COMMISSION OF THE EUROPEAN COMMUNITIES

DIRECTORATE-GENERAL FOR DEVELOPMENT AID

ECONOMETRIC ANALYSIS OF THE MARKET IN TROPICAL OILS AND OIL SEEDS

(extracts)

STUDY COMPILED BY METRA INTERNATIONAL

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The opinions and conclusions found in this study are those of METRA INTERNATIONAL and not necessarily those of the Commission of the European Communities

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I.

ECONOMETRIC ANALYSIS OF THE MARKET IN TROPICAL OILS AND OILSEEDS

This study, made by Metra International, comprises the following sections:

Introduction (about 10 pages)

Part I: Survey of the world market in oils and fats (about 115 pages)

Part II: Survey of the oils and fats market in the EEC countries (about 145 pages)

Summary and conclusions (about 30 pages)

Statistical annexes (about 100 pages).

The study as a whole is available only in French; its subject and highly technical nature militate against a wide distribution. However, it seemed advisable that the essential results should be put at the disposal of a larger number of readers.

For this purpose, the Directorate-General for Development Aid has prepared the present document of 55 pages, which contains the gist of the study, i.e. the Introduction, the Summary and conclusions, and a selection of 16 diagrams illustrating Parts I and II. The Summary and conclusions are divided into two parts corresponding to those of the study.

The document is available in Dutch, English, French, German and Italian.

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INTRODUCTION

The European Economic Community commissioned the METRA group to make a survey of the prospective outlets for tropical oleaginous products in the six member countries in 1970 and 1975.

This survey comprises the following stages:

Stage 1: Compilation of basic data on (a) the world situation for oils and fats and (b) the Community States' production of and foreign trade in oils and fats. This stage gave rise to the two following EEC publications:

(i) "General survey of the world situation regarding fats and oils" (Studies - Overseas Development Series, No. 2, 1964);

(ii) "The market in tropical oleaginous products in the EEC Member States: basic statistical information on the production of and foreign trade in fats and oils" - published by the Directorate-General for Overseas Development, EEC Commission, December 1965.

Stage 2: Analysis of the uses, the industry and the marketing of tropical oleaginous products in the EEC

This stage occasioned the preparation of three reports per country. The EEC published a major summary report entitled "The market in tropical oleaginous products in the EEC Member States - Recent trends and present situation" (Studies - Overseas Development Series, No. 4, 1966).

Stage 3: Assessment of the probable market prospects for tropical oleaginous products in each of the EEC countries.

.../...

This stage consists in an econometric analysis, based on a model enabling medium-term (1970 and 1975) forecasts and projections to be made.

The present report summarizes the third stage.

In this introduction we shall define the aim of the study, indicate the complexity of the problem, and describe the method employed to deal with it.

Aim of the study

The purpose of the third stage is to work out figures for the consumption of tropical oleaginous products in the EEC in 1970 and 1975. In addition to these forecasts, which are the main object of the study, the analysis is intended to throw light on the different factors determining the level of consumption, and also on the incidence of the variations of each factor, whether or not such variations are due to a deliberate policy. In particular, it is interesting to see how far these quantities are affected by a change in the retail price of butter or margarine, by Community policy for olive oil or rapeseed, by American soya bean support policy, or by changes in the market price of raw materials.

Complexity of the problem

The difficulties of analysing such a market are well known. They stem from a number of factors : the finished products - butter, margarine, table oils, vegetable fats and "white products" (ex Brussels Nomenclature heading 15.13) - are often in competition, for certain uses at any rate ; and the raw materials used to manufacture these finished products are very numerous and often interchangeable.

.../...

Variations in the market prices of the products have a very definite influence on the variations in their composition. But even apart from this, manufacturing habits and differences of taste lead to composition formulas that differ widely from country to country.

On account of the substitutions that can be made, it is necessary to study all the raw materials, as otherwise the findings on one or other of them may be distorted. To give an idea of the extent of the problem, we list below the principal oils and fats and the products of which they are in reality a by-product:

Fluid oils:

Soya bean oil ⟷ demand for oilcake for animal fodder

Cottonseed oil ⟷ demand for cotton fibre

Groundnut oil

Other fluid oils: rapeseed, sunflower, olive, maize, etc.

Solid oils:

Coconut oil

Palm kernel oil

Palm oil

Marine oils:

Whale oil

Fish oil ⟷ demand for fishmeal for animal fodder

Animal fats:

Butter ⟷ dairy products

Tallow ⟷ demand for beef

Lard ⟷ demand for pigmeat

.../...

