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APPLICATION OF TINPLATE AS A PACKAGING MATERIAL ✓

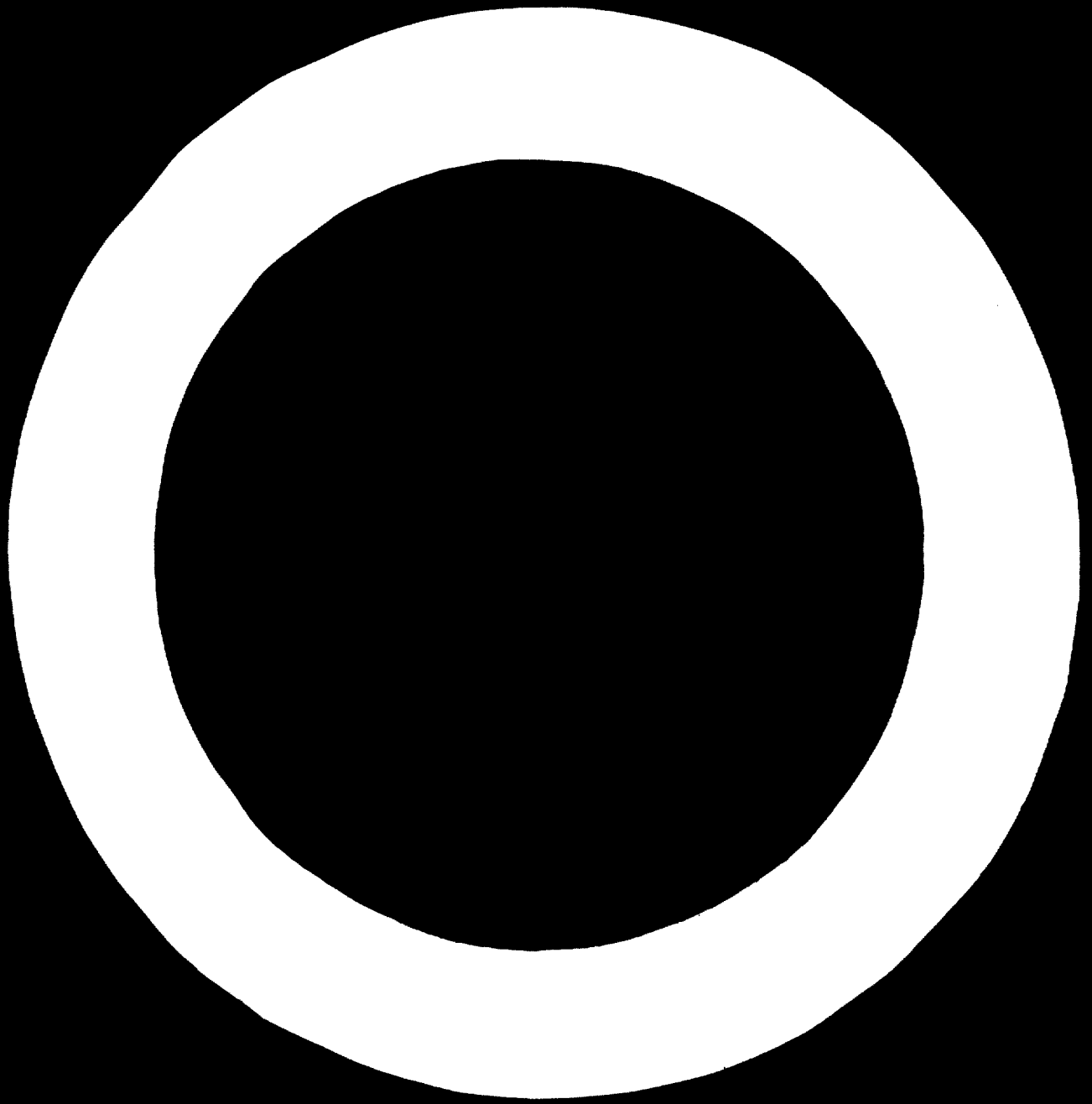
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## APPLICATION OF TINPLATE AS A PACKAGING MATERIAL

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### 1) Introduction

1. For the satisfaction of human requirements, it is the task of the package to give the produced goods the necessary protection and a design adapted to the market conditions. The demands on the package can be characterized as follows:

- a. - The product to be despatched must be protected by the package in such a way that it will not be damaged under normal transport and storage conditions.
- b. - Under the supposition of the necessary security of the delivery in view of damaging and robbery, the employed package shall be as cheap as possible.
- c. - The packaging materials must be applied economically and the special properties of each material exploited appropriately.
- d. - For the manufacture of the package, for packaging and transportation, economical procedures have to be used.
- e. - All progresses and experiences of science, technique and economy have to be taken into consideration for the manufacture and the application of packages.
- f. - By stressing their properties (sales promotion, facilitation of use), form, execution and design must be selected such as to ensure a rational distribution and utilization. The consumers'

requests and expectations on the package have to be found out by market investigations and consumer inquiries. (1)

2. The package has nowadays become an indispensable component for the goods and thus an unalterable prerequisite. In order to meet with the requirements on the package - dependent on the products - an exact planning is necessary.

3. It shall be tried to give a report on the position and development possibilities, in the world, of the packaging material tinplate. Since the packages made of this material are under competition and substitution of other packaging materials and thus can only be judged - as to their further development and their application - in this total connexion, an analysis of the total package must be made.

4. Statistical records in form of a world packaging statistic are not available. According to an information by the World Packaging Organization (WPO) it is worked on this survey recognized as internationally necessary. On this occasion, the request for an accelerated execution of this work which lies in the international interest shall be repeated.

5. For these reasons, largely incomplete individual statements had to be used and various estimates be made which require a verification. Thus only some tendencies can be shown. It must further be pointed out that the analysis' have been elaborated from the viewpoint of a European packaging and marketing expert.

6. I here want to thank the associations and companies which by placing at my disposal documents enabled me to work out this report.

7. It is the aim of this report to lay down an analysis of the importance of the packaging material tinsplate for the packaging industry and consequently for the various economies, and to indicate future possibilities of development for these industries, in particular also in developing countries. As becomes evident from the present figures, just in these countries it has to be reckoned with an increase of the tinsplate<sup>\*</sup>consumption within the next ten years.  
<sup>\*</sup>and blackplate



2) Present Packaging Material Supply and Role of Tinplate

8. The general industrial upwards development in the world also leads to a big growth in the packaging industry. In order to give an example, the developments in the Federal Republic of Germany (FRG) and in Japan shall be referred to. In the FRG, the production of packages increased from about 5.3 billion DM in 1960 to about 10 billion DM in 1969. A comparison of the gross national product (nominal) shows that after heavy fluctuations in the growth rates during the first half of the sixties, a development began in 1965/66 which leads to a certain approach in the growth rates. Details are given in the following table.

Table 1

Increase of the gross national product (GNP) and of the growth rates in the FRG (2)

Year	GNP (bill. DM)	increase %	packages (bill. DM)	increase %
1960	297	11.7	5.31	14.5
1961	326	9.8	5.52	3.9
1962	355	8.9	5.99	8.5
1963	378	6.5	6.71	12.0
1964	414	9.5	7.47	11.4
1965	453	9.4	8.34	11.6
1966	481	6.2	8.71	4.4
1967	485	0.8	8.65	- 0.7
1968	530	9.3	9.31	7.7

9. The development of the Japanese packaging industry shows that compared with 1963 the value of the production volume has become more than double in 1969.

Table 2  
Growth of Japan's Packaging Industry (3)

	1963 %	1964 %	1965 %	1966 %	1967 %	1968 %	1969 %
Paper & Paper-board	100	118	128	145	166	187	214
Cellophane	100	122	130	147	161	182	205
Plastics (pkg. materials & containers)	100	167	196	265	308	346	417
Metal (Pkg. materials & containers)	100	108	124	128	152	172	193
Glass (containers)	100	101	100	112	141	157	175
Closures	100	90	94	125	152	166	182
Wood & Bamboo	100	104	113	122	144	159	174
Textile (Bag)	100	102	121	151	123	131	139
Cushionings	100	123	125	173	188	228	276
Miscellaneous	100	110	119	161	197	235	290
Packing & Packaging Machines	100	133	148	177	244	316	375
Paper Converting Machines	100	110	108	121	141	185	214
Gross Total (Pkg. Materials & Machines)	100	115	123	145	168	189	216

Note: Figures in 1969 are estimated

10. The U.S. development shows that for the period from 1961 until 1968 the growth of packages lies under the growth rates of the gross national products. A certain approach towards a parallel development is noticeable since 1964.

Table 3

Increase of the GNP and of the growth rates for packages in the USA <sup>(4)</sup>

Year	GNP (bill. \$)	Increase %	Packages (bill. \$)	Increase %
1960	503.8		11.530	♦ 3.8
1961	520.1	3.2	11.944	♦ 3.6
1962	560.3	7.7	12.353	♦ 3.4
1963	590.5	5.4	12.055	- 2.4
1964	632.4	7.1	12.840	♦ 6.5
1965	684.9	8.3	13.803	♦ 8.9
1966	747.6	9.2	15.028	♦ 7.5
1967	789.7	5.6	15.712	♦ 4.6
1968	860.6	9.0	16.823	♦ 7.1

11. It may be taken from the present calculations that the percent shares of packaging on the GNP are varying, e.g. in the countries USA, FRG and Austria, around a percentage rate of 1.5 to 2. For instance, the share of packages on the GNP in 1968 amounted to 1.76 % in the FRG, to 1.93 % in the USA, to 1.59 % in Austria.

Table 4

Share of Packages on the GNP

Year	FRG %	USA %	Austria %
1960	1.79	2.28	1.67
1965	1.84	2.01	1.53
1968	1.76	1.93	1.59

12. For the not so highly developed and industrialized countries, one has to start from the principle that the percentage rate of packages on the GNP will in the first instance increase overproportionally.

13. A variety of materials are used for the package. Of essential importance are the groups paper and cardboard, metal, plastics, glass, wood, textile and tissue and others. An analysis of the shares of materials on the gross production value shows the following situation: in the FRG, the most important groups of packaging materials had the following shares in 1968:

**FRG 1968**

Paper and cardboard	47.0 %	
Metals	21.8 %	
	substitution materials (metal)	0.6 %
Plastics	19.4 %	
Glass	8.5 %	
Wood	2.7 %	
Textile and tissue	0.3 %	
Others	<u>0.3 %</u>	
	100.0 %	(2)

14. A division corresponding to materials in Japan shows the following distribution:

Paper and cardboard	49.1 %	
Metal	16.0 %	
Plastics	12.8 %	
Glass	5.3 %	
Wood	9.6 %	
Textile	1.4 %	
Others	<u>5.8 %</u>	
	100.0 %	(3)

15. In the industrialized countries it is normally reckoned with shares of about 50 % for paper and cardboard, 16 to 25 % for metal and 6 to 9 % for glass. For plastics, the shares are internationally varying up to 20 %.

