1979, PS was produced by Dow and Monsanto. Estireno do Nordeste (EDN) commissioned their 45,000 tonne plant in the northern petrochemical pole in Bahia in 1979 and Proquigel also commenced production.

In 1981, Monsanto commissioned a new 16,000 tonne plant in Sao Jose dos Campos, but deactivated the old Koppers plant in Sao Bernardo.

- **Raw Material Supply - PS**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal capacity	132	189	192	189	189
Production	96	133	124	99	97
Imports	-	1	1	2	2
Exports	2	4	5	12	11
Apparent consumption	94	130	120	89	88
Expanded PS	n/a	n/a	n/a	4	3
High Impact PS	81	n/a	n/a	85	85

- **Market Share 1982**

The five suppliers of PS in Brasil are:

Monsanto	-	32%
Dow	-	28%
EDN	-	27%
Proquigel	-	8%
BASF	-	5%

PS for packaging applications is mainly supplied by Dow and Monsanto. EDN have a smaller participation. Proquigel do not supply packaging grades and BASF only manufacture expanded polystyrene.

- **Breakdown Of Consumption For Packaging**

In 1982, packaging accounted for 14,500 tonnes of PS or 16% of the total. The bulk of this tonnage is used in food packaging.

The principal applications for PS in the packaging industry are:

Thermoformed pots	66%
Thermoformed trays	15%
Foamed Trays	11%
Other	8%

Of these, thermoformed pots and trays and foamed trays are used mainly for food packaging. The residual other category includes blow-moulded bottles. A small amount of these are used for packaging fermented milk, but most are used for non-food applications.

Conversion

The principal companies extruding and thermoforming PS for packaging are:

Itap
Brasholanda
Dixie
Metalma

Itap and Brasholanda specialise in the dairy industry producing both sheet for form-fill-seal machines and preformed, decorated pots. 80% of Dixie's activity is related to disposables but they supply some pre-formed, decorated pots. Metalma concentrates on extruded sheet for the refrigerator industry but also supplies some sheet for form-fill-seal applications. Other important thermoforming companies include Iplac, Industampa, Piramides, Brasilia and Zanata, but these companies mainly supply disposable coffee and drinking cups.

Spumapak, in which Dow has an interest, supplies expanded polystyrene for egg boxes and flat trays for prepacking of meat, fruit and vegetables at supermarkets.

The other major PS user is Yakult, a fermented milk manufacturer producing their own small injection blow moulded bottles on Netstahl machines.

In addition, there are a large number of small companies producing simple thermoformed trays from bought-in sheet.

- **Packaging End-Use Markets For PS**

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Thermoformed Pots:					
Yoghourt & Desserts	4590	6850	+10½	9370	+ 4
Ice Cream	1530	920	-12	1200	+ 3½
Mineral Water	870	920	+ 1½	350	-11
Butter/Seasonings etc	850	900	+ 1½	1160	+ 3
Thermoformed Trays:	1700	2170	+ 6	3370	+ 5½
Foamed Trays:					
Egg Trays	910	960	+ 1½	1490	+ 5
Flat Trays	420	660	+12	890	+ 4
TOTAL	10870	13380	+ 5½	17830	+ 3½
Non-Food:					
All Applications	780	1120	+ 9½	2010	+ 7½
OVERALL PACKAGING TOTAL	11650	14500	+ 5½	19840	+ 4

- **Trends In Demand For PS Food Packaging**

In terms of growth, none of these markets is expected to advance much more than 4-5% per annum with the exception of supermarket trays. The concern is whether PS will be substituted by polypropylene in these markets. To a considerable extent this depends on the relative prices of the two materials, which is a matter of government policy. Currently this favours

PP, but it could easily change. However, it is very unlikely that yoghourt or desserts will change over completely to polypropylene since 70% is produced on form-fill-seal machines, which would not be suitable for polypropylene - a much more difficult polymer to thermoform. The same is true of butter but the bought-in portion of mineral water pots will probably change to polypropylene. No change is anticipated for formed trays.

Egg boxes were a growing market for PS, but the price relationship with moulded pulp has shifted making PS relatively more expensive.

1.5 POLYVINYL CHLORIDE (PVC)

PVC was in short supply in Brasil until 1980 when CPC's 150,000 tonne plant in Bahia came fully on stream. Unfortunately their new capacity coincided with the 1981 recession, when consumption dropped by 26%.

In 1982 capacity and consumption were more equally matched although 15,000 tonnes were exported.

A 200,000 tonne PVC plant is projected for the southern pole but nothing has been been decided yet.

• Raw Material Supply - PVC

Tonnes (000)	1978	1979	1980	1981	1982
Nominal capacity	171	321	325	325	375
Production	173	210	341	260	316
Imports	61	99	26	9	6
Exports	-	-	3	-	15
Apparent Consumption	234	309	364	269	307

• Market Share In 1982

The four producers of PVC in Brasil are:

CPC	49%
Electrocloro	25%
Brasivil	18%
Plastivil	8%

Brasivil was recently acquired by the Hansen Group, one of Brasil's largest pipe manufacturers with a consumption of approximately 100,000 tonnes annually. CPC was commissioned in 1979 using Mitsubishi technology. Electrocloro is owned by the Solvay Group and Plastivil by the Matarazzo Group.

- **Breakdown Of Consumption For Packaging**

In 1982, packaging accounted for 42,600 tonnes, almost 14% of apparent consumption of PVC. Over 60% of the PVC used in packaging was converted for food packaging. Non-food uses for PVC include bottles for washing up liquid and shampoo, and rigid blisters (for example for pharmaceuticals).

- **Conversion**

There are several small companies extruding PVC sheet but 50% of sheet is calendered by Plavinil and Vulcan. Plavinil, which is a downstream operation belonging to Electrocloro, produce sheet for blisters and margarine pots which they thermoform themselves. Vulcan (Oxydental Petroleum) produce sheet for blisters. Plavinil have concentrated on the packaging market and appear to have 80% of calendered sheet sales for packaging.

The use of PVC for bottle blowing is widespread and there is a strong tendency toward vertical integration by the users.

Major users who blow their own bottles include:

Minalba	(mineral water)
Sao Lourenco	(mineral water)
Poa	(mineral water)
Lindoya	(mineral water)

Major converters include:

Electroflex
Filtrona
Casa Nobre
Providencia
Raimundo de Fonte
Marco Tulio Russo
Spinola
Guarapiranga
Plasbe
Flexolit

These companies account for 30% of the total blown bottle market.