In view of the breadth and complexity of the subject, it was decided that the method selected to tackle the problem must be based on certain hypotheses, which are explained below in the description of the principle of our model.

Principle of the proposed model

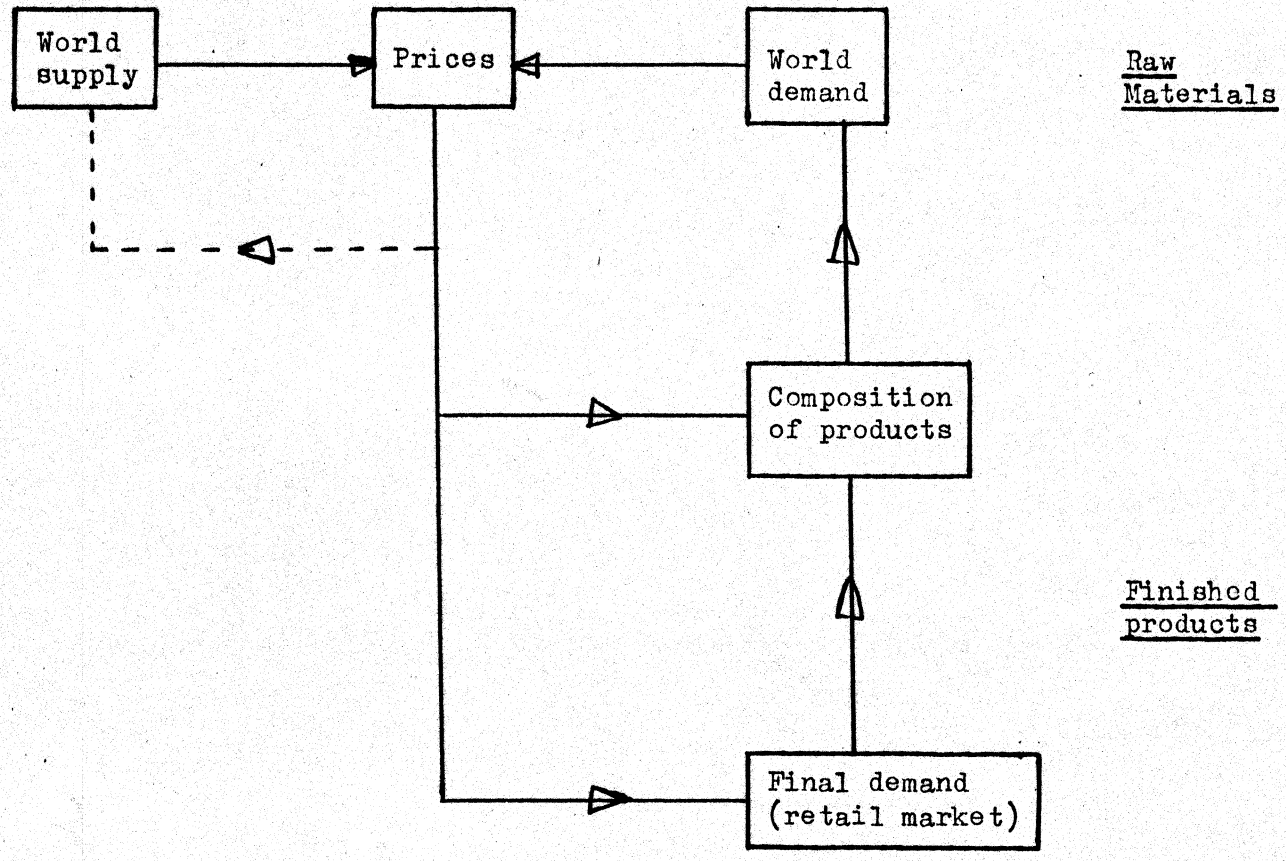
As the following diagram shows, a fully comprehensive survey of the world market in oils and fats ought to include:

country-by-country surveys of the retail market;

country-by-country surveys of product composition;

a survey of the world supply of raw materials;

a survey of world equilibrium and price determination.