16. Another characteristic of the packaging industry is the fact that a variety of small, middle sized and big manufacturers are on the market. All alone in the FRG, there are already more than 3.000 manufacturers of packages and packaging materials offering their production for the market supply.

17. Here it becomes obvious that there is a continuous development of new procedures for the manufacture and application of the materials and the packages.

18. The packaging industry is left to a close co-operation with the producers of raw-materials and with the filling and packaging industries, in order to guarantee the rational manufacture and possibility of application in the customers' industries. Last not least, the requests and demands of trade and consumer in view of transport, storage and sales presentation are to be taken into consideration.

19. An analysis of the different manufacturers of packages shows that on one hand specialized plants have raised, orientated on one material, e.g. tinplate. From this basic material, the different packages are produced. On the other hand, big plants have developed which are processing various materials for packages. The reason for this lies in the principle of supplying a customer, e.g. the food industry, with different packages. With this kind of operation, the experiences and knowledges of the filling industry are exploited in order to be enabled to offer an economically favorable package for each purpose. For instance, manufacturers of blackplate packages also produce so-called composite containers representing a combination of paper and metal. With the manufacture of substitution packages, these manufacturers stay conscious of their problems, i.e. they are product-orientated.

20. Among the manufacturers of <sup>tinplate and</sup> blackplate packages it is noticeable that during the recent years there came up more and more combinations of tinsteel and aluminium. In this context, one may recall the introduction of aluminium easy-opening ends which are also produced by manufacturers of blackplate packages in order to meet with the demands raised by trades and consumers, i.e. to offer more convenience for can opening. For many <sup>tinplate and</sup> blackplate packages, e.g. for the general line sector (i.e. pails, drums, etc.), plastic accessories in form of caps, screwings, discharging necks etc., are used to an increasing extent. These accessories, too, are produced by a number of self-manufacturers. The customer of these packages thus has the security of receiving from one supplier the entire package and thereby the guarantee of the functional capacity of one supplier. Furthermore, the customer knows for certain that in combinations of materials the properties of the different materials are optimally exploited. For instance, plastic caps and screwings on metal containers enable the desired easy and simple closure.

21. For the economy of the packaging industry, the location is essential. Historically seen, this industry, from its very beginning, was forced to install its plants near the production areas of products to be packed in order to save transport costs. The expected growth of packaging due to the increasing consumption by packers and fillers raises the question when and under which conditions self-manufacture of packages in customers' plants may be effected economically.

22. First of all, one has to start from the principle that the manufacturer is domiciling near the filling industry. If these are plants with so low a need of packages that the necessary high-capacity plants, e.g. for the can manufacture, would not be fully exploited it is obvious that there is no question of a self-manufacture of cans. Another situation is given when for instance a big condensed milk producing plant - because of its can consumption - decides to take up self-manufacture. Considering the experiences made up to now, a self-manufacture becomes rational if at least two can manufacturing lines can be installed. Depending on the economic conditions, a minimum acceptance of 100 mill. cans p.a. must be the basis. This figure can be varying on the products and on the size of packages.

23. Another possibility of economical self-manufacture in the customers' plants is a system based on an agreement between a can manufacturer and a customers' plant. A long-term contract is concluded between customer and packaging manufacturer, under which the customer fulfils some functions which were previously carried out by the can manufacturer. The customer also bears part of the capital investment. The customer makes a building available in which the production equipment for the can manufacture is installed. Furthermore, he has to supply the electrical energy, gas, water, thermal energy, etc., required for the operation of the equipment. The can manufacturer then installs the machinery for the manufacture of cans, and the customer makes a can conveyor system and a warehouse available for accomodation of empty cans. The can manufacturer guarantees and supplies a minimum number of cans per day. The can manufacturer makes operating personnel available and takes care of and inspects the production. In a so-called mother plant, the special productions, e.g. bottoms and tops, are executed.



24. This combination has the following advantages for the customer:

- He will be able to employ the best available techniques of can production.
- He will have the advantage of participating in the developments made by the can producer.
- He will not need to invest in more expensive high-capacity installations.
- He will save costs as compared to the present system of supply by the can producer.

25. This system has made its proves in the past years, e.g. in the U.S. beverage industry. However, as said already, the prerequisite is a correspondingly high need of cans per day.

2a) The Total Packaging Consumption in the World in mill. \$

26. Since there is no world packaging statistic available, the indication of a world packaging requirement is only possible if based on estimates and assumptions. In the different scientific publications a world packaging need of about 60 billion \$ is supposed. This amount also includes the values of the world production of packaging machines, as well as the costs for development, technical assistance, fees, etc. An estimate of packaging supplies for 1970 in the following 20 countries gives a total of 42.170 billion \$. According to calculations made by market research institutes and other experts, about 4 billion \$ have to be added for the countries USSR, German Democratic Republic, CSSR, Poland, Rumania, Hungria, Yugoslavia, Bulgaria, Albania etc., so that - including the not listed countries of the world - a packaging volume of about 54 billion \$ can be reckoned with.

TABLE I

Packaging-Supplies Sales Forecast for Different Countries (Millions of Dollars)

	'70 (est.) \$	per capita consumption*	'67 (est.) \$	increase \$	increase %	Average annual % increase
United States	20.0	52	15.6	4.4	28.2	9.4
Japan	4.00	37	2.31	1.77	76.0	23.5
West Germany	3.00	51	2.42	1.14	45.9	15.2
France	2.90	58	2.32	0.58	25.0	8.3
United Kingdom	1.98	39	1.50	0.38	23.8	7.9
Italy	1.80	33	1.34	0.46	34.0	11.4
Canada	1.54	73	1.15	0.39	33.0	11.3
India	0.820	1	0.000	0.020	--	--
Australia	0.680	55	0.532	0.148	27.3	9.3
Mexico	0.660	12	0.180	0.180	37.5	12.3
Sweden	0.600	19	0.180	0.120	25.0	8.3
Netherlands	0.600	45	0.435	0.145	31.9	10.0
Brazil	0.600	6	0.554	0.046	7.3	2.8
Belgium	0.500	52	0.390	0.110	28.2	9.4
Argentina	0.430	17	0.295	0.135	45.5	15.3
Switzerland	0.400	64	0.315	0.085	27.0	9.0
Denmark	0.330	67	0.240	0.090	37.5	12.5
Austria	0.270	36	0.215	0.055	25.6	8.3
Norway	0.250	64	0.165	0.085	51.5	17.2
Venezuela	0.200	19	0.170	0.030	17.6	5.9
<b>TOTAL:</b>	<b>42.170</b>		<b>31.831</b>	<b>10.339</b>	<b>32.5</b>	<b>10.8</b>
Eastern countries	4.0					
Other countries (estimated)	10.0					
<b>TOTAL:</b>	<b>56.0</b>					

\* private estimate

27. The per capita consumption of packages in the different countries may only be considered as an approximative statement.

- a) - The estimates of the packaging material volume 1970 are optimistic for some countries (price changing rates resulting in a further increase, are not known as yet).
- b) - The population figures are partly going back to 1961 since there are no up-to-date figures available yet.
- c) - Generally, the average might be lower.

28. The recovering need for packages is obvious for various countries, in order to secure a better supply of the population with packed products.

29. Since for the last countries mentioned there exist no comparative figures or estimates for 1967, the increase and average annual increase percentage cannot be shown.

30. A reference point, for instance in Eastern Europe, is given in a calculation which for the years 1965 to 1983 is coming to the following result: In 1965, the material consumption per capita was at 41 DM in Eastern Europe. Based on a tendency calculation, an increase up to 217 DM per capita is expected for 1983. This would result in a growth rate of 449% from 1965 to 1983. On the same basis, the following statements have been made for Western Europe: Average material consumption per capita in 1965: 106 DM, 1983: 266 DM, i.e. an increase from 1965 to 1983 by 176%. These tendency values are inferior to the a.m. estimates of Modern Packaging.

31. It seems to be justified for all packaging and substitution materials to count with an annual growth rate of 8 to 10% (value) in the world. It is emphasized once again that for these estimates the tolerance lies between 10 to 20%.

32. Another point of reference for the consumption of selected packaging materials for 1970 in billion \$, excluding Eastern Europe, is an investigation of Modern Packaging, Economic Department Survey, which was published in International Management, May 1970, shown below:

Table 6

Consumption of Selected Major Packaging Materials, 1970  
(in billions of US \$ and excluding the Eastern Countries) (C)

Area	Paper and Paperboard \$	Metal \$	Films and Foils \$	Glass \$	Rigid and semi-rigid Plastics \$
North America	8.115	4.353	1.779	1.583	521
Europe	5.371	2.882	1.176	1.045	396
Asia	1.536	824	337	299	111
South America	480	258	106	93	37
Oceania	303	163	67	59	22
Africa	123	67	26	24	9
<b>TOTAL:</b>	<b>15.928</b>	<b>8.547</b>	<b>3.491</b>	<b>3.103</b>	<b>1.166</b>

Note: Total dollar value (US) of the major materials categories above is \$ 32.235 billion (about 75 % of total world spending on all packaging materials). The balance is accounted for by other materials, such as aerosol components, closures, wood, textiles, etc., and by fragmentary consumption by countries not included in the table.

2b) Tinplate Consumption for Packaging in the World

33. For demonstration of the world tinplate consumption, the market supply (i.e. imports and domestic supply) of all tinplate processing countries of the world are compared in metric tons for the years 1960 to 1969 (tinplate and tinplate coils).