In flexible films, the principal companies are Darex (Grace), Good Year and Propack.

Packaging End-Use Markets For PVC

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Rigid Sheet:					
Margarine Tubs & Lids	1670	2140	+ 6½	2820	+ 3½
Bottles:					
Mineral Water	4940	5200	+ 1½	7780	+ 5
Vinegar	2390	3560	+10½	4360	+ 2½
Flexible Film:	11330	15700	+ 8½	19500	+ 2½
TOTAL	20330	26600	+ 7	34460	+ 4
Non-Food					
All Applications	9920	16000	+12½	19610	+ 2½
OVERALL PACKAGING TOTAL	30250	42600	+ 9	54070	+ 3

Trends In Demand For PVC Food Packaging

The large question mark hanging over PVC is whether the vegetable oil industry will decide to follow most of Europe and use PVC bottles. The existing tin plate or black plate can has come down in price relatively, but can be expected to increase again. Cans offer the best protection but have little marketing benefit, especially in a country where transparent packaging is preferred and cans are regarded as somewhat suspect. There are many difficulties to be overcome: who will produce the bottles, how they will be filled, what will happen to the existing investment in high

speed can filling lines. A comparative trial of all types of oil packaging is under way and undoubtedly will influence the choice of packaging.

As for other products, margarine will tend towards polypropylene for tubs. The existing uses for PVC bottles will all continue to grow. It is possible that bioriented PVC bottles will be used for carbonated beverages in competition with PET. Another possible market is lower quality wines.

1.6 POLYPROPYLENE (PP)

Polypropylene was imported in large quantities until 1979 when Polibrasil's 50,000 tonne plant in Sao Paulo came fully on stream and Polipropileno's plant in Bahia started up.

- **Raw Material Supply - PP**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal capacity	50	100	100	100	100
Production	25	98	121	128	155
Imports	41	4	2	-	-
Exports	1	8	11	52	50
Apparent Consumption	65	94	112	76	105

- **Market Share**

The three producers of PP in Brasil are:

	1982	1983	1987
Polibrasil (Shell)	55%	43%	40%
Polipropileno (ICI)	45%	35%	30%
PPH (Hercules)	-	22%	30%

PPH's 50,000 tonne plant started up in early 1983 in the southern petrochemical pole in Rio Grande do Sul.

The market for converted products in 1982 was valued at US$ 160 million. Polypropylene is a relatively new material in Brasil, but has made considerable progress and is now used for a very large number of applications.

- **Breakdown Of Consumption For Packaging**

In 1982 packaging accounted for 42% of total PP consumption; the 44,300 tonnes were used for the following packaging products.

Woven rafia sacks	51%
Film	35%
Thermoforming	9%
Injection	4%
Blow moulding	1%

Approximately 70% is used for food packaging; the remainder being converted into sacks for fertilizers, film for cigarette overwrapping and blow-moulded containers for pharmaceuticals and cosmetics.

- **Conversion**

The principal manufacturers of woven rafia sacks are:

Cata
Jauense
Cia Uniao
Plasticos de Parana
Cacique
Iplac
Fitesa

These companies account for 55% of the market. Rafia sacks are used for flour, fertilizers and frozen chickens.

The main producers of polypropylene film are:

Polo	-	bioriented
Shellmar	-	bioriented
Itap	-	cast
Edea	-	cast
Providencia	-	cast

Thermoformed pots and lids are produced for the most part by Polyvac, SPPF and Itap. Polyvac are very strong in the soft margarine market.

The principal producers of injection moulded closures are Xaplas, Engequimica and Modelar.

PP blow moulded bottles are manufactured mainly by Wheaton, Flexolit and Filtrona.

- **Packaging End-Use Markets For PP**

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Rafia Sacks:					
Flour	9500	8600	- 2½	8750	+ ½
Poultry	1460	3400	+23½	6500	+ 8½
Film: Bioriented					
Biscuits	2230	2150	- 1	7400	+16½
Coffee	1020	1090	+ 1½	1300	+ 2
Cast:					
Pasta	12100	8900	- 7½	10230	+ 2
Snacks	850	960	+ 3	1680	+ 7
Thermoforming:					
Margarine	2050	3530	+ 3	4100	+ 2
Other (inc. Mineral Water)	160	200	+ 5½	1450	+28
Injection Moulding:					
Tops	750	1700	+22½	3050	+ 7½
Other	220	350	+12	800	+11
TOTAL	30340	30880	+ ½	45260	+ 5
Non-Food:					
All Applications	12750	13420	+ 1½	19230	+ 4½
OVERALL PACKAGING TOTAL	43090	44300	+ 1	64490	+ 5

Trends In Demand For PP Food Packaging

The demand for flour and pasta will grow very slowly, unless the government re-institutes the subsidy on flour.

The rapidly growing markets for PP in food packaging are, woven rafia sacks for frozen poultry, bioriented film for biscuits in replacement of cellophane, and thermoformed cups for mineral water as substitute for PS. The snacks market as a user of BOPP is also expected to grow strongly as this is a new market and there are many new products being introduced.

Other possible growth areas for PP in food packaging are chocolate wrappings, PP coated board for frozen food cartons, and in a co-extruded PP/PVA blow-moulded bottle for vegetable oil.

1.7 POLYESTER

Polyester may be produced by one of two routes; from either teraphthalic acid (TPA) or dimethylteraphthalate (DMT), both of which are produced in Brasil.

- **Raw Material Supply - Polyester**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal capacity	130	130	130	135	135
Production	93	118	128	116	103
Imports	4	3	2	n/a	8
Exports	6	11	9	n/a	15
Apparent Consumption	91	110	121	125	96

- **Market Share 1982**

The two producers of Polyester in Brasil are:

Rhodiaco (TPA)	59%
Pronor (DMT)	41%

All the DMT-based polyester and the bulk of the TPA-based polyester is used for textiles.

- **Breakdown Of Consumption For Packaging**

In 1982 less than 2000 tonnes of Polyester were used for packaging films in Brasil, all of this going to food end markets. Films can only be produced from the TPA polyester production process.