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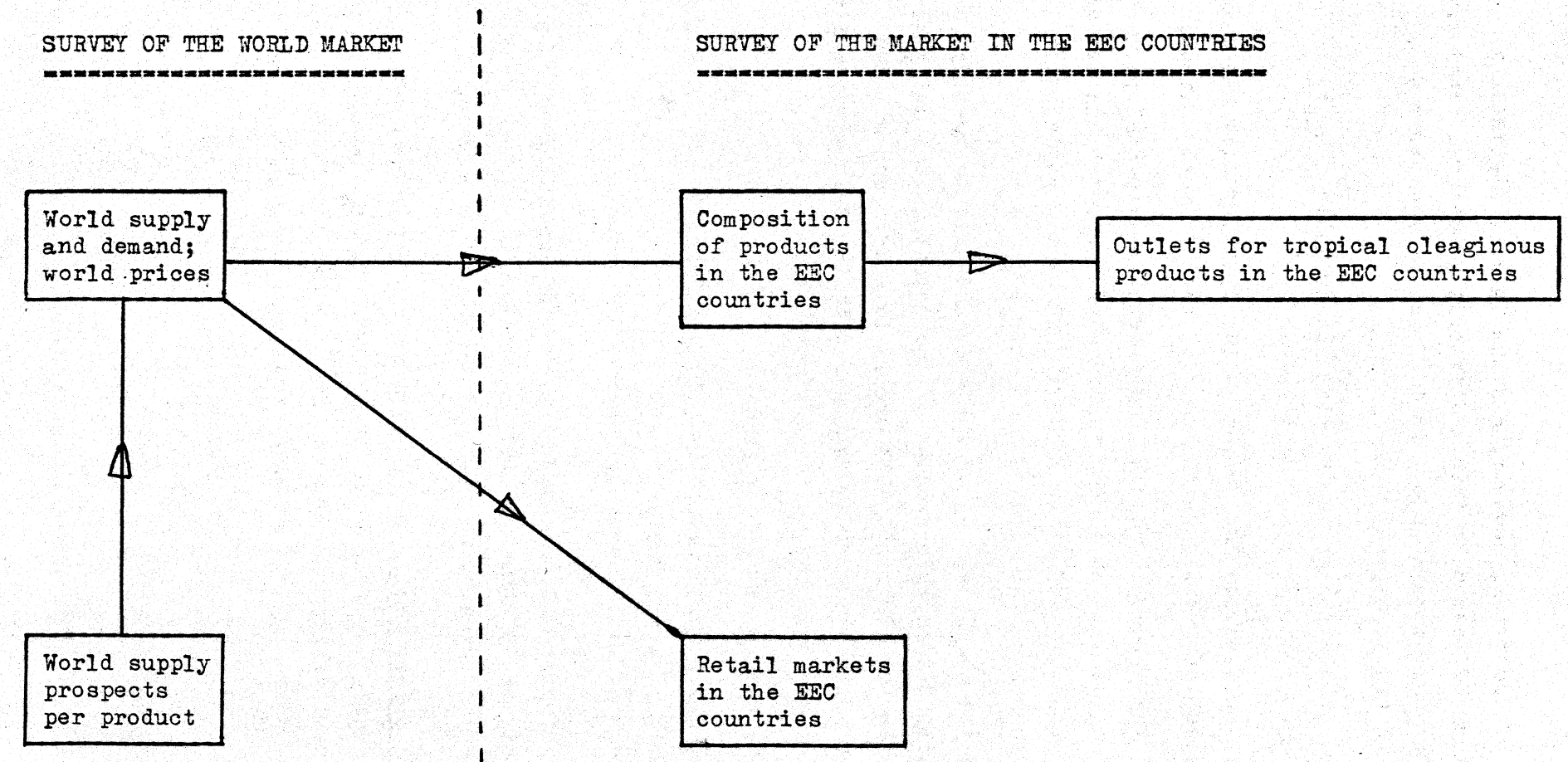
SURVEY OF THE WORLD MARKET
SURVEY OF THE MARKET IN THE EEC COUNTRIES
World supply and demand; world prices
Composition of products in the EEC countries
Outlets for tropical oleaginous products in the EEC countries
World supply prospects per product
Retail markets in the EEC countries

The number of countries, however, and the lack of statistical information on many of them make this a difficult procedure. Furthermore, in the present survey the main object is to forecast the imports of raw materials into the EEC countries.

We therefore simplified the above plan and broke it down into two parts (see diagram opposite):

(1) A survey of world supply and demand in the field of oils and fats, for the purpose of estimating the future trend of world prices;

(2) A survey of the market in the EEC countries; this second part is subdivided into two sections, analysis of the retail market and analysis of product composition, assuming that the world price levels are known.

By the same token, the survey of world demand will be greatly simplified and will not include studies of the retail market and product composition in every country; it will simply take into account the population and world income curves, together with the trends representing technological progress and changes in consumer habits.