Table 7  
Market Supply (7)

	1960 1,000 t	1969 1,000 t
<u>E.C.S.C. (European Coal and Steel Community)</u> <u>(FRG, Belgium, France, Netherlands, Italy)</u>	1,078,900	1,741,450
<u>England</u>	716,000	928,750
<u>E.C.S.C. + England</u>	1,794,900	2,670,200
<u>Other West European Countries</u> (Denmark, Finland, Norway, Sweden, Eire, Iceland, Portugal/Madeira, Spain/Can. Islands, Austria, Switzerland, Greece, Malta, Turkey, Cyprus)	378,100	708,100
<u>East European Countries</u> (Albania, Bulgaria, Yugoslavia, Poland, Rumania, USSR, Hungary)	127,100	287,600
<u>USSR</u>	276,000	458,500
<u>EUROPE TOTAL</u>	2,576,100	4,154,900
<u>AFRICA</u>		
<u>North Africa</u> (Egypt, Algeria, Maroc, Tunisia)	44,000	72,350
<u>Middle Africa</u> (Angola, Ethiopia, Ivory Coast, Ghana, Kenya, Congo, Libya, Madagascar, Mozambique, Nigeria, Rhodesia/Njassaland/Sambia, Senegal, Somali, Sudan, Tanzania, Uganda, other countries)	23,500	78,000
<u>South Africa</u> (Including South-West Africa)	119,200	169,400
<u>AFRICA TOTAL</u>	186,700	319,750

Table 7 continued

	1960 1,000 t	1969 1,000 t
<b>AMERICA</b>		
<b>North America (USA, Canada)</b>		
	5,142.300	5,115.800
<b>Central and South America</b>		
(Argentina, Bolivia, Brazil, Chile, Costa Rica, Domin. Republic, Ecuador, Guatemala, Columbia, Cuba, Mexico, Nicaragua, Panama, Paraguay, Peru, Salvador, Uruguay, Venezuela, Trinidad/Tobago, etc., Jamaica, Haiti, other countries)	517.800	834.000
<b>AMERICA TOTAL</b>	5,660.100	5,949.800
<b>ASIA</b>		
<b>West East</b>		
(Aden, Irak, Iran, Israel, Jorjania, Lebanon, Saudi-Arabia/Cu- velt, Syria)	37.200	109.500
<b>Far East</b>		
(Afghanistan, Burma, Ceylon, China, Formosa, Taiwan, Hongkong, In- dia, Indonesia, Cambodia, Corea (North and South), Malaysia (Singa- pore), Pakistan, Philippines, Thailand, Vietnam/Laos, Ryuku-Islands/ Okinawa, others)	405.700	638.750
<b>JAPAN</b>	361.400	739.900
<b>ASIA TOTAL</b>	804.300	1,488.150
<b>Australia and Oceania (incl. New Zealand)</b>	185.500	294.000
<b>WORLD TOTAL</b>	9,412.700	12,206.600



34. Thus, in the years from 1960 to 1969, the market supply in the whole world increased from 9.4 mill. t to 12.2 mill. t, whereby these figures are estimates. TFS materials are not included. It must further be pointed out that according to estimates, up to 10 % of the utilized tinplate is not destined for packaging purposes. A division of the total consumption of tinplate, tinplate coils, blackplate and TFS in the FRG in 1968 shows that 93 % have been used for packages. The remaining 7 % are destined for different steelplate goods, musical instruments and toys, gymnastic apparatuses, mechanical and optical articles and other consumers.

35. The tinplate consumption for packages in 1968 has been statistically specified for the FRG and USA, as follows:

FRG

Fruit and vegetables	16.1 %
Other food	15.4 %
Milk and milk products	15.0 %
Meat	8.3 %
Fish	5.5 %
Crown corks	6.3 %
Other closures	2.7 %
Chemicals	24.6 %
Aerosols	4.2 %
Pharmaceuticals	1.9 %
	<u>100.0 %</u>

USA

Fruit and vegetables	26.6 %
other food (incl. beverage cans)	51.6 %
Milk and milk products	2.5 %
Meat	3.9 %
Fish	2.0 %
Chemicals	10.2 %
Aerosols	3.2 %
	<u>100.0 %</u>

A survey on different countries

<u>FRG</u>	60.3 % for cans, preserves, for food incl. fancy boxes
	30.7 % for packages for the chemical and pharmaceutical industry and aerosols
	9.0 % closures and crown corks
<u>France</u>	63.0 % food cans
	31.0 % preserves, fancy cans for food, pet-food cans, aerosols and packages for the chemical industry
	6.0 % Closures and crown corks
<u>Netherlands</u>	69.0 % only food cans
	26.0 % preserves, fancy cans for food, pet-food cans and packages for the chemical industry, aerosols
	5.0 % closures and crown corks
<u>Italy</u>	79.0 % cans, preserves for food incl. fancy boxes
	21.0 % only packages for the chemical and pharmaceutical industry (including closures)
<u>USA</u>	87.0 % cans/preserves for food incl. closures
	13.0 % only packages for the chemical and pharmaceutical industry

34. For the packaging industry, it is of special interest that the trend towards electrolytic tinsheets virtually increased up to 95 %. For comparison: In 1960, the share of market supply in the FRG for hot-dipped tinsheet was 39.4 %, in 1968 5.4 %, i.e. 1968 already 94.6 % electrolytic tinsheet material was used. In this context it must be mentioned that for instance in the USA-statistic there is no hot-dipped tinsheet specified separately since 1968, the share being too small. Apart this, we want to point out that the production of blackplate, blackplate coils

and TFS materials shows a noticeable increasing trend. For instance, in the USA already about 965.000 t of these materials were produced in 1968. For the next years, an increasing share of these materials must also be reckoned with in other industrialized countries.

### 2c) Stable Market for Tinplate

35. For a review on the development of the consumption of processed food, reference is made to an investigation by some European companies. The different tables and diagrams are attached to this report.
36. An analysis of the different per-capita consumptions of canned foods (kgs per capita p.a.) shows the production and consumption potential in the different countries.
37. Fruit. With a consumption of more than 11 kg per head, the USA are the most important consumers, followed closely by the United Kingdom with 10 kg/head, but countries like the FRG and Belgium also reached a per-capita consumption of more than 6 kg.
38. Vegetables. A similar situation is observed on this market. The USA report a consumption of 20 kg, the U.K. of 16kg, France of 10.6 kg and Western Germany of 8.6 kg.
39. Milk. With respect to condensed milk, the FRG has reached a per-capita consumption of more than 8 kg, only surpassed by Belgium with 10.7 kg.
40. Fish. For fish, the highest consumption can be stated in the Northern countries, as e.g. Norway with 4.5 and Sweden with 3.5 kg.
41. Meat. For processed meat, a per-capita consumption of 6.7 kg is stated for the USA, followed by the U.K. with 5.6 and Sweden with more than 4 kg per head.

42. Fruit juices. The most important consumers of fruit juices are the FRG, the USA, and Norway and Sweden.

43. Soups. For soups, the U.K. reached a per-capita consumption of approx. 5 kg compared to 13.2 kg in the USA.

44. The figures obtained by this investigation refer to processed food which may be packed in tinfoil, aluminium or glass containers. They do not permit any direct conclusion regarding the share of tinfoil containers but should be further analysed.

45. The following situation results from estimates for processed fruit in the FRG in 1969. Total per-capita consumption is approx. 6.1 kg, whereby cans account for 3.3 kg and glass containers for 2.8 kg. Total consumption in the U.K. is 10 kg, the major portion of which comes in cans. The comparatively high share of glass jars in the FRG is exceptional in the European and world patterns. Reasons are, on the one hand, the high imports of food in glass jars from the Eastern European countries and, on the other, a comparatively high domestic production of e.g. apple sauce.

46. Per-capita consumption of processed vegetables in the FRG amounts to 10.1 kg - cans account for 7.9 kg, glass jars for 0.9 kg and frozen vegetables for 1.3 kg. Estimated figures for the U.K. for comparison: Total per-capita consumption is 19.5 kg, of which 16.3 kg are canned and 3.2 kg frozen. The share of glass jars is not known. The statistics for the individual countries show considerable differences in the per-capita consumption of processed food. The consumption of some products in the U.K., for instance, is twice that of the FRG.

Furthermore, the share of canned food in the total per-capita consumption in kg differs. As explained by the example of processed fruit, this share is higher than in other West European countries. Reasons are manifold. The glass industry contributed to this development, their slogan "Nothing hidden behind glass" has consumer appeal. In general, we must admit that the image of tinplate packaging needs improvement.

47. For the consumption of tinplate, chemical, technical and pharmaceutical products are particularly important apart from food products. Paints and varnishes, other chemical and technical products as well as mineral oil products are very significant. These products account today for about 30 % of total sales of the German tinplate container manufacturing industry. Aerosol packages show outstanding growth, since this convenient package is adopted for a steadily growing variety of products.

48. A large portion of tinplate is used for the manufacture of closures and crowns. With increasing use of one-way glass containers in the form of beverage bottles as well as jars for various products such as jam, honey, certain processed products like sausages, etc., the demand for crown corks and other tinplate closures, for instance vacuum closures, will continue its upward trend.

2d) Trends of Tinplate Consumption for 1960 to 1970

49. The increase of tinplate consumption, i.e. the supply of all countries of the world with tinplate in sheet and coil form, from 9.412 million metric tons to 12.206 metric tons equals a growth rate of 30 %. Broken down by continents and groups of countries, the following picture results:

Table 8

Market Supply in Million Tons of Tinplate Sheets and Coils

	1960	1969 <sup>o)</sup>	growth rate
Europe	2.576	4.154	61 %
Africa	0.186.7	0.319	72 %
North America (incl. TFS, etc.)	5.142	5.115 (6.115)	- 0.05 % (+ 19.0 %)
Central and South America	0.517	0.834	61 %
America total	5.660	5.949	5 %
Asia	0.804	1.488	85 %
whereof Japan	0.361	0.739	104 %
Australia, Oceania	0.185	0.294	59 %
World, total	9.412	12.206	30 %
		(incl. TFS etc. 13.206)	(40 %)

<sup>o)</sup> preliminary, estimated

50. An analysis of this development reveals the following facts:

- a) - With reference to the volume by weight, growth rates for the various continents range between 60 to 100 %.
- b) - In the USA, market supplies stagnate. If both tinplate and TFS for packaging are considered, the increase is approx. 1 million tons.

- c) - If the plate surface area is taken as a basis, growth is considerable, especially in the U.S.A. It is assumed that estimates are correct specifying that 40 % of the total tinsplate and TFS plate consumption is double-reduced material today. Plate is reduced to a thickness of 0.12 mm. A similar development will take place in Europe and other countries in the next few years.
  
- d) - The decisive factor for the packaging industry is the production volume. In 1969, for instance, the USA produced about 28 billion beverage cans. A rise to approx. 40 to 50 billion beverage cans is expected for 1975.



### 3) Future Application of Tinplate as a Packaging Material

51. The future world consumption of tinplate will be governed by the following factors:

- a) - To what extent the expected use of non-tincoated plate and TFS materials will increase, particularly in North America, Europe and Japan.
- b) - To what extent tinplate thickness may be further reduced.
- c) - To what extent production capacities will be expanded, i.e. for the manufacture of tinplate containers and for the manufacture of products to be packed in the food and non-food industries of Eastern European countries, USSR, Asia, Africa and Central and South America.
- d) - To what extent new products, such as beverages (beer, soft drinks, mineral waters, etc.) will be marketed in one-way containers in Europe and other countries of the world.
- e) - To what extent staple products, such as fish, fruit and vegetables, milk, meat, etc., as well as non-food standard products will be produced in the developing countries for own consumption and for export.
- f) - To what extent the adoption of blackplate and tinplate packages, i.e. non-returnable packages, for non-food products will increase and returnable steel containers will be abandoned.
- g) - To what extent the overall standard of living and population increase and, as a consequence, the industrialization will advance further.