- **Conversion**

Polyester film is used in sophisticated laminates for flexible packaging, and as a base for vacuum-metallising to produce highly decorative materials. The principal companies converting polyester film are:

Toga
Shellmar
Itap
Santa Rosa
Matarazzo

- **Packaging End-Use Markets For Polyester**

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Coffee	1050	1630	+11½	2750	+ 7
Easter Eggs	50	130	+27	270	+ 9½
Cold Meats	75	100	+ 7½	460	+21
Chocolates	-	60	-	190	+15
TOTAL FOOD	1175	1920	+13	3670	+ 8½

• Trends In Demand For Polyester Food Packaging

Polyester film is used mainly for the packaging of coffee. Growth will be much higher than overall coffee growth due to the rapid development of the vacuum packed coffee market. Other growing markets are chocolate wrappings and cold meats.

An inevitable development will be the PET bottle. The advantages of PET in terms of reduced breakages in filling, capping and distribution, and the considerable weight reduction have resulted in non-returnable PET bottles being widely accepted for vegetable oil, carbonated beverages and beer in the USA, Western Europe and Japan.

Studies have been carried out in the past on the feasibility of PET bottles in Brasil, but none has so far lead to any significant investment. The present economic climate, and problems of importing machinery are holding up this breakthrough.

However, in the next two to three years it is likely that some vegetable oil will switch to PET bottles, especially where new additional filling capacity is being installed in the South of the country. In the longer term beer and carbonated beverages will also transfer to PET from returnable glass bottles.

PET has the advantage that it may be produced from either TPA or DMT. Within the period to 1990 assuming the continued penetration of polyester films and the use of PET for bottles, annual consumption of polyester could rise to more than 10,000 tonnes. Of this total, approximately one third would be films, the remainder, blown bottles.

PAPER BASED PACKAGING

SECTION 2 PAPER BASED PACKAGING

2.1 INTRODUCTION

This section is divided into two:

Multiwall Sacks
Single Wall Bags

2.2 MULTIWALL SACKS

- **Raw Material Supply - Kraft Paper**

Tonnes (000)	1978	1979	1980	1981	1982
Unbleached Kraft	257.3	259.2	309.2	249.7	247.7
Bleached Kraft	34.4	41.5	47.5	32.3	33.0
Total	291.7	300.7	356.7	282.0	280.7

- **Market Share 1982**

The principal producers of kraft for multiwall sacks are:

Klabin	29%
Manville	16%
Catarinense	16%
Rigesa	11%
Portela	8%
Cocelpa	5%

Conversion

The principal manufacturers of multiwall sacks are:

Bates (St. Regis)	25%
Divani	19%
Curipel (Trombini)	17%
Manville	14%
Celucat (Klabin)	8%
Cocelpa	4%
Rigesa	3%

Bates and Divani buy in kraft. Curipel and Manville purchase part of their requirement while Celucat, Cocelpa and Rigesa all have excess kraft production.

- **End-Use Markets - Multi-wall Sacks**

SACKS CONSUMPTION: 1978, 1982, 1990

Tonnes ('000)	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
5kg Bags (Sugar/Rice)	16	25	+12	30	+ 2½
Flour	10	11	+ 2	12	+ 1
Salt	1	1	nc	2	+ 9
TOTAL	27	37	+ 8	44	+ 2
Non-Food:					
All Applications	220	243	+ 2½	320	+ 3½
TOTAL	247	286	+ 3	364	+ 3

The principal non-food end markets are cement and animal feed, which between them represent over 60% of the total tonnage of sacks, others include plastics resins and hydrated lime.

- **Trends In Demand For Sacks For Food Packaging**

No major changes are expected in this market. Much will depend on the developments in the economy, particularly for non-food packaging. Flour consumption depends on the wheat subsidy, and this seem unlikely to be re-introduced in the short-term; sugar consumption keeps pace with population growth.

2.3 SINGLE WALL BAGS

Paper for single-wall bags is in relatively good supply. Paper bags are a relatively new packaging product in Brasil, where previously either no packaging or simple paper wrappings were all that was used.

- **Raw Material Supply - Bag Papers**

Tonnes (000)	1978	1979	1980	1981	1982
M G Paper	16.6	16.7	18.2	17.9	20.4
Bleached/Coloured Kraft	36.7	50.4	49.4	65.1	57.9
Unbleached Kraft	90.3	98.4	105.5	94.8	106.3
Total	143.6	165.5	173.1	177.8	184.6

- **Market Share In 1982**

The principal producers of paper for single wall bags are:

Madeireira Squario SP	-	16%
Irani SC	-	11%
Celupel SC	-	8%
Santo Amaro BA	-	7%
Senges PR	-	7%
Pedras Brancas RS	-	5%
Ararense SP	-	5%
Manville SC	-	4%
Catarinense SC	-	4%

This is a much more fragmented market than kraft for multiwall sacks with many small paper mills.

- Conversion

The principal manufacturers of single wall bags are:

Bates	-	10%
Divani	-	10%
Curipel (Trombini)	-	6%
Rigesa	-	5%

This is also a very fragmented industry with many small companies.

Nearly 90% of production of single wall bags is for retail, carrier and supermarket bags. The remainder is used for prepackaged food bags.

End-Use Markets - Single-wall Bags

BAG CONSUMPTION: 1978, 1982, 1990

Tonnes ('000)	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Sugar	8	13	+13	17	+ 3
Flour	4½	4	- 3	5	+ 2½
Other	3	3	nc	4	+ 4
TOTAL	15.5	20	+ 6½	26	+ 3½
Non-Food:					
Supermarket Bags	-	102	-	134	+ 3½
Carrier Bags	-	23	-	29	+ 3
Retail Bags	-	20	-	28	+ 4½
TOTAL NON-FOOD	110	145	+ 7	191	+ 3½
OVERALL PACKAGING TOTAL	1255	165	+ 7	217	+ 3½

Trends In Demand For Single Wall Bags For Food Packaging

Neither flour nor sugar consumption is expected to grow significantly in the forecast period, and the main forms of packaging will not alter significantly. There may be some substitution of plastics for paper, but this will largely result from changes in relative prices.

FIBREBOARD PACKAGING

SECTION 3 FIBREBOARD PACKAGING

3.1 INTRODUCTION

This section is concerned with corrugated cases (B and C flute) and corrugated cartons (E flute).

Corrugated cases are the principal form of collation packaging, and shrink wrapping has so far made little impact, mainly due to adverse transport and handling conditions and also to the relatively low cost of corrugated board, which is produced domestically, compared with plastics which depend on imported oil.