The plan will therefore be as follows:

Part I: Survey of the world market in oils and fats
1. Study of world prices
2. Trend of world supply and price forecasts

Part II: Survey of oils and fats market in the EEC countries
1. Study of EEC final demand
2. Study of product composition and import forecasts.

In the world prices study, we first verified that the market quotations were really representative of all trading by comparing them with the unit import values. We then devised a model to describe the price-forming mechanism. In this model we assumed the supply to be

.../...

defined by the quantities available for the developed countries' consumption; we further assumed that these quantities were independent of the price quotations for the year (inelastic supply).

In order to forecast the price level, it was therefore necessary to carry out a study of the world supply trend, and more specifically of the quantities that will be available for the developed countries. For this purpose, production and export forecasts concerning each product were prepared in respect of the principal producing and exporting countries; matrices of trade between developed, developing and Eastern bloc countries were then constructed. The last step was to make sure the forecasts were consistent with the growth of total world consumption of oils and fats.

In the light of the price trend hypotheses thus elaborated, we next carried out a detailed analysis of the oils and fats market in each of the EEC countries. This involved a study of final demand, in which we tried to account for the trend in consumption of each finished product by the trend in population, household incomes, prices of that product and prices of competing products.[1] We had, of course, to check that these forecasts were consistent with the trend in total consumption of visible oils and fats, a consumption which often tends to become saturated.

Next we analysed, country by country, the composition of the different products or of the total availabilities if the existing statistics did not allow a more detailed analysis. The variations in the percentage of each raw material were thus explained in terms of the movement of the prices of these materials, and the econometric models we worked out enabled us to form hypotheses on the pattern of oils and fats utilizations in 1970 and 1975. In conclusion, with the final demand forecasts it was possible to project the EEC countries' requirements of each raw material.

.../...

[1] The future trend in these prices was, of course, sometimes linked with the forecasts of world prices of the raw materials.

Method

At each step of the survey, after a descriptive analysis preference was always given to an econometric formulation of the problem. In every case we tried at the outset to construct an explanatory and forward-looking model to account for past development and assess the future.

Obviously, however, mathematical models cannot make allowance for every one of the factors that determine the equilibrium of so complex a market. They did at least enable us to gauge the influence of the more important ones and to give the study a logical framework. And we tried, of course, to take any other available information into account when deciding on the forecast figures.

The econometric methods employed are all known ones, some of them relatively recent. In the first place, multiple regressions were used a great deal; as this method has been in use for a long time, we refer interested readers to the textbooks on the subject.[1]

We shall simply mention that, as is customary today, we used for each regression the standard deviations of the regression coefficients[2] (in brackets under each coefficient), the multiple correlation coefficient R, and the residual standard deviation $\sigma_{\overline{r}}$.

However, at times it was necessary to complicate the traditional multiple regression to some extent, either by introducing seasonal coefficients (covariance analysis for the final demand study) or by imposing certain restrictions (the sum of the percentages of the various raw materials composing a product is, by definition, equal to 100).

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[1] There are numerous works, e.g. "The Advanced Theory of Statistics" by M.G. Kendall and A. Stuard (Griffin).

[2] The standard deviation measures the accuracy with which the coefficient is known. It is also used for rapidly ascertaining the statistical significance of the variable in question.

Furthermore, in certain cases the hypotheses needed for a correct estimate of the regression coefficients were not verified, and it was necessary to write multiple equation models. There have been many publications since 1950 on the theory of these models, but far fewer practical applications, particularly in Europe.

Depending on the case, we used recursive, also called causal chain, models, which have been studied chiefly by H. Wold,[1] or simultaneous equation models, which were developed largely by the work of the Cowles Commission;[2] for this second type of model we used the double and triple least-squares estimating methods recommended by H. Theil.[3] All the details that obviously cannot be included in the present study will be found in these authors' works.

Lastly we should mention that, although application of these recent methods unquestionably entails difficulties, the difficulties have already been overcome in a limited but rapidly growing number of studies. We hope that the use we have made of them will convince the reader of their value, more especially for examining the interaction of world prices.

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1 "Demand Analysis" (1953), John Wiley and Sons, and various articles published in the review "Econometrica".

2 "Studies in Econometric Method" - Hood and Koopmans, Monograph No. 14.
"Statistical Inference in Dynamic Economic Models" - T.C. Koopmans, Monograph No. 10.

3 "Economic Forecasts and Policy ", North Holland Publishing Company, Amsterdam (1961).
"Econometric Theory" - A.S. Goldberger, John Wiley and Sons, 1964.