52. In Europe, for instance, considerable growth is expected for the future for the products coffee, pre-cooked meals, soups, pet-food, fish and meat specialties as well as beverages and aerosols.

53. According to estimates made in various European countries, an average increase of 4 per cent p.a. is expected for the years from 1969 to 1975.
54. Investments in the food processing industries of some Eastern European countries, which have been reported, give reason to assume that an above-average rise in the consumption of tinplate may be expected for these countries.
55. The USA expect an increase of the total consumption of tinplate and TFS stock on account of a further growth for beer and beverage cans. A stagnation of the tinplate consumption and even a decline of the tonnage may be expected, but the figure for consumed plate area will increase.
56. In industrialized Asian countries, for instance in Japan, growth rates of above 4 per cent p.a. are also expected.
57. On account of the recent development of African, Asian and South American countries one may assume an above-average growth for these countries as well. In these countries, the consumption of tinplate in tons is likely to increase substantially, because the conversion of other materials is not possible everywhere on existing production facilities.
58. In view of the previous development of the world tinplate consumption, both for sheets and coils, a conservative estimate of the annual growth rate until 1975 is 2 to 2.5 per cent. This average rate is taken as a basis for planning until 1980 by several experts. It should be emphasized once more that these growth rates depend largely on individual decisions by the various countries, as the necessary investments must fit in their plans.

59. Despite this overall growth, declines resulting from substitution by other packaging materials must be expected for some products until 1975. A few examples are listed below showing which products of the food and non-food markets are concerned in Europe and especially in the FRG:

- Tinplate packages for instant coffee replaced by glass jars.
- Tinplate packages for other instant products and dry baby food replaced by composite containers and plastic packages.
- Tinplate packages for pickled vegetables and cabbage, e.g. red cabbage, replaced by glass jars.
- Tinplate packages for baby food replaced by glass jars.
- Tinplate packages for motor oil replaced by plastic containers.
- Tinplate packages for certain dispersion paints and other non-food products replaced by plastic containers.

60. It should be mentioned in this context that reverse developments may occur in these product markets due to marketing decisions as well. This applies especially to such products which are exported, stored for long periods or which should not require special care during transport. In these cases, tinplate and blackplate are naturally preferred materials.

61. Apart from glass and plastics, paper and combined materials such as foil laminations and composite containers, a replacement by aluminium must be expected for various steel cans. This is particularly true for aerosol cans (mainly cans below 6 oz. capacity) in Europe. It is also applicable for cans for cosmetic products like skin cream and portion pack cans for meat and meat spreads as well as for some fish can types which are replaced by drawn aluminium cans.

#### 4) Conclusions

62. On account of the rising standard of living and the resulting increase in consumption, a further growth of the demand for packages may be expected in the industrialized countries, whereas in the developing countries the development will largely depend on the creation of new food producing and processing industries to fight starvation as well as the production of export goods, for which packages will be required on a growing scale.

63. Consequently, an increasing demand for packages may be expected for all countries of the world for the next years.

64. On account of their technical and economical features, tinplate and steel packages meet the requirements for protection and appearance in an outstanding manner. More and more high-quality food must be easily transported to the place of consumption and needs protection for sufficient storage life. Apart from a better supply of the domestic population, specialties as well as staple goods for export are essential factors. Processed fish products and exotic ready-to-serve dishes as well as ingredients, spices and staple products like canned fruit from the South may gain a large market, as is proven by examples from India and other countries. A peanut producer in Persia packs peanuts in vacuum cans which are exported to Europe and North America. Special marketing campaigns by export or import companies succeed in creating a demand for these products in industrialized countries and thus secure export sales of these products. The fact that here exporters were able to change this fruit into a branded item in our countries, proves that many other products may also find an outlet. The increasing import of processed products in the industrialized countries all over the world evidences that many countries have perceived these opportunities and are seizing them.

65. Technical and marketing experts should support the developing countries in solving their packaging problems and finding the optimum marketing methods for the individual countries.

66. On account of their inherent features - light weight, no breakage, optimum protection of packed product, excellent suitability for decoration and printing, easy manufacture on proved production equipment, rational filling and closing, relatively low price of package, acceptance by trade and consumer, safety in transport, etc. - tinsplate and blackplate packages have been and will be economical means of packaging, including and especially for staple goods, also in the future.

67. Numerous institutions and companies in industrialized countries are actively working on the further technical development of these packages, they warrant also on the production and application side that these tinsplate and blackplate packages will meet the requirements for increased economy.

**LITTERATURE**  
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**Different Company Reports**

A N N E X

**EUROPE AS A MARKET FOR CANNED FOOD**  
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The following statistical indications and estimates have been collected on the basis of different national records by the firms: A/S Haustrups Fabriker, Denmark - Oy G.W. Sohlberg Ab., Finland - J.J. Carnaud et Forges de Basse-Indre, France - Schmalbach-Lubeca-Werke AG, Germany - The Metal Box Company Ltd., Great Britain - Thomassen & Drijver - Verblifa N.V., Holland - Noblikk-Sannem A/S, Norway - Olmesa, Compania International de Envases, S.A., Spain - Aktiebolaget Platmanufaktur, Sweden - Louis Sauter A.-G., Switzerland - Continental Can Company, Inc., USA -

Notes on the statistical data

For better comparability of the figures given in the following pages we have defined what has been covered by the different countries (Germany, Belgium, Denmark, France, Netherlands, Sweden and Great Britain) of the different processed products. This definition must not be regarded as complete, all the more since there could not yet be made statistical definitions of the products in question of other countries (Austria, Finland, Italy, Norway, Portugal, Spain and Switzerland).

We are endeavoring to reach definitions for all countries which would improve the statements.

For better understanding of the tables we point to the following legend:

- means "Zero or insignificant"
- means "estimated"
- ;1.000 litres"

The particular products on which the individual figures are based are defined as follows:

Fruits

Germany:

All fruits in cans and glass-jars - excl. dried fruits and deep-frozen fruits, candied peel, orange peel, marmelade and jelly.

Belgium:

Processed fruits - excl. dried fruits and deep-frozen fruits, candied peel or orange peel.

Danmark:

Processed fruits - excl. dried fruits, candied peel, jam and jelly.

France:

Packed in cans: fruits in pieces and whole fruits, chestnut-sauce, apple-sauce, fruits in syrup, jams and jelly.

Nether-lands:

Processed fruits in syrup or water, syrup in cans and glass-jars inclusive of apple sauce - excl. dried fruits and deep-frozen fruits, candied lemon or orange peel.

Great-Britain:

Processed fruits - excl. dried and deep-frozen fruit, candied peel, marmelade and jelly.

Vegetables

Germany:

Vegetables in cans and glass-jars - excl. processed pickled cucumber, dried vegetables, deep-frozen vegetables, vegetables in vinegar, Sauerkraut.

Belgium:

Processed vegetables - excl. cucumber, dried and deep-frozen vegetables.

France:

Canned: peas, tomatoes, beans, asparagus, Leipsiger Allerlei, spinach, mushrooms, celery, ready-to-serve meals, truffles and other vegetables.



Netherlands: Processed vegetables in cans - excl. pickled vegetables, dried and deep-frozen vegetables, ready-to-serve meals.

Sweden: Processed vegetables - excl. cucumber, dried or deep-frozen vegetables, pickles and Sauerkraut.

Denmark: Processed vegetables - excl. cucumber, dried or deep-frozen vegetables, pickles and Sauerkraut.

Great Brit.: Processed vegetables - excl. cucumber, dried or deep-frozen vegetables, pickles and Sauerkraut.

Milk

Germany: Condensed rich milk - excl. milk powder, processed cream and bottled milk, milk powder products.

Belgium: Condensed rich milk - excl. milk powder, processed cream or bottled milk.

Denmark: Condensed rich milk - excl. milk powder or milk powder products and processed bottled milk.

France: Sweetened and unsweetened condensed milk and milk powder.

Netherlands: Sweetened and unsweetened condensed milk, sweetened skimmed milk in cans, - excl. coffee cream in cans, milk powder in cans and in bags.

Sweden: Evaporated milk - excl. milk powder or milk powder products, processed cream and processed bottled milk.

Great  
Britain:

Condensed milk - excl. milk powder or milk powder products, processed bottled milk and processed cream.

Fish

Germany:

All fish preserves inclusive of semi-preserved - excl. marinades, other smoked fish and pickled herrings.

Belgium:

All fish preserves - excl. marinades, smoked fish and pickled herrings.

Denmark:

All fish preserves - excl. marinades, smoked fish and pickled herrings.

France:

In cans: anchovy, sardines, tunny, mackerals, sprats, sea-fish, other fish and shell-fish.

Netherlands:

Fish in cans or glass jars inclusive of marinades - exclusive of dried or frozen fish and shell-fish.

Sweden:

Processed fish in cans inclusive of sardines, anchovis, pickled herrings (in vinegar and spices), tunny, mackerals, Salmon, fish spawn, and fish in cream, shell fish (lobster, shrimp, etc.)

Great-  
Britain:

Processed fish in cans - excl. marinades, smoked fish and pickled herring.

Meat

Germany:

Meat preserves inclusive of sausage and poultry preserves - excl. sausage products and meat products and meat based delicatessen.

Belgium:

Meat preserves inclusive of sausage preserves - excl. non processed sausage products or meat products, meat salads or delicatessen with meat.

Denmark:

Meat preserves inclusive of sausage preserves - excl. non processed sausage products or meat products, meat salads or delicatessen with meat.

France:

Meat preserves from pork, mutton and beef in cans inclusive of ham, liver-paté, chopped meat steak, and pastries, ready-to-serve-meals, game, poultry, and rabbit with or without truffles, other kinds of meat not specified.

Netherlands:

Meat inclusive of poultry in cans, sausages in jars - excl. ready-to-serve-meals.

Sweden:

Meat preserves inclusive of sausage and poultry preserves and mixed meat preserves - excl. non preserved meat and sausage products, meat salads, or meat based delicatessen products.

Great-Britain:

Meat preserves inclusive of sausage, poultry and mixed meat preserves - excl. non preserved sausage and meat products, meat salads and delicatessen products with meat content.

Fruit juices

Here only the data of France are available?

France:

All canned fruit juices.

SOUPS:

Here only the data of Germany, the Netherlands, and Sweden are available:

- Germany: Ready-to-serve-soups - excl. other soups, sauces and broths.
- Netherlands: Soup preserves in cans and in jars - excl. dry soups.
- Sweden: Soups preserves with meat, fish or fruits.