The market for converted products in 1982 was valued at US$ 465 million.

- **Raw Material Supply - Liner And Fluting**

Tonnes (000)	1978	1979	1980	1981	1982
Production					
Liner	314.8	411.8	474.8	433.9	451.4
Fluting	313.1	384.9	452.8	392.4	473.4
Total	627.9	796.7	927.6	826.3	924.8

- **Market Share 1982**

53 mills produce fluting and 46 produce liner. However, the principal companies (over 7,000 tonnes annual production) are:

FLUTING			LINER		
Klabin	PR	19.6%	Klabin	PR	27.3%
Rigesa	SP	16.5%	Rigesa	SC	15.7%
Trombini	PR	9.0%	Manville	SC	13.6%
Papelok	SP	5.1%	Trombini	PR	10.0%

FLUTING			LINER		
Cibrapel	RJ	4.7%	Mara	SP	5.6%
Fernandes	SP	3.8%	Itapaje	MA	3.7%
Alcantara	RJ	3.7%	Paraibuna	MG	2.9%
Matarazzo	SP	2.9%	Sao Roberto	SP	1.9%
Sao Roberto	SP	2.8%	Papelok	SP	1.5%
Bresler	SP	2.7%			

- **Consumption Of Kraft Liner And Fluting**

Tonnes (000)	1978	1979	1980	1981
Liner*	398.5	435.3	507.1	451.2
Fluting	316.9	382.0	442.6	394.3
TOTAL	715.4	817.3	949.7	845.5

* The shortfall between consumption and production of kraft liner is explained by the use of materials based in paper which are not included in the published statistics.

- **Conversion**

There are 35 corrugated board converters in Brasil, but production is highly concentrated and 11 companies represent 70% of the market.

The principal manufacturers of corrugated board are:

	Tonnes (000)	
Rigesa	121.1	16.0%
Klabin	120.2	15.9%
Trombini	69.8	9.2%
Manville	45.4	6.0%
J. Costa e Ribeiro	34.1	4.5%
Papelok	33.1	4.4%
Sao Roberto	28.0	3.7%
N S da Penha	27.8	3.7%
Asahi	22.2	2.9%
Itapaje	19.9	2.6%
Matarazzo	17.6	2.3%
Others	217.3	28.8%
TOTAL	756.5	100.0%

- **Corrugated Board Production**

Tonnes (000)	1978	1979	1980	1981	1982
Capacity	1090.8	1169.3	1385.5	1608.7	1738.4*
Production	696.6	798.6	939.1	842.9	880.0

* Estimated.

- **Corrugated Case Production**

Tonnes (000)	1978	1979	1980	1981	1982
Capacity	881.4	988.5	1205.0	1338.5	1519.2*
Production	628.7	726.8	858.4	756.5	801.4

* Estimated.

There is considerable (47%) spare capacity in both the corrugated board and case making industries.

- **E Flute**

This is a specialised market where corrugating technology is used to produce a product competitive with duplex board. Folding cartons made from E flute are extensively used for electrical appliances, shoes, wines and spirits cartons, gift sets of glass, porcelain, stainless steel and kitchenware.

The market is estimated at 70,000 tonnes and the major converters are:

Frugis	12%
Flor de Maio	8%
Mazza	3%
Divani (Cromopel)	14%

- **End-Use Markets - Corrugated Cases**

CORRUGATED CASE CONSUMPTION: 1978, 1982, 1990

Tonnes('000)	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
All Applications	233	256	+ 2	330	+ 3
Non-Food:					
All Applications	395	544	+ 8	745	+ 4
TOTAL	628	800	+ 6	1075	+ 4

- **Trends In Demand For Corrugated Cases For Food Packaging**

There will be continued substitution of corrugated cases by trays and overwrap films, especially for canned/bottled foodstuffs. This development will initially be concentrated on urban areas, but later in the forecast period this type of distribution packaging will be in use throughout the country.

One major growth area for corrugated cases is in fruit and vegetable packaging currently using returnable wooden crates.

PAPERBOARD PACKAGING

SECTION 4 PAPERBOARD PACKAGING

4.1 INTRODUCTION

This section is concerned with folding cartons.

The principal types of board are:

Duplex - folding box board with kraft back.
This consists of 2 or 3 layers of unbleached eucalyptus pulp and a layer of bleached pulp.

Triplex - folding box board with white back.
This consists of two layers of bleached eucalyptus pulp with an internal layer of unbleached pulp.

White board - solid bleached board.
This consists of two layers of bleached eucalyptus pulp.

40% of cartonboards are produced from virgin pulp. The remainder contain an element of waste paper.

The duplex board was originally developed for detergent cartons and the white board for flip top cigarette packs, although it is now also used for quality packing such as cosmetics.

Brasil is self sufficient in boards for folding cartons. Production peaked in 1980, but has since dropped by 20%.

- **Raw Material Supply - Cartonboards**

Tonnes (000)	1978	1979	1980	1981	1982
Duplex	196.5	235.8	259.1	209.1	189.1
Triplex	11.9	12.2	16.2	22.1	27.0
White board	29.7	12.8	15.8	13.6	15.9#
TOTAL	238.1	260.8	291.1	244.9	232.0#

Estimated.

The installed capacity in 1982 was 1489 tonnes per day. No shortage of supply is anticipated.

- **Market Share 1982**

The major producers of board are:

Suzano SP	39%	Manville	4%
Santista SP	26%	Cicero Prado SP	4%
Papirus SP	10%	Simao SP	3%
Miguel Forte PR	7%	Bonet SC	2%

- **Conversion**

There are many printers in Brasil capable of producing folding cartons. However, there are 21 companies which consume over 2000 tonnes of board annually and account for 53% of the market.

Toga	7.8%	San Remo	2.1%
Paranaense	6.2%	Gasparini	1.9%
Romitti	4.1%	Brasil Grafica	1.6%
Flor de Maio	3.7%	Noviello	1.6%
Sarcinelli	3.1%	Campo Bom	1.5%
Lanzara	2.8%	Martinelli	1.3%
Rebizzi	2.6%	Rainha L'Escal	1.3%
Nicolini	2.4%	Grupo Graf	1.3%
Igel	2.2%	Colibri	1.3%
Gloria	2.1%	Martini	1.3%
		Laborgraf	1.0%

A further 20 carton makers each consume over 1000 tonnes annually.