SUMMARY AND CONCLUSIONS

In this concluding section we shall try to pinpoint the principal results obtained in the four main stages of this survey - the world prices study, the world supply trend and price forecasts, the study of EEC final demand and, lastly, the study of product composition and import forecasts (Part I).

We shall then discuss the influence of certain important hypotheses on the forecasts of oleaginous imports - Community policy for olive oil, American soya bean policy, the influence of butter and margarine prices (Part II).

PART I

1 - WORLD PRICES

a) Comparative analysis of the past pattern of market quotations for the principal oils and fats and of the unit values for imports of these products into the principal countries revealed that the quotations are closely representative. For instance, the unit value of coconut oil imports in a given quarter of a year can be calculated to within a few cents by weighting the average quotation for the same quarter by 42% and that for the preceding quarter by 58%. This shows that:

(i) The few bilateral agreements existing between a producer country and an importer country have only a minimal effect on the average transaction prices. The only exception concerns the exports of groundnut oil to France from the African countries;

(ii) The vertical concentrations in the oils and fats sector do not lead to parallel markets with different trade prices.

b) The construction of an econometric model describing the mechanism that forms the prices of the principal products was found to be feasible and afforded a better understanding of that mechanism. The model is based on the following two hypotheses, which we have tried to substantiate.

In the first place, supply appears to us to be almost entirely inelastic from year to year and also to a large extent inelastic over five or ten years, owing to the shrubby nature of certain of the plants concerned (i.e. no satisfactory yield is obtained from them for the first five or ten years); the numerous systems for protecting producers; the absence of any profitable substitute crop in many developing countries; and the fact that several major oils and fats are by-products.

Furthermore, we assume that prices are not dictated by world production but only by the quantities available for the developed countries, consumption in the developing countries and those of the Eastern bloc being determined by a different process; for example, the African producers keep what they need and sell the surplus.

.../...

In the present state of world commerce, trade with the Eastern bloc countries is on a very small scale and is little affected by price fluctuations.

c) The main conclusions from study of the price-forming mechanism are as follows:

1) The prices of certain products are always closely linked - so closely, in fact, that where one is known the others can be calculated almost exactly. These close-knit groups are:

Soya bean, cottonseed and rapeseed oils;
Whale and fish oils;
Coconut and palm kernel oils.

In each of these groups, however, there is one "leader product", namely soya bean, fish and coconut oil respectively. This means that the prices in question are not simultaneously determined by mutual interaction, but the price of one product is determined first and the prices of the others follow suit. What is more, we showed that over the reference period (1950-1965) it was only the supply of the leader product that affected the prices. Thus, for the lauric oils the price-forming process is as follows (leaving aside the influence of the other raw materials):

Coconut oil availability	Coconut oil price	Palm kernel oil price

The supply of palm kernel oil does not affect the price of that oil, and the price of palm kernel oil does not affect the price of coconut oil.

These findings are obviously valid only in so far as the palm kernel availabilities, which have been ranging between 300 and 400 thousand tons, do not increase or decrease by a very much wider margin.