1. SUMMARY OF CANNED FOOD PRODUCTION

METRIC TONS  
(\*000)

YEAR	FRUIT	VEG	MILK	FISH	MEAT	FRUIT JUICES	TOMATO JUICE	SOUP	BEER (000 HL)	PET FOOD	READY MEALS
AUSTRIA	1965 2.4	17.8	6.6	-	6.2	-	-	0.6			
	1966 2.7	25.6	7.0	-	9.0	-	-				
BELGIUM	1965 32.3	71.2	119.4	1.9	12.5						
	1966 32.8	94.9	139.6	3.2	13.9						
	1967 33.6	117.0	157.1	N.A.	15.7						
	1968 37.1	109.3	171.9	N.A.	14.0				5.9	N.A.	N.A.
DENMARK	1965 3.3	24.2	11.9	13.0	113.8	N.A.	N.A.	1.7			6.3
	1966 2.4	24.4	N.A.	14.7	172.1			1.6			5.2
	1967 3.3	25.1	12.0	15.7	149.4	3.2		1.5	5.4	N.A.	6.2
	1968 3.1	24.1	63.0	17.2	161.3	3.7		2.0	5.5	N.A.	6.5
FINLAND	1965 -	5.0	-	5.5	7.5			0.9			
	1966 -	9.2	1.2	4.1	7.0	7.2		1.2			
	1967 0.1	5.1	0.4	5.7	5.6	6.8		1.3			
	1968 0.2	6.7	0.3	1.5	2.4	6.6		3.3			
FRANCE	1965 126.7	452.0	121.0	52.3	52.3	2.6	5.3	3.1	24.0		24.7
	1966 117.2	513.0	205.1	64.8	49.9	3.6	7.3	4.1	48.0		103.5
	1967 126.0	577.5	227.1	71.8	51.5	2.3	5.8	4.6	44.0		107.0
	1968 132.2	574.9	215.3	62.4	51.0	3.1	7.9	4.5	55.0		100.3
GERMANY	1965 110.0	228.5	401.0(9)	58.5	130.1	332.5	1.3	29.7	191.3	3.0	38.9
	1966 94.4	237.6	447.5(9)	61.4	145.0	252.6		34.5	250.2	4.4	39.3
	1967 107.2	311.5	465.0(9)	59.4	140.1	316.5		33.6	350.1	3.0	42.0
	1968 137.1	271.7	412.0(9)	59.4	141.1	299.5		39.7	420.0	6.0	44.0
GREECE	1965 15.3	26.3	-	9.4	6.3	35.7		-	5.0		
	1966 23.0	7.0	N.A.	-	-	26.0		-			3.5
	1967 19.0	7.3	1.0	-	-	27.5	N.A.	-			3.0
	1968 20.0	78.8	362.9	11.0	94.7		N.A.	31.0	63.0		9.3
HOLLAND	1966 19.0	104.8	338.0	10.3	113.0			36.4	62.6		9.7
	1967 11.5	114.2	337.4	10.2	107.8			41.2	73.7		10.6
	1968 33.1	110.2	358.9	11.3	133.1			53.6	83.1		11.2
ITALY	1965 33.0	405.0	14.0	13.0	30.0	N.A.		6.0			
	1966 55.0	420.0	14.0	10.0	35.0	32.0		6.0			
	1967 -	-	-	-	-	35.0		6.0			
	1968 -	-	-	-	-	-		-			

1. SUMMARY OF CANNED FOOD PRODUCTION (CONTINUED)

METRIC TONS  
(1000)

YEAR	FRUIT	VEG	MILK	FISH	MEAT	FRUIT JUICES	TOMATO JUICE	SOUP	BEER (000 ML)	NET FOOD	READY MEALS
1965	10.2	11.2		40.5	15.5	8.4	0.3				
1966	11.2			44.0	10.5	10.7					
1967		1.6				9.7				0.2	
1968											
1969											
1970											
1971	13.0	20.0		65.0	9.0	28.6 (B)	5.2				
1972	22.0	20.0		64.3	12.2	28.7 (B)	5.4				
1973	25.2	26.5		72.0	10.6	35.0	6.3		9.4		
1974	26.6	30.6			11.1	45.8					
1975	27.2	28.2	8.9	22.2	27.2	2.9 (B)		15.0	100.0		
1976	30.6	35.5	7.8	16.1	27.9	3.2 (B)		12.8	80.0		
1977	31.1	31.1	7.1	24.1	27.7	4.2 (B)	0.1 (E)	11.8	166.5		
1978									627.0		
1979											
1980											
1981											
1982											
1983											
1984											
1985	26.5 (C)	65.2	37.1	6.1	89.1			290.3 (A)	1,036.0	260.0	62.9 (F)
1986	26.1 (B)	71.2	67.7	8.3	104.1			302.6 (A)	1,067.0	261.0	75.3 (F)
1987	31.5 (C)	75.8	61.8	6.4	113.2			269.9 (A)	1,255.0	288.0	82.2 (F)
1988	32.1 (C)	77.1	53.6	6.0	129.3			271.4 (A)	1,588.0	300.0	99.9 (F)
1989	32.4 (C)	77.5	42.1	53.0	93.0	1,385.3 (B)	53.2	878.1	39,203.5	1,066.5	
1990	23.9 (C)	4,104.0	948.5	533.8	1,566.2	1,625.0 (B)	525.0	2,436.5	95,760.0	1,145.0	
1991	2,023.0	3,858.0	126.6	531.3	1,205.5	791.1	439.0	2,651.3	48,100.0	1,215.1	
1992											

(A) U.S. SOUP; READY TO SERVE EQUIVALENT  
 INCLUDES CANS AND BOTTLES  
 (B) U.S. FRUIT; INCLUDES FRUIT PRESERVES  
 (C) BULKY LITRES AND INCLUDES GLASS  
 (D) BULKY LITRES  
 (E) ALUMINUM INCLUDES WASH MEAT  
 (F) 1,000 LITRES  
 (G) ESTIMATE



2. SUMMARY OF IMPORTS OF CANNED FOOD (CONTINUED)

NETTAE TONS  
(\*000)

YEAR	FRUIT	VEG	MEAT	FISH	MEAT	FRUIT JUICES	VEGETABLE JUICES	SOUP	SOUP (000 ML.)	PEST FOOD	READY MEALS
FRANCE	17.2	3.3	0.3	1.3	0.3	2.8	-	0.2	-	0.1	-
1965	12.2	3.7	0.3	2.0	0.3	2.6	-	0.1	-	0.1	-
1966	10.7	3.8	0.2	1.6	0.2	2.8	-	0.1	-	0.1	-
1967	12.5	0.1	0.3	1.3	0.3	3.2	N.A.	0.2	-	0.3	N.A.
1968	-	-	-	0.3	-	-	-	0.3	4.6	-	-
1969	-	-	-	0.2	-	-	-	0.3	-	-	-
1970	-	-	-	0.2	-	-	-	0.3	-	-	-
1971	-	-	-	0.2	-	-	-	0.3	-	-	-
1972	5.7	0.2	0.3	0.7	0.3	1.4	-	-	-	-	-
1973	6.5	0.0	0.1	0.9	0.4	1.1	-	-	-	-	-
1974	-	-	0.1	-	0.1	-	-	-	-	-	-
1975	-	-	0.1	-	0.1	-	-	-	-	-	-
1976	-	-	0.1	-	0.1	-	-	-	-	-	-
1977	-	-	0.1	-	0.1	-	-	-	-	-	-
1978	-	-	0.1	-	0.1	-	-	-	-	-	-
1979	25.5	14.1	0.2	5.7	0.2	3.3	0.6	1.7	-	1.3	N.A.
1980	25.5	14.1	0.2	6.0	0.5	11.6	0.8	2.1	-	3.1	-
1981	25.5	13.6	0.2	6.6	5.2	13.9	0.8	1.8	-	2.5	-
1982	20.8	14.8	0.2	6.9	3.4	24.3(a)	0.8(b)	1.1	61.0	2.9	-
1983	21.6	15.6	0.1	6.7	3.1	6.9	-	1.3	-	-	-
1984	20.4	10.9	5.1	10.7	3.1	7.0	-	-	-	-	-
1985	-	-	5.4	-	-	-	-	-	-	-	-
1986	393.6(c)	143.3	6.4(d)	75.5	164.8	93.5	15.7	0.9	-	-	-
1987	434.4(e)	163.6	14.7(f)	68.8	169.6	90.1	15.5	1.1	-	-	-
1988	429.0(g)	177.5	16.8(h)	78.7	193.4	96.3	13.8	0.9	-	-	-
1989	432.2(i)	193.6	17.4(j)	82.9	185.6	97.1(k)	18.2(l)	2.9	-	N.A.	N.A.
1990	452.8	70.9	1.3	60.9	134.3	86.5	-	0.3	748.8	-	-
1991	134.1	98.3	2.9	81.3	153.5	63.2	-	1.4	N.A.	-	N.A.
1992	130.5	157.4	6.5	79.6	168.8	36.3	N.A.	N.A.	N.A.	-	N.A.

(A) FRANCE READY MEALS ONLY INCLUDES MEAT DISHES  
 (B) INCLUDES CANS AND BOTTLES  
 (C) U.K. FRUITS INCLUDES FRUIT PRESERVES  
 (D) INCLUDES LITRES AND INCLUDES GLASS  
 (E) INCLUDES LITRES  
 (F) ESTIMATE  
 (G) INCLUDES ONLY FOOD