Toga, Paranaense and Sarcinelli concentrate on the volume markets, such as detergents, razor blades, table jellies, cake mixes and desserts. Flor de Maio concentrates on toys, hardware and china. Lanzara and Grupo Graf supply the frozen food market. Nicolini specialises in pharmaceutical packaging and Gasparini in food packaging. Laborgraf make record sleeves.

Packaging End-Use Markets For Cartons

PACKAGING CONSUMPTION: 1978, 1982, 1990

Tonnes ('000)	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Breakfast Cereals	4.6	5.8	+ 6	8.6	+ 5
Cornflour	3.7	4.1	+ 2½	5.7	+ 4
Wines And Spirits	1.4	1.6	+ 3½	2.5	+ 5½
Margarine	1.2	1.5	+ 5½	1.9	+ 3
Coffee	1.0	1.0	nc	1.4	+ 4½
Frozen Foods	0.3	0.7	+23½	1.0	+ 5
Cake Mix	1.0	1.3	+ 7	1.6	+ 2½
Other	17.5	16.8	- 1	19.9	+ 2
TOTAL	30.7	32.8	+ 1½	42.6	+ 3½
Non-Food:					
All Applications	123.8	117.7	- 1½	133.0	+ 1½
OVERALL PACKAGING TOTAL	154.5	150.5	- ½	175.6	+ 2

Trends In Demand For Paperboard Food Packaging

The per capita consumption of board in Brasil is extremely low compared with industrialised countries (1.8kg annually compared to 7kg for Italy).

The advantage of this market is the large number of applications resulting in a greater protection from the effects of the recession in specific markets.

Board consumption, however, is down 3% on 1978 levels compared with a 4% increase in the general production index for the same period, suggesting that board is being substituted by other materials such as plastics.

Growth of food packaging in cartons will be steady rather than spectacular, as new products are packed in cartons, replacing those lost to flexible packaging forms.

FLEXIBLE PACKAGING

SECTION 5 FLEXIBLE PACKAGING COMBINATIONS

5.1 INTRODUCTION

For the purposes of this report, flexible packaging has been defined as any structure, laminate or combination of two or more materials.

Monowebs, such as paper, polyethylene, polypropylene or aluminium foil are dealt with in the appropriate sections.

The flexible packaging market is difficult to identify since most of the converters work with a large number of structures. However, based on the above definition, the market was estimated at US$ 255 million in 1982.

The principal types of flexible packaging are:

Aluminium based	40%
Cellophane based	37%
Paper based	19%
Other	4%

Conversion

The principal converters of flexible packaging by sales value are:

Toga	26%
Empax	12%
Shellmar	10%
Panbrasil	9%
Polipel)	
Bafema)	30%
Matarazzo)	
Itap)	
Santa Rosa)	10%
Itaipava)	
Others)	
Total	100%

The total market is estimated at 65,000 tonnes. Toga, which produces considerable quantities of coffee bags and soap wrappers, has 26% of the market measured in tonnage terms. Empax, Shellmar, Panbrasil, Polipel, Bafema and Matarazzo share 60% of the market, more or less divided equally. Shellmar and Panbrasil specialise in aluminium while Empax, Polipel, Bafema and Matarazzo are more general.

• End-Use Markets - Flexible Packaging

CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Confectionery	9500	9750	+ ½	11830	+ 2½
Coffee	6220	5850	- 1½	7780	+ 3½
Biscuits	5480	5200	- 1	6540	+ 1½
Other Food	25300	25350	nc	29830	+ 2
TOTAL	46500	46150	nc	55980	+ 2½
Non-Food:					
All Applications	17560	18850	+ 1½	22860	+ 2½
TOTAL PACKAGING	64060	65000	+ 1	78840	+ 2½

• Trends In Demand For Flexible Food Packaging

There are no major new growth markets for flexible packaging combinations. There will in fact, be a move away from laminates to bioriented polypropylene film for sweets, biscuits and coffee.

The growth of the market will depend on new products being launched which require sophisticated packaging. However, flexible packaging probably became too sophisticated in the 1970s and now the trend is for simpler and cheaper forms of packaging.

Continued substitution for folding cartons and corrugated cases will maintain growth in the market for flexible packaging mono webs, which are discussed under the individual material headings. The rate of substitution is highly dependent in movements in the price of oil which has to be imported, compared with indigenous packaging materials. However, in the absence of another major OPEC oil price rise, the present price ratios will favour a greater use of flexibles.

METAL PACKAGING

SECTION 6 METAL PACKAGING

6.1 INTRODUCTION

Metal Packaging is divided into two principal areas:

Aluminium
Steel

6.2 ALUMINIUM PACKAGING

Aluminium has traditionally been considered an expensive product in Brasil and efforts have been made by users to restrict its use. Certain products such as sheet for Easy Open Lids had to be imported until recently but Brasil is now virtually self sufficient in aluminium for packaging applications.

The major raw material producers are:

Alcan
Alcoa
Companhia Brasileira De Aluminio (CBA)

Aluminium packaging is divided into two main product areas:

Aluminium Sheet And Plate
Foil

6.2.1 Aluminium Sheet And Plate

- **Raw Material Supply**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal Capacity	133.0	140.0	146.0	149.0	150.0
Production	87.2	90.9	101.4	77.9	104.0
Imports	n/a	8.9	5.8	3.1	n/a
Exports	n/a	1.5	2.4	2.8	n/a
Apparent Consumption	n/a	97.0	101.8	80.1	104.0

Market Share 1982

The two main suppliers of aluminium sheet are:

Alcan	78%
CBA	22%

Breakdown Of Consumption For Packaging

In 1982 packaging represented approximately 12% of apparent consumption of aluminium sheet, over 12,000 tonnes broken down as follows:

1.	Tubes	45%
2.	Easy Open Lids	25%
3.	Closures	12%
4.	Aerosols	9%
5.	Crimped Caps	9%

Closures, crimped caps and easy-open lids are of relevance to food packaging; tubes and aerosols are used mainly for non-food applications.

The end-use markets for aluminium packaging are summarised on page 133.

Conversion

- Closures

The main closure manufacturers are:

Perticamps	59%
Heleny	32%
Others	9%

The market of 444 million units for closures (tear off and screw caps) is dominated by pharmaceuticals with 90%. The remainder is used for pilfer proof caps for spirits.