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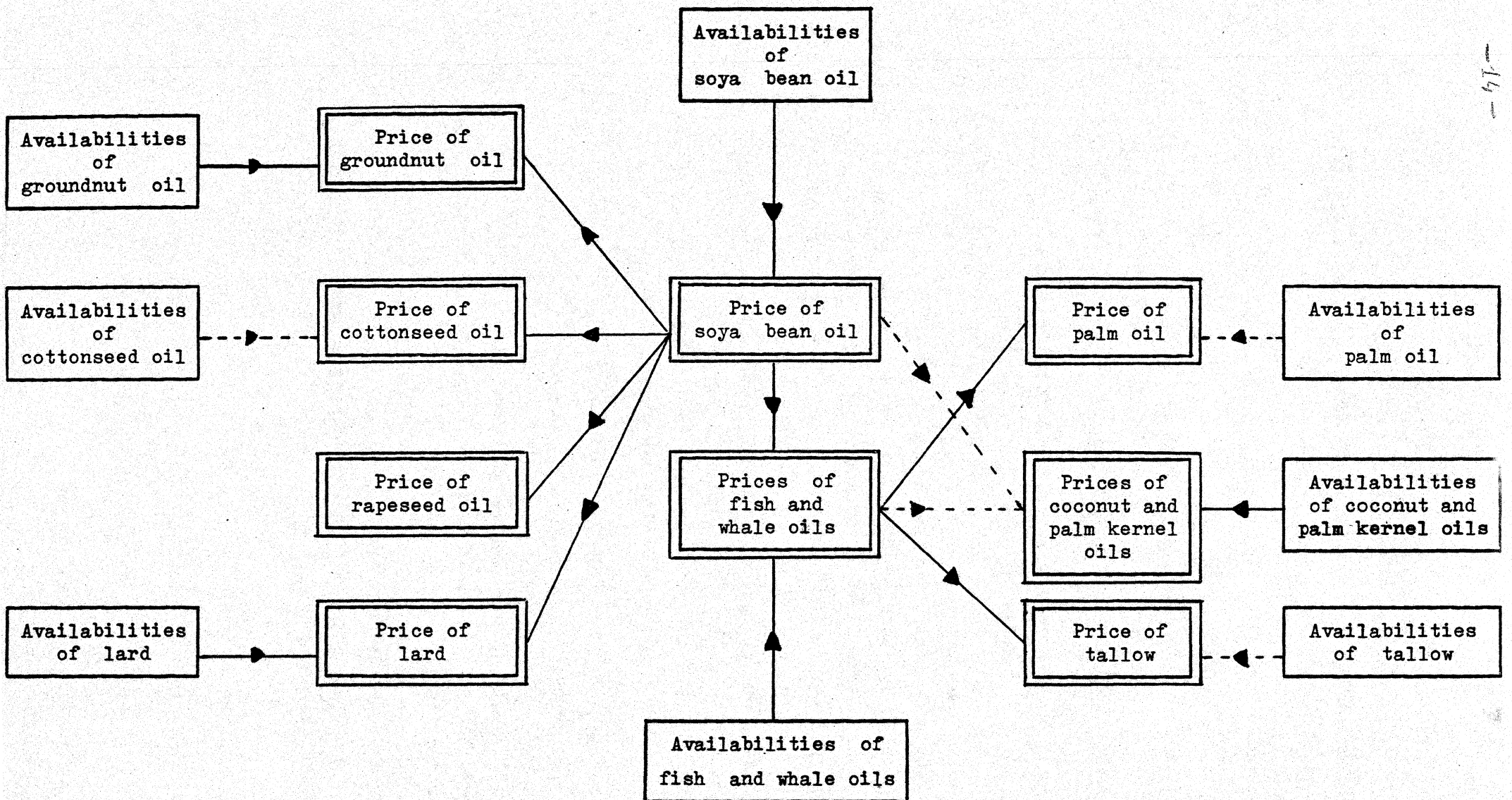
Diagram 1 (2)- Mechanism of price formation for the principal oils and fats



The figure between brackets is the number of the corresponding diagram (or table) in the complete french version of the study

That is why we adopted for forecasting purposes a model in which the sum of the coconut and palm kernel oil availabilities determined the price of coconut oil, which in turn determined the price of palm kernel oil.

2) If we now consider all the raw materials together, we again find there is a leader product; the prices are not simultaneously determined by mutual interaction, but certain prices crystallize first and thereafter influence the others. More specifically, the raw materials can be divided into two groups - the fluid oils and lard, and the marine oils, solid oils and tallow. Within the first group, soya bean oil is a very dominant leader: the soya bean availabilities alone determine this product's price, which materially influences formation of the prices of all the other products in the first group, and less definitely the pricing of certain raw materials in the second group. In the latter the situation is less clearly defined, but the marine oils nevertheless have a leading position; they distinctly influence the pricing of all the other products in the group, though it should be observed that the lauric oils have some effect on marine oil prices.

Diagram 2, opposite, sums up these interactions and plainly shows the decisive part played by soya bean oil and marine oils.

3) The econometric analysis enabled us to determine the elasticity of prices to a sometimes high supply: -1 for marine oils, -1.4 to -2.4 for lauric oils, -1.3 for groundnut oil, -1.1 to -1.5 for lard. The calculations were made for two periods, 1953-1964 and 1955-1964, since 1953 and 1954 might have been somewhat disturbed by the after-effects of the Korean war and the long-term contracts between Nigeria and the UK did not cease until 1955.

.../...

These elasticities, which well express the price response to the annual fluctuations of supply, deviate from the medium-term elasticities needed for five- or ten-year forecasts proportionately as the annual supply and price variations differ from the price trend. The table below shows that this is particularly the case with coconut oil and the marine oils. We therefore decided that for the 1970 and 1975 forecasts we should adopt the lowest elasticity values for products that fluctuated widely from the trend.