3. SUMMARY OF EXPENSES OF CARRIED FEES  
 Average Fees  
 ('000)

YEAR	FEES	SALES	FINES	RENTS	PROPERTY TAXES	TRAFFIC TICKETS	REPAIRS	DEPR. (100 ML)	PCT. FEES	GRANT REVENUE
1965	0.2	-	0.1	0.6	0.5	-	-	-	-	-
1966	-	-	-	-	-	-	-	-	-	-
1967	-	-	-	-	-	-	-	-	-	-
1968	7.4	35.7	0.5	3.9	1.1	1.4	0.2	1.4	1.4	1.4
1969	7.4	34.4	0.5	4.2	1.1	1.4	0.2	1.4	1.4	1.4
1970	6.4	108.2	0.4	9.2	1.1	1.4	0.2	1.4	1.4	1.4
1971	2.9	122.7	0.3	10.1	1.1	1.4	0.2	1.4	1.4	1.4
1972	2.1	110.3	0.3	10.2	1.1	1.4	0.2	1.4	1.4	1.4
1973	0.1	20.5	0.5	10.2	1.1	1.4	0.2	1.4	1.4	1.4
1974	0.5	62.9	0.1	10.4	1.1	1.4	0.2	1.4	1.4	1.4
1975	0.5	61.2	0.7	10.8	1.1	1.4	0.2	1.4	1.4	1.4
1976	-	-	-	-	-	-	-	-	-	-
1977	-	-	-	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-	-	-	-
1979	3.5	82.2	0.7	13.2	1.1	1.4	0.2	1.4	1.4	1.4
1980	3.5	82.2	0.4	14.4	1.1	1.4	0.2	1.4	1.4	1.4
1981	4.6	79.1	0.7	17.4	1.1	1.4	0.2	1.4	1.4	1.4
1982	4.9	80.3	0.7	16.4	1.1	1.4	0.2	1.4	1.4	1.4
1983	6.4	4.5	0.1	4.6	1.1	1.4	0.2	1.4	1.4	1.4
1984	6.4	4.5	0.1	4.6	1.1	1.4	0.2	1.4	1.4	1.4
1985	5.4	21.4	0.2	5.7	1.1	1.4	0.2	1.4	1.4	1.4
1986	5.4	21.4	0.1	7.2	1.1	1.4	0.2	1.4	1.4	1.4
1987	5.2	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1988	19.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1989	14.5	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1990	13.7	302.3	12.8	2.9	1.1	1.4	0.2	1.4	1.4	1.4
1991	10.8	308.0	10.9	78.0	1.1	1.4	0.2	1.4	1.4	1.4
1992	10.5	302.9	6.4	80.4	1.1	1.4	0.2	1.4	1.4	1.4
1993	21.1	307.4	7.5	80.2	1.1	1.4	0.2	1.4	1.4	1.4
1994	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1995	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1996	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1997	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1998	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
1999	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2000	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2001	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2002	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2003	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2004	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2005	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2006	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2007	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2008	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2009	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2010	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2011	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2012	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2013	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2014	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2015	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2016	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2017	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2018	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2019	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2020	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2021	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2022	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2023	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2024	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2025	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2026	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2027	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2028	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2029	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2030	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2031	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2032	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2033	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2034	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2035	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2036	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2037	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2038	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2039	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2040	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2041	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2042	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2043	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2044	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2045	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2046	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2047	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2048	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2049	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2050	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2051	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2052	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2053	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2054	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2055	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2056	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2057	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2058	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2059	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2060	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2061	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2062	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2063	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2064	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2065	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2066	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2067	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2068	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2069	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2070	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2071	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2072	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2073	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2074	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2075	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2076	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2077	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2078	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2079	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2080	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2081	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2082	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2083	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2084	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2085	20.8	-	-	-	1.1	1.4	0.2	1.4	1.4	1.4
2086	20.8	-	-	-	1.1	1.4				

3. SUMMARY OF EXPORTS OF CANNED FOOD (continued)

IN KILOGRAMS  
(1965)

YEAR	FRUIT	VEG	MILK	FISH	MEAT	FRUIT JUICES	TEA/COFE	SOAP	COND. (COND MILK)	FEED FOOD	READY MEALS
NORWAY	1963	0.1	-	2.1	36.1	1.0	-	-	-	-	-
	1964	0.1	0.1	2.7	29.7	1.1	-	0.1	-	-	-
	1967	1.1	0.1	2.8	28.2	0.4	-	0.1	-	-	-
	1968	1.3	0.1	3.9	28.4	0.7	-	0.2	-	-	-
PERU	1965	-	66.9	0.2	61.4	0.6	-	-	-	-	NA
	1967	-	72.7	-	73.7	-	-	-	-	-	-
SPAIN	1963	193.9	61.4	-	28.3	-	15.2	-	-	-	-
	1964	113.0	71.2	-	28.0	-	15.5	-	-	-	-
	1967	64.8	53.6	-	-	712.9	2.7	-	-	-	-
	1968	187.9	74.0	3.4	-	279.4	1.7	-	-	Nil	NA
SWEDEN	1963	0.5	2.1	-	2.4	0.5	-	0.1	-	-	-
	1964	0.5	2.1	-	2.4	1.1	-	0.1	-	-	-
	1967	1.4	1.9	0.1	2.8	0.9	-	-	-	-	-
	1968	0.5	0.9	0.1	2.9	0.5	-	-	-	-	-
SWITZERLAND	1965	0.5	0.3	5.8	-	2.8	-	0.3	-	-	-
	1967	0.9	0.1	7.5	-	2.8	-	1.0	-	-	-
UNITED KINGDOM	1963	2.2(1)	15.3	47.0	12.4	3.3	-	2.5	275.0	6.4	-
	1964	1.7(1)	15.0	36.8	11.1	2.3	-	4.4	241.0	7.4	-
	1967	1.2(1)	12.0	32.5	8.3	2.7	-	3.9	241.0	7.8	-
	1968	3.4(1)	17.3	31.9	9.5	3.3	-	2.9	300.0	7.9	-
U.S.A.	1965	251.7	7.4	4.0	23.4	11.5	11.4	7.4	32.0(1)	NA	NA
	1966	221.1	59.1	42.1	24.6	9.7	10.3	9.4	NA	NA	NA
	1967	272.2	34.9	31.0	28.5	13.6	0.9	NA	NA	NA	NA

(1) FRUIT BEANS ONLY INCLUDES MEAT BEANS  
 (2) INCLUDES BEANS AND VEGETABLES  
 (3) U.K. FIGURES INCLUDES FRUIT PREPARATIONS  
 (4) MILLION LITERS AND INCLUDES GLASS  
 (5) 1,000 LITERS  
 (6) DIFFERENT

4. APPARENT CONSUMPTION OF CANNED FOOD

MEALS PER YEAR  
(1967)

YEAR	FRUIT	VEG	MEAT	FISH	EGG	FRUIT JUICES	TOBACCO	WINE	BEER (1000 ML)	FEY FOOD	READY MEALS
Australia	1965 16.8	18.7	6.6	3.7	6.6		-	0.6			
	1966 16.5	27.2	6.6	10.4	9.8						
	1967 16.5	27.2	6.6	10.4	9.8						
Belgium	1965 65.3	21.2	75.0	20.2	11.9						
	1966 66.1	29.7	97.8	26.5	12.5						
	1967 65.4	79.2	104.1	NA	11.8						
	1968 63.9	29.7	102.5	NA	5.3						
	1965 12.3	27.2	NA	NA	NA	NA	NA	2.8	NA	NA	NA
	1966 12.3	27.2	NA	NA	NA	NA	NA	1.9	NA	1.2	NA
	1967 10.5	29.2	NA	NA	NA	NA	NA	2.5	4.5	1.8	NA
	1968 17.2	27.8	NA	NA	NA	NA	NA	1.9	4.9	2.0	NA
	1965 4.4	10.8	0.2	6.1	7.8	10.5	0.2	1.5	0.1	NA	NA
	1966 4.4	10.8	0.2	6.1	7.8	10.5	0.2	1.5	0.1	NA	NA
	1967 4.4	10.8	0.2	6.1	7.8	10.5	0.2	1.5	0.1	NA	NA
	1968 4.4	10.8	0.2	6.1	7.8	10.5	0.2	1.5	0.1	NA	NA
	1965 105.3	218.2	118.2	4.7	2.4	10.5	0.2	1.5	1.5	NA	NA
	1966 131.0	482.8	126.2	95.8	41.5	10.5	0.2	1.5	1.5	NA	NA
	1967 162.5	537.1	140.6	101.3	39.9	10.5	0.2	1.5	1.5	NA	NA
	1968 161.5	525.1	140.2	88.7	39.9	10.5	0.2	1.5	1.5	NA	NA
	1965 301.2	417.8	283.2	28.7	8.9	10.5	0.2	1.5	1.5	NA	NA
	1966 292.6	483.1	483.2	81.6	187.3	10.5	0.2	1.5	1.5	NA	NA
	1967 227.8	497.5	388.1	78.4	185.8	10.5	0.2	1.5	1.5	NA	NA
	1968 207.8	515.1	483.2	78.4	185.8	10.5	0.2	1.5	1.5	NA	NA
	1965 308	247.5	343.5	23.8	13.5	10.5	0.2	1.5	1.5	NA	NA
	1966 308	247.5	343.5	23.8	13.5	10.5	0.2	1.5	1.5	NA	NA
	1967 308	247.5	343.5	23.8	13.5	10.5	0.2	1.5	1.5	NA	NA
	1968 308	247.5	343.5	23.8	13.5	10.5	0.2	1.5	1.5	NA	NA
	1965 6.1	1.7	29.0	12.9	6.9	7.2					
	1966 5.4	1.7	29.0	13.5	6.9	4.9					
	1967 49.4	106.8	NA	11.8	26.7						
	1968 26.4	116.1	14.5	11.1	26.9						
	1965 57.8	211.5	12.8	NA	41.8	1.8	3.6	24.9	0.3	NA	NA
	1966 57.8	211.5	12.8	NA	41.8	1.8	3.6	24.9	0.3	NA	NA
	1967 57.8	211.5	12.8	NA	41.8	1.8	3.6	24.9	0.3	NA	NA
	1968 57.8	211.5	12.8	NA	41.8	1.8	3.6	24.9	0.3	NA	NA

4. APPARENT CONSUMPTION OF CANNED FOOD (continued)

Metric Tons

(1968)

YEAR	FRUIT	VEG	MILK	FISH	MEAT	FRUIT JUICES	Tomato Juice	SOUP	BEER (100 ML.)	PET FOOD	READY MEALS
Norway	167	16.4 14.8		12.2 17.1	12.6 9.9	10.4 13.3	0.3				
Portugal	11.2		N.A.	N.A. 3.3 12.5	N.A.	11.9	N.A.	N.A.		0.5	
SPAIN	85.0 35.0 435.0	29.0 135.0 291.3		42.9 41.3	3.3 12.5	12.0 14.0	2.3 2.6				
SWEDEN	32.5 21.0 27.6 21.3	40.2 41.2 43.5	1.4 3.9 9.0 7.2	25.0 19.4 27.9	31.7 31.3 32.0	8.4 14.5 17.5	0.6 0.8 0.9	19.6 14.7 13.6	110.0 80.0 165.5 609.0	N.A. 7.0 7.1 6.2 8.8	N.A.
SWITZERLAND	N.A.	N.A.	N.A. 7.0	N.A. 16.1	N.A.	N.A.	N.A. 0.8				
UNITED KINGDOM	480.0 (a) 531.1 (b) 506.7 (c) 360.5 (d)	46.5 671.3 211.1 900.3	129.2 145.5 135.2 147.0	55.2 75.7 73.1	249.0 271.1 305.1 311.9	27.1 1,383.3 (e) 1,587.9 (e) 815.3	15.7 15.3 12.5 18.9 (f)	285.2 (A) 276.3 (A) 263.5 (A) 270.4 (A)	750.0 340.0 1,014.0 1,295.0		
U.S.A.	2,251.0 2,295.3	4,143.2 3,961.4	783.0 668.0 702.1	271.0 551.5 529.6	3,071.2 2,136.0 2,251.9	1,383.3 (e) 1,587.9 (e) 815.3	222.2 514.7 450.1	870.3 874.1 2,691.3	35,917.0 N.A. 48,100.0		