- Crimped Caps

The main producers of crimped caps are:

Rojek	70%
Aro, Others	30%

Crimped caps are used for food products packed in small glass jars which are designed to be reused as drinking glasses. Four major markets have been identified with a total consumption of 252 million units in 1982 split:

Tomato Extract	52%
Caramelised Milk	22%
Cheese Spread	16%
Other, including Jams	10%

- Easy Open Lids (can ends)

The producers of easy-open lids are:

Metalurgica Matarazzo	60%
Rheem	40%

The easy open lid market is essentially restricted to beer and carbonated beverages which are still small markets in Brasil. The total consumption in 1982 was estimated at 387 million units made up as follows:

Beer	-	50%
Carbonated Drinks	-	48%
Exports (packed)	-	2%

6.2.2 Aluminium Foil

- **Raw Material Supply**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal Capacity	24.0	24.0	27.0	31.0	31.0
Production	16.2	19.5	20.4	18.8	n/a
Imports	n/a	0.8	1.1	1.0	n/a
Exports	n/a	2.3	3.7	4.4	n/a
Apparent Consumption	16.3	18.0	19.9	19.2	21.0

Discrepancies in apparent consumption are due to movements in stocks.

- **Market Share 1982**

There are three suppliers of Aluminium foil in Brasil:

CBA	70%
Alcoa	21%
Alcan	9%

Alcan and CBA have operated in Brasil for many years, but Alcoa is a more recent entrant with the acquisition of ASA in Recife.

• Breakdown Of Consumption For Packaging

In 1982, 5,750 tonnes of printed foil and 4,900 tonnes of unprinted foil were used for packaging end-uses (excluding disposable containers). In addition to the above, approximately 1,000 tonnes of foil is used in UHT milk cartons, and 850 tonnes in composite cans.

Foil is used in both printed and unprinted form, and the principal end-markets for both are as follows.

Printed Foil			Unprinted Foil (Coated or Laminated)		
Pharmaceuticals	-	38%	Diaphragms	-	32%
Lidding	-	16%	Cigarettes	-	22%
Confectionery	-	9%	Confectionery	-	18%
Coffee	-	8%	Stock Cubes	-	4%
Butter/Margarine	-	8%	Other	-	24%
Powdered Drinks/Soups	-	7%			
Cheese	-	5%			
Other	-	9%			

• Conversion

The main converters of aluminium foil are:

Printed Foil			Unprinted Foil (Coated or Laminated)		
Panbrasil	-	30%	Alcan	-	43%
Shellmar	-	26%	Italpava	-	15%
Toga	-	13%	CBA	-	11%
Polipel	-	12%	Alcoa	-	8%
Bafema	-	10%	Bafema	-	7%
Itap	-	5%	Toga	-	6%
Empax	-	4%	Others	-	10%

The end-use markets for aluminium packaging are summarised on page 133.

Panbrasil is particularly strong in pharmaceuticals, whereas Shellmar concentrates on lidding foil. Toga specialises in laminates for powdered fruit drinks and soups.

Alcan is particularly strong in membranes for powdered milk cans, but also leads in cigarettes and chocolate foil. Italpava converts for CBA.

- **Packaging End-Use Markets For Aluminium**

ALUMINIUM CONSUMPTION: 1978, 1982, 1990

Tonnes	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food:					
Closures	1040	1490	+ 9½	1820	+ 2½
Crimped Caps	580	1120	+18	1350	+ 2½
Easy-Open Lids	2750	3120	+ 3	4680	+ 5
TOTAL FOOD	4370	5730	+ 7	7850	+ 4
Non-Food:					
All Applications	5850	6750	+ 3½	9230	+ 4
TOTAL ALUMINIUM SHEET	10220	12480	+ 5	17080	+ 4
Aluminium Foil:					
Printed:					
Food	2680	3550	+ 7½	5120	+ 4½
Non-Food	1570	2200	+ 9	3060	+ 4
TOTAL	4250	5750	+ 8	8180	+ 4½
Unprinted:					
Food	2970	3180	+ 2	3720	+ 2
Non-Food	1530	1720	+ 3	2250	+ 3½
TOTAL	4500	4900	+ 2	5970	+ 2½
OTHER FOIL	950	1850	+18	3780	+ 9½
TOTAL FOIL	9700	12500	+ 6½	17930	+ 5
TOTAL ALUMINIUM	19920	24980	+ 6½	35010	+ 4½

Trends In Demand For Aluminium Packaging

Aluminium, although expensive, has potential in Brasil in terms of new applications for collapsible tubes for food products and two piece cans.

Prospects for both of these products will depend on the demand for convenience packaging. With the current recession, it is hardly likely that there will be a sharp rise in demand, rather a slow trend backed up by considerable marketing effort.

There are no applications at present using collapsible tubes for food products, but Brasil generally follows international trends and these will come.

Potential for the two piece can is more difficult to assess due to the resistance to the existing three piece can for beverages. Price will be the determining factor in choosing between tin plate and aluminium.

Demand for traditional products such as caps, closures and crimped caps is currently stable, but should pick up in 1984/85.

Other products such as pharmaceuticals blister packs, confectionery and margarine may actually drop in 1983 due to lower disposable income but should recover in 1984.

Coffee and powdered drinks will grow due to changing consumer habits. Diaphragm tonnage will drop due to reduced gauge of material and cigarettes tonnage will fall due to replacement by metallised paper as bundling tissue. UHT milk should continue to grow. Demand for composite cans will depend on the selection of packaging for vegetable oil, but should show some growth.

6.3 STEEL PACKAGING

The major raw material producers are:

Companhia Siderurgica Nacional (CSN)	82%
Usiminas	18%

CSN manufacture tinplate and Usiminas black plate.

- **Raw Material Supply - Tinplate, Tin Free Steel And Black Plate**

Tonnes (000)	1978	1979	1980	1981	1982
Nominal Capacity					
Tinplate TFS (CSN)	600.0	600.0	600.0	600.0	600.0
Black Plate (Usiminas)	-	-	-	30.0	110.0
Shipments					
Tinplate	542.4	564.9	631.2	379.5	426.9
Tin-Free Steel	30.3	29.2	20.8	41.6	42.7
Black Plate	5.4#	6.7#	3.2#	22.0	100.8
Total	578.1	600.8	655.2	443.1	570.4

CSN supplied small quantities of black plate in these years.