Table 1 (36)

FLUCTUATIONS, TRENDS AND ELASTICITY TO SUPPLY OF THE PRINCIPAL RAW MATERIALS

	Trends over period 1953-1966	Standard deviations of annual fluctuations from trend	Elasticity to supply		
			A 1953-1964	B 1955-1964	Values adopted for forecast
Coconut (and palm kernel) oil	+ 4%	13%	-1.4	-2.4	-1.4
Whale (and fish) oil	- 8%	16%	-0.9	-1.0	-1.0
Groundnut oil	- 20%	11%	-0.3	-1.3	-1.3
Soya bean oil	- 33%	12%	-0.7	-0.7	-0.7
Palm oil	+ 13%	7%	-0.3	-0.1	-0.3
Lard	- 24%	13%	-1.1	-1.5	-1.1
Tallow	1%	14%	-0.1	-0.4	-0.4

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We may also mention that the reciprocal elasticity values are:

Soya bean oil and groundnut oil	0.3
Soya bean oil and cottonseed oil	0.7
Soya bean oil and lard	0.5
Soya bean oil and whale oil	1
Whale oil and coconut oil	0.7
Whale oil and palm oil	0.3
Whale oil and tallow	0.5

2 - WORLD SUPPLY TREND AND PRICE FORECASTS

a) Prospects for production and export

The world supply trend study consisted in forecasting the probable future of world output product by product, and the export prospects in cases where the producer country is a developing or an Eastern bloc country. For that purpose we used the available data on acreages and yields, and existing production plans.

However, we always proceeded from the standpoint of what was likely to happen, not of what was desirable; this explains why our forecasts for certain raw materials concerning the developing countries are lower than those of the FAO's World Indicative Plan, whilst for other raw materials, originating in developed countries, they are higher.

The forecasts were always calculated for the five or six major producing and exporting countries, and production and export figures for the rest of the world were extrapolated afterwards.

The findings were as follows. World production, which grew at an average annual rate of 860 thousand tons between 1953 and 1965, is expected to increase slightly and reach 950 thousand tons a year between 1973 and 1975. This corresponds to availabilities of some 39 200 thousand tons in 1975.

.../...

Table 2 (37)

WORLD PRODUCTION OF OILS AND FATS
(EXCLUDING BUTTER)

'000 tons

	Average 1953 1954 1955	Average 1962 1963 1964	1975	Annual rate of growth	
				1954 - 1963	1963 - 1975
Coconut	1 909	2 089	2 390	20	25
Palm kernel	415	412	460	-	4
Palm	1 080	1 162	1 635	9	39
Groundnut	1 784	2 661	4 000	97	112
Soya bean	2 195	4 057	6 880	207	235
Cottonseed	1 878	2 242	2 950	40	59
Rapeseed	985	1 258	2 020	30	63
Sesame	619	534	675	9	12
Sunflower seed	978	2 129	3 650	128	127
Maize	135	197	365	7	14
Olive	1 118	1 467	1 490	39	2
Tallow	2 752	3 862	5 550	123	141
Lard	3 618	4 928	5 630	146	58
Whale	391	282	75	-12	-17
Fish	335	636	1 400	33	64
WORLD TOTAL	20 192	27 916	39 170	858	938

The 11 500 thousand tons additional output envisaged will come:

mainly from soya bean oil, tallow, sunflower seed and groundnut oils;

partly from fish, cottonseed, rapeseed and palm oils and lard;

very little from coconut and palm kernel oils, olive oil or whale oil.

The linear growth rate of the various products will be:

faster for palm and rapeseed oils;

the same for soya bean, groundnut, coconut, cottonseed and fish oils;

slower for tallow and sunflower seed oil, and considerably slower for lard (see Table 37 opposite).

b) Consumption prospects

This slight acceleration of production will only influence the availabilities of the developing countries.

For the developed and Eastern bloc countries, the current trend should continue, availabilities rising from 12 500 thousand tons in 1964 to 16 400 in 1975 in the developed countries and from 4 400 thousand tons in 1966 to 6 750 in 1975 in the Eastern bloc. In the developing countries, however, the contribution of palm, coconut, fish, rapeseed and soya bean oils should cause the growth rate to speed up somewhat; availabilities, which stood at 11 960 thousand tons in 1964, will reach 16 500 in 1975.

This predicted increase in production should be absorbed by consumption, so there would be no notable overproduction during the period 1965-1975.