(A) U.K. SOUPS READY TO SERVE EQUIVALENT  
 INCLUDES CANS AND BOTTLES  
 (B) U.K. FRUITS INCLUDES FRUIT PRESERVES  
 (C) MILLION LITRES AND INCLUDES FLASKS  
 (D) MILLION LITRES  
 (E) 1,000 LITRES  
 (F) ESTIMATE  
 (A) INCLUDES BULK PACKS

5. APPENDIX FOR CAPITA CONSUMPTION OF CANNED FOOD  
(IN KILOGRAMS PER HEAD PER ANNUM)

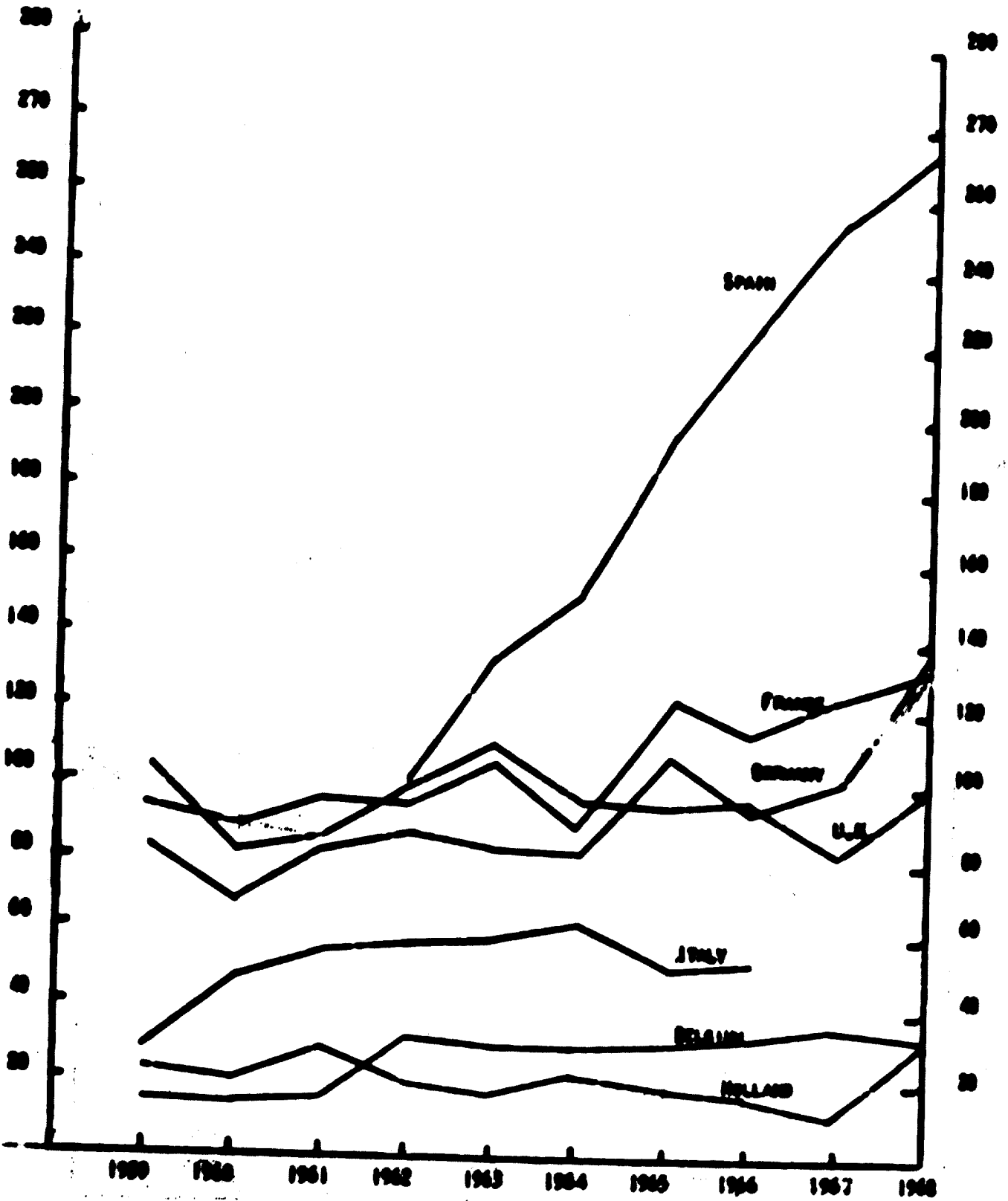
YEAR	FRUIT	VEG	MEAT	FISH	EGG	FRUIT JUICES	VEGETABLE JUICES	SOUP	MILK (LITRES)	PEST FOOD	RELAY MEALS
AUSTRIA	1965 2.2	2.6	0.9	1.3	0.9	-	-	0.1			
	1966 2.2	3.7	1.2	1.4	1.3						
	1967 2.2										
BELGIUM	1965 6.7	2.3	1.3	2.3	1.3						
	1966 6.9	2.3	1.2	2.9	1.2						
	1967 6.8	2.3	1.2	N.A.	1.2						
	1968 6.5	2.3	1.2	1.7	1.2						
	1969 2.5	2.3	1.2	1.7	1.2						
	1965 1.9	4.1	N.A.	1.7	2.9						
	1966 1.9	6.1		1.9	1.1						
	1967 3.4	5.7		1.7	1.5						
	1968 3.5	2.3		1.3	1.7						
	1969 0.8	2.3		1.3	1.7						
FINLAND	1965 1.0	1.0	0.1	1.2	1.7						
	1966 1.0	1.0	0.1	1.2	1.2						
	1967 1.0	1.0	0.1	1.2	1.2						
	1968 3.2	1.0	0.1	1.2	1.2						
	1969 3.2	1.0	0.1	1.2	1.2						
FRANCE	1965 3.2	9.1	2.5	1.9	0.9						
	1966 3.3	10.7	3.0	2.0	0.9						
	1967 3.3	19.6	3.4	2.9	0.9						
	1968 3.3	7.1	2.2	1.3	1.1						
	1969 4.9	8.3	0.1	1.4	3.1						
	1965 3.5	8.3	0.1	1.3	3.1						
	1966 3.5	8.3	0.1	1.3	3.1						
	1967 3.5	8.3	0.1	1.3	3.1						
	1968 3.5	8.3	0.1	1.3	3.1						
	1969 3.5	8.3	0.1	1.3	3.1						
GERMANY	1965 4.7	1.3	2.1	2.6	1.6						
	1966 4.9	2.9	2.0	1.4	0.7						
	1967 4.9	1.9	1.4	1.4	0.7						
	1968 4.9	1.9	1.4	1.4	0.7						
	1969 4.9	1.9	1.4	1.4	0.7						
HUNGARY	1965 4.9	2.9	7.0	1.4	0.7						
	1966 4.9	2.9	8.0	1.4	0.7						
	1967 4.9	2.9	8.0	1.4	0.7						
	1968 4.9	2.9	8.0	1.4	0.7						
	1969 4.9	2.9	8.0	1.4	0.7						
HOLLAND	1965 3.5	2.3	0.7	0.9	2.5						
	1966 3.5	2.3	0.7	0.9	2.5						
	1967 3.5	2.3	0.7	0.9	2.5						
	1968 3.5	2.3	0.7	0.9	2.5						
	1969 3.5	2.3	0.7	0.9	2.5						
ITALY	1965 2.5	2.9	0.5	0.8	2.3						
	1966 2.5	2.9	0.5	0.8	2.3						
	1967 2.5	2.9	0.5	0.8	2.3						
	1968 2.5	2.9	0.5	0.8	2.3						
	1969 2.5	2.9	0.5	0.8	2.3						

5. APPROPRIATE PER CAPITA CONSUMPTION OF CANNED FOOD (CONTINUED)  
(KILOGRAMS PER YEAR PER ANNUM)

YEAR	FRUIT	VEG	MILK	MEAT	EGG	FRUIT JUICES	CRUDD MILK	SOUP	BEER (LITRES)	PET FOOD	READY MEALS
Norway	4.0	2.0			3.5	2.0			-	-	-
1966		3.0			4.5	3.5					
1967											
Portugal	2.2	2.0								0.1	
1965											
1966											
1967											
Spain	2.7	4.4			1.5	0.5(0)					
1965	3.1				1.5	0.5(0)					
1966											
1967											
Sweden	3.8	3.2			3.5	1.1(0)		2.2	1.4	0.5	
1965	3.5	6.1			3.5	1.5(0)		1.9	1.9	0.9	
1966	3.5	3.5			3.5	2.2		1.7	2.1	0.9	
1967											
Switzerland					1.7						
1965											
1966											
1967											
1968											
United Kingdom	8.3(0)	14.0			1.3	1.7		5.2(0)	1.7		
1965	9.0(0)	15.0			1.2	1.6		5.4(0)	1.7		
1966	9.2(0)	16.5			1.4	1.2		4.9(0)	1.9		
1967	10.1(0)	15.7			1.5	1.2		4.9(0)	2.1		
1968	12.7	20.7			1.9	1.9(0)		4.9(0)	2.3		
1965	10.8	21.1			2.0	2.1(0)		4.6	2.5		
1966	10.8	19.9			2.0	2.1		4.6	2.5		
1967	11.6				2.0	2.2		4.6	2.5		
1968					2.0	2.2		4.6	2.5	6.1	