A certain amount of tinplate and TFS is exported. These exports are made by CSN and are not included in the shipment figures. Certain imports not made by CSN probably relate to tinplate imported under draw back, for the packaging of corned beef for export.

In 1982 32,600 tonnes of tinplate were imported and 24,200 tonnes exported.

There was considerable destocking in 1981 but stocks were built up again in 1982 increasing by 19,100 tonnes over 1981. 4,800 tonnes of black plate went for non-packaging uses. Real consumption for packaging in 1982 was therefore 546,500 tonnes compared with 479,800 tonnes in 1981.

- **Breakdown Of Consumption For Packaging**

The principal applications for steel packaging by type of material are:

Tinplate
- Open Top Cans
  - food product cans
  - vegetable oil cans (not sterilized)
  - beverage cans
  - lubricating oil cans
- General Line Cans
  - lever lid cans
- Closures
  - crown caps
  - screw caps

Black Plate
- Open Top Cans
  - vegetable oil cans

Tin-Free Steel (TFS) is used for making lids and certain types of fish cans. The total market for converted products was valued at US$ 880 million in 1982, broken down by tonnage as follows:

Cans	-	94%
Closures	-	6%

Traditionally, tinplate cans have been used for tomato products, vegetable oil and powdered milk, but there is a tendency for glass partially to substitute in tomato products and PVC bottles or composite cans to substitute in vegetable oil. Many companies are integrated and produce their own cans, probably a result of shortages of supply in the past.

- **Conversion**

There are about 29 companies converting tinplate for packaging in Brasil:

Can makers	-	12
Closure makers	-	5
Food companies	-	10
Non food companies	-	2

The major converters can be divided into the following categories:

- Can Makers

Metalurgica Matarazzo	Metalurgica Cearense
Rheem	Metalurgica Iguacu
Prada	Incoflandres
Brasilata	Metalurgica Guerreiro
Metalurgica Emesa	Metalurgica Paulista
Rio Industrial	Metalurgica Giorgi

- Closure Makers

Crown Cork	Metalurgica Rojek
Tapon Corona	Silva Portella
Industrias Silva Pedroza	

- Food Companies

Nestle	Renda Priori
Mococa	Quaker
Embrasa (Olvebra group)	Fleischmann & Royal
Paoletti	Anderson Clayton
Swift Armour	Frigorifico Anglo

- Non Food

Renner Hermann	Tintas Ypiranga

Metalurgica Matarazzo specialises in vegetable oil and beverage cans, Nestle in lever lids and sanitary cans, Rheem in sanitary and beverage cans, Prada in vegetable oil and paint cans.

Crown Cork and Tapon Corona produce crown caps. Rojek specialises in screw caps where it has 70% of the market.

It is interesting to note that the integrated companies account for 29% of all tinplate consumption.

• End Use Markets

- Cans

The principal end uses of cans in 1982 were:

- Open Top Cans

Total Food Product Cans	1,538 million
of which:	
meat	390 million
sardines	360 million
tomato products	341 million
fruit and vegetables	204 million
milk products	197 million
sugar preserves	45 million
Vegetable Oil Cans	1,171 million
Beverage Cans	378 million
Lubricating Oil Cans	147 million

- General Line Cans

Powdered Milk etc.	409 million
Paint & Other Non-Food	615 million

- Closures

- Crown Caps

This is an important market due to the large proportion of returnable glass bottles.

In 1982, 31,400 tonnes of tinplate were used to make crown caps, resulting in approximately 14.1 thousand million units.

- Screw Caps

The screw cap market accounted for 8,500 tonnes of tinplate in 1982, resulting in approximately 333 million lids.

Packaging End-Use Markets For Tinplate, TFS and Black Plate

CONSUMPTION: 1978, 1982, 1990

Tonnes ('000)	1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Food - Open-Top Cans:					
Food	100.4	109.1	+ 2	136.6	+ 3
Vegetable Oil	178.1	174.6	- ½	126.0	- 4
Beverages	14.2	16.4	+ 3½	20.9	+ 3
General Line:					
Lever Lid	58.1	70.9	+ 5	96.7	+ 4
Closures:					
Crown Caps	44.1	32.7	- 7	42.6	+ 3½
Screw Caps	11.7	8.5	- 8	9.5	+ 1½
FOOD TOTAL	406.6	412.2	+ ½	432.3	+ 1
Non-Food:					
All Applications	142.6	133.3	- 1½	242.8	+ 8
OVERALL PACKAGING TOTAL	549.2	545.5	- ½	675.1	+ 3

Trends In Demand For Tinplate Food Packaging

Cans have become relatively cheaper due to raw material price control. Finished can prices are controlled at 139% of the raw material content. This, plus the trend to lighter gauge plate and the increased use of thinner black plate, has contributed to steel cans being retained as the

principal package for edible oil. However,these prices are artificially low and price rises can be expected, which will help to make plastic and fibre based composite containers more competitive.

Since there are no real growth markets - with the exception of tomato puree and tomato sauce, where the increase will be at least partially absorbed by glass - the question is whether steel can hold its own against other materials in the vegetable oil market which represents more than 30% of the total consumption of steel for packaging.

BULK PACKAGING

SECTION 7 BULK PACKAGING

7.1 INTRODUCTION

This section is concerned with

Steel drums and pails
Plastic drums
Banding and strapping materials

7.2 STEEL DRUMS

These are mainly made from black plate supplied by the Companhia Siderugica Nacional (CSN), Usiminas or Companhia Siderugica Paulista (Cosipa). In 1982, the consumption of 200 litre drums was estimated at 5.5 million, down 10% on 1981.

The market is supplied by:

Rheem	30%
Van Leer	30%
Cemibra	27%
Barra de Pirai	8%
Steel Drums	5%

The principal end use markets are:

Chemicals	47%
Orange Juice	27%
Lubricating Oil	25%

The market has dropped due to a tendency to ship some products particularly chemicals and lubricating oil in larger bulk containers.

Approximately 1.5 million steel drums with LDPE liners are used for the export of orange juice.

7.3 STEEL PAILS

This market is estimated at 30 million units. 20 litre pails are used mainly for lubricating oil - 33%, agricultural pesticides - 9%, and paints - 8%. In addition, many chemical products are also packed in 20 litre pails. The principal suppliers are Rheem - 45%, Prada, Brasilata and Van Leer.

No change is expected in this market.