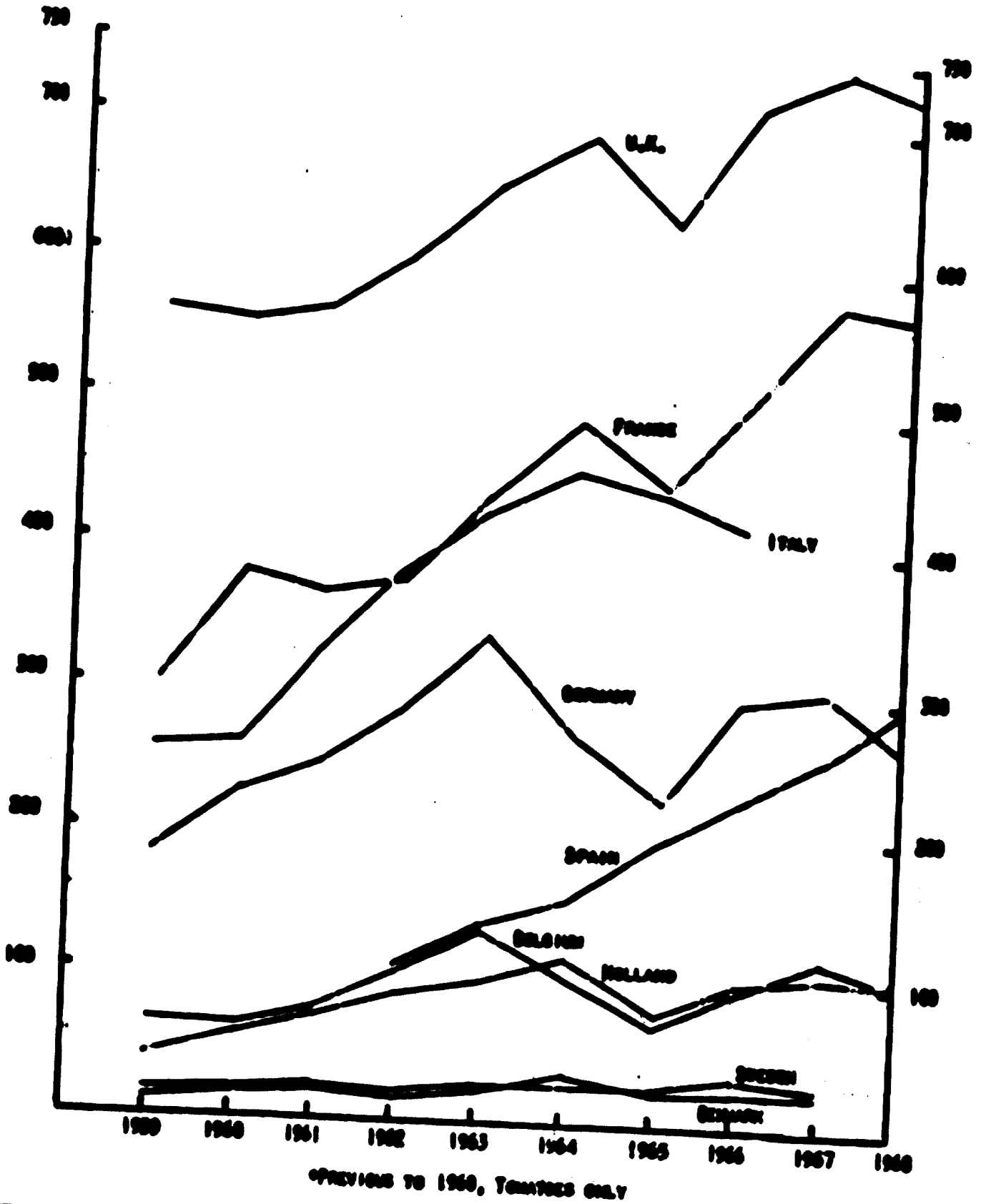
(A) U.S. SOUP: READY TO SERVE CONCENTRATED  
(B) INCLUDES CORN AND BEANS  
(C) U.S. FRUIT: INCLUDES FRUIT PRESERVES  
ESTIMATED

**CANNED FRUIT PRODUCTION**  
**(THOUSANDS OF METRIC TONS)**



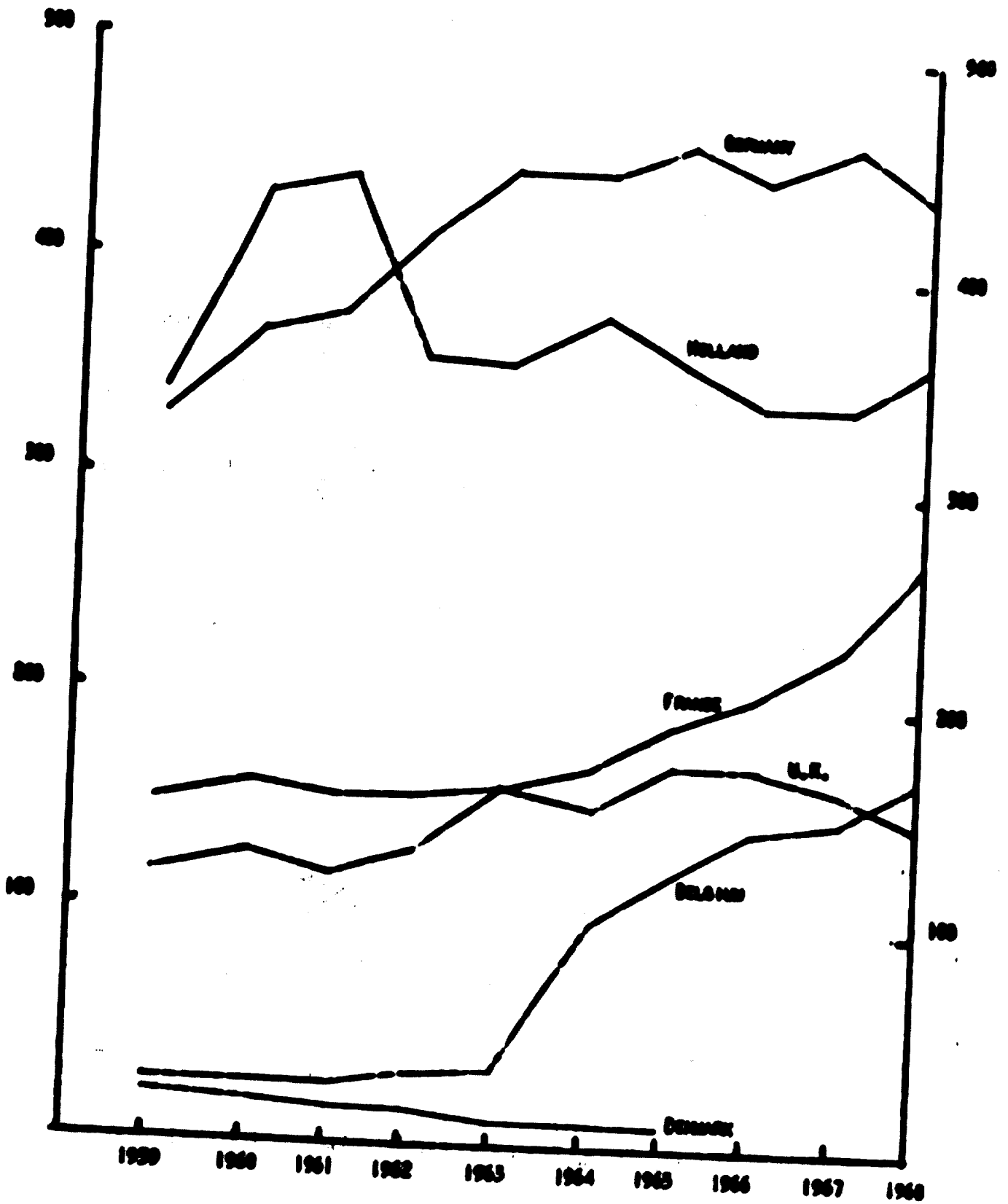
• IN 1962 AND 1963, INCLUDES JAN.

**CANNED VEGETABLE PRODUCTION**  
**(THOUSANDS OF METRIC TONS)**



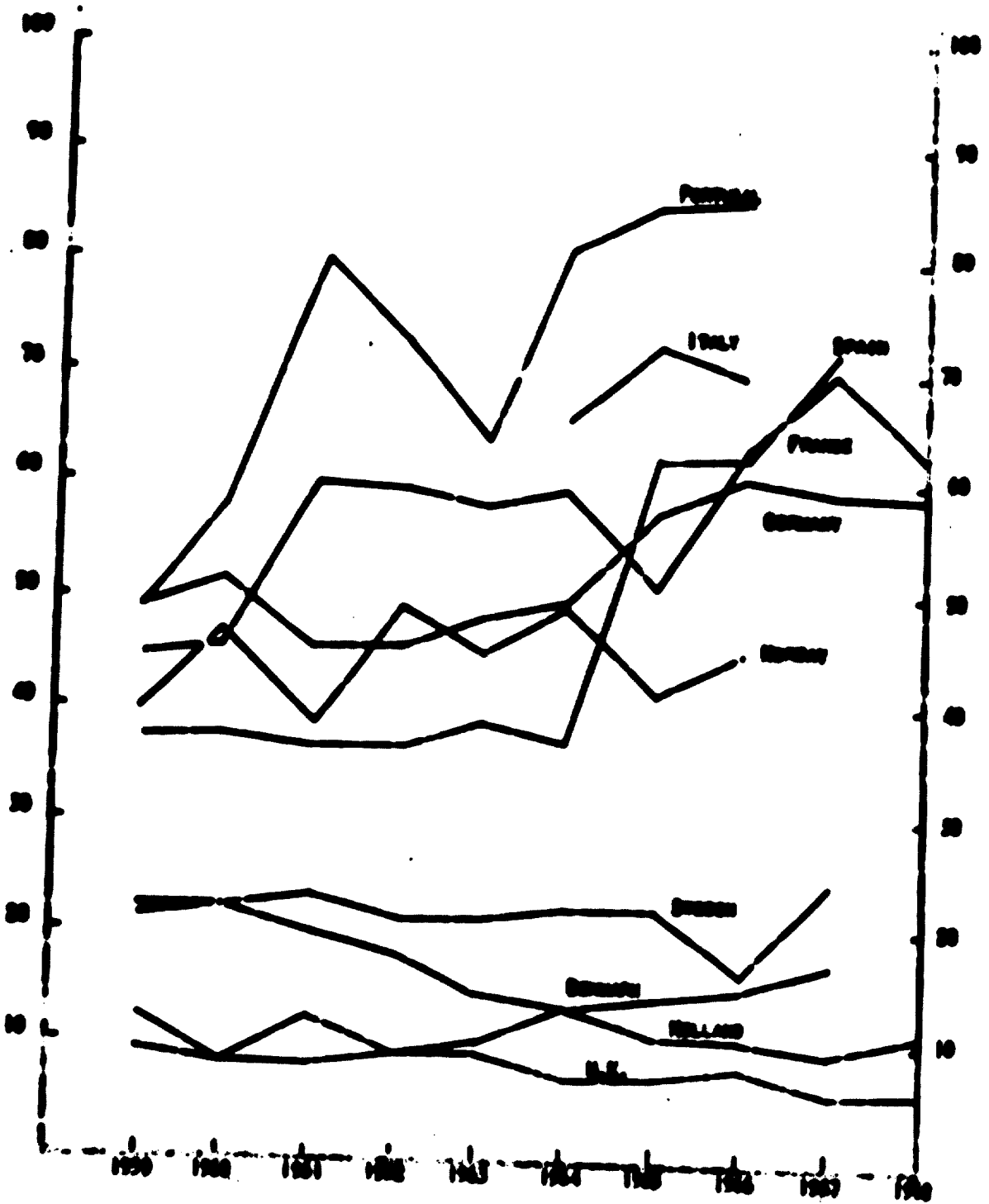


CANNED MILK PRODUCTION  
(THOUSANDS OF METRIC TONS)



• NEW SERIES BEGINS IN 1963

**CAPED FISH PRODUCTION**  
**(THOUSANDS OF METRIC TONS)**



### GRADED MEAT PRODUCTION (THOUSANDS OF METRIC TONS)