7.4 PLASTIC DRUMS

This is a small market of 800,000, 20-50 litre, HDPE drums annually. The market dropped by 10% in 1982. Plastic drums are used essentially for chemicals but also for some food products such as concentrate for carbonated beverages and pepper. The principal manufacturers are Barra de Pirai, Italplast, Van Leer, Unipac, Mapla and Bandeirante.

The consumption of HDPE in 1982 was estimated at 4,400 tonnes.

7.5 BANDING AND STRAPPING MATERIALS

This market can be divided into:

Gummed paper tape	1,000 tonnes
Self adhesive tape	1,000 tonnes
Steel strapping	600 tonnes
Polypropylene strapping	150 tonnes
Staples	n/a
Film for palletisation	50 tonnes

Gummed paper tapes are used extensively in the food and electrical appliance industries for sealing corrugated cases. This product is tending to lose out to self adhesive tape. Steel strapping is used mainly in the steel, engineering, construction, wood, paper and food industries, but is being replaced by polypropylene strapping in the food and paper industries. Film for palletisation is a small but growing market, mainly used by the food and pottery industries.

Cyklop supply 80% of steel and polypropylene strapping and 65% of self adhesive tapes which 3M and Adere also supply. There are many suppliers of gummed tapes, including Lider and Cyklop.

In palletisation film, Alba have over 50% of the market, but Cyklop, Goodyear and Brafilm also participate.

GLASS PACKAGING

SECTION 8 GLASS PACKAGING

8.1 INTRODUCTION

Traditionally glass packaging has been important in Brasil due to the high proportion of returnable glass bottles for beer and carbonated drinks. It is estimated that Brasil has probably one of the largest returnable glass bottle markets in the world. This is not hard to understand when we note that Brasil ranks fourth in world consumption of carbonated beverages although the per capita consumption is very low at 28 litres.

Another interesting aspect of the Brasilian market is the housewife's preference for transparent packaging. This must partly explain the trend towards glass for tomato products and the glass manufacturers have developed glass packaging which can be reused as drinking glasses.

- Raw Material Supply

The raw material, soda ash, is supplied exclusively by the Companhia Nacional de Alcalis, but considerable quantities have to be imported to meet demand.

Supply Of Soda Ash

Tonnes (000)	1978	1979	1980
National production	121	119	176
Imports	183	199	203
Apparent consumption	304	318	379

Glass Production, Conversion And Market Share

Tonnes (000)	Nominal Capacity	Production 1982
Cisper (Owens Illinois)	440	250
Santa Marina (St. Gobain)	170	150
Wheaton	60	50
Nadir Figueiredo	60	80
CIV	160	80
Total	890	610

Cisper specialize in packaging for high volume products such as beer bottles and carbonated beverages. Santa Marina also manufacture bottles but participate in the small bottle market. Wheaton specialize in small bottles, Nadir Figeuiredo in the small jar market and CIV make bottles and jars.

In addition there are a number of smaller glass makers but their market shares are not significant.

The total market for converted products in 1982 was broken down by weight as follows:

Bottles - 400,000 tonnes
- Cisper 60%
- Sta. Marina 30%
- Nadir Figueiredo) 10%
- CIV)

Jars - 80,000 tonnes
- Cisper 52%
- Sta. Marina 32%
- Wheaton 16%

Small Bottles - 70,00 tonnes
- Wheaton 60%
- St. Marina 32%
- Cisper 5%

Small Jars - 60,000 tonnes
- Nadir Figuerido 80%

The identified replacement markets were:

(Million Units)

Bottles -	Beer	225	Jars	- Mayonnaise	94
	Carbonated beverages	199		- Tomato products & jams	11
	Wine	117		- Bottled fruit and veg	44
	Aguardente	100		- Soluble coffee	93
	Spirits	113		- Baby food	45
	Pine disinfectant	113			
	Fruit juices	69			
	Mineral water	6			
Small Bottles -	Pharmaceuticals	23	Small Jars	- Tomato extract	130
	Condiments	22		- Caramelized milk	55
	Fragrances	5		- Cheese spread	36

Packaging End-Use Markets For Glass

CONSUMPTION: 1978, 1982, 1990

Tonnes ('000)		1978	1982	Annual % Change 1978/82	1990	Annual % Change 1982/90
Bottles	Food	348.6	354.3	+ ½	376.5	+ 1
	Non-Food	47.1	48.3	+ ½	66.4	+ 4
TOTAL		395.7	402.6	+ ½	442.9	+ 1
Small Bottles	Food	5.6	6.0	+ 1½	7.9	+ 3½
	Non-Food	42.7	61.1	+ 9½	105.0	+ 7
TOTAL		48.3	67.1	+ 8½	112.9	+ 7
Jars	Food	50.8	70.5	+ 8½	112.6	+ 6
	Non-Food	7.5	8.8	+ 4	15.7	+ 7½
TOTAL		58.3	79.3	+ 8	128.3	+ 6
Small Jars	100% Food	52.5	61.0	+ 4	93.6	+ 5½
TOTAL		52.5	61.0	+ 4	93.6	+ 5½
Total Food		457.5	491.8	+ 2	590.6	+ 2½
Total Non-Food		97.3	118.2	+ 5	187.1	+ 6
TOTAL GLASS		554.8	610.0	+ 2½	777.7	+ 3

- Trends In Demand For Glass Packaging

In the beer and carbonated beverage markets, the trend has been at best static and it will probably be some time before carbonated beverages again reach 1980 levels. Beer was production limited until 1980 but the recession has resulted in static demand and as no new investments are anticipated in the near future, the likelihood is that beer will again become production limited.

Wine, aguardente, fruit juices, mayonnaise and sophisticated tomato products will all grow 30-40% over the next 5 years, while traditional products such as caramelised milk and cheese spread will show only 2-3% per annum growth. Tomato ketchup is expected to grow considerably over theperiod.

The question regarding glass packaging is the introduction of single trip packaging in the beer and carbonated beverage markets. Tin plate cans have not made significant inroads into the market yet but the introduction of two piece aluminium cans which should be cheaper than tin plate, plus changing consumer habits, may change this. Single trip glass bottles for beer were recently launched but will probably only achieve a small market share due to their high price.

The PET bottle for carbonated beverages has been a possibility for some time. The inconvenience of returning glass bottles plus a trend towards home consumption should make PET a more attractive alternative. This is discussed in detail in Part II, Section 1.7.