The (visible) oils and fats consumption per head (excluding butter), which was 7 kg in 1953 and 9 kg in 1965, will be 10 kg in 1975. Thus, allowing for the growth of population, the consumption growth rate per head would continue to slacken. This overall trend masks some pronounced differences, depending on the entities concerned. In the developed countries, our forecasts indicate a 1975 consumption figure of 23.6 kg per head, which, bearing in mind the butter consumption, is perhaps not

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Table 3 (38)

RATES OF INCREASE:
AVAILABILITIES IN THE DEVELOPED
COUNTRIES AND WORLD PRICES
OF THE PRINCIPAL OILS AND FATS

%

	Availabilities in the developed countries		Prices	
	1954 - 1963	1963 - 1975	1955 - 1965	1965 - 1975
Soya bean oil	88	65	- 22	- 21
Groundnut oil	50	32	- 11	- 17
Lard	20	4	- 11	4
Marine oils	10	36	7	- 14
Coconut and palm kernel oils	6	- 2	9	2
Palm oil	- 16	7	14	- 2

very high; the saturation level is not far off, but is mainly after 1975 that saturation effects will be really significant.

In the Eastern bloc countries, consumption per head is expected to advance at the same rate as in recent years. And in the developing countries, although the present level of consumption is extremely low, even the very modest acceleration predicted[1] appears to be optimistic and thus the gap between them and the developed countries will go on widening.

c) Prices and availabilities in developed countries

The trend in the developed countries' availabilities of the various raw materials which influence prices will be as follows:

Soya beanoil availabilities will continue to mount rapidly, though not quite so fast as during the previous period; they will form a larger proportion of the total availabilities and the price might fall to some 200 dollars a ton;

Groundnut oil availabilities will probably make slower progress than previously, and their share may stabilize at about 6.2%. The price would then be 260 dollars;

Lard will probably increase only very slightly, and this fact may keep its price up in spite of the drop in the price of soya beanoil;

The marine oils, expanding rapidly, are likely to find their price falling;

The availabilities of lauric oils will be practically constant. Their price can therefore be expected to remain fairly high on average;

Palm oil availabilities, which were shrinking over the previous period, should expand, mainly after 1970. Then the price, which had been tending to rise for the previous ten years, would stabilize.

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[1] 1953: 4.4 kg per head
1964: 5.1 kg per head
1970: 5.4 kg per head
1975: 5.7 kg per head

Table 4 (39)

FORECASTS OF THE PRICES OF THE PRINCIPAL OILS AND FATS

	Average 1954 - 1956	Average 1964- 1966	1970	1975
Soya bean oil	324	254	210	200
Cottonseed oil	298	266	216	206
Groundnut oil	350	312	270	260
Lard	337	301	310	313
Whale oil	234	239	212	206
Fish oil	178	202	179	174
Coconut oil	289	323	330	340
Palm kernel oil	279	295	287	289
Palm oil	222	253	246	248
Tallow	204	225	190	190

3 - EEC FINAL DEMAND

Our fairly detailed study of the trend of final demand in each of the EEC countries calls forth comments on four points, namely:

the paucity of present statistics on the subject,
the shortcomings of traditional demand analysis,
saturation levels,
the diverging trend of consumption patterns in the various countries.

a) Paucity of statistics

We collected the annual or monthly statistics available for each country on consumption of the various finished products - butter, margarine, table oil, vegetable fats, shortening and lard - for the period 1950-1965. In this context it should be noted that the gathering of basic statistical data is generally left to the national producers' associations, whose activity is often confined to one or two products. Generally speaking, therefore, there are no official statistics, nor is there even co-ordination in most cases; in particular, the Brussels Nomenclature is unknown. The result is that the same name is used for different products in different countries; it is frequently impossible, in such statistics as do exist, to distinguish household consumption from the food industries' consumption; and one sometimes finds several sources giving different consumption figures for the same product. For instance, the consumption of olive oil in Italy is not known even to within 50 000 tons, and the statistics on butter in France and Belgium are hardly better. The German and Dutch figures for household consumption of oil and vegetable fats are extremely difficult to disentangle from those for the food industry. Furthermore, there is no information on the variations in retailers' and sometimes in manufacturers' stocks.

Such scanty and vague figures obviously provide a rather shaky basis for the findings of the econometric analysis.

.../...

Table 5 (40)

PRICE ELASTICITIES

	Butter	Margarine to butter price	Table oil	Olive oil
Germany	- 0.36	+ 0.32[1]	- 0.52	-
France	- 0.29[2]	-	- 0.24	- 0.77
Italy	- 0.63[3]	-	- 0.88[4]	- 1.36[5]
Netherlands	- 1.27[6]	+ 0.10	-	-
BLEU	-	-	- 0.62	-

[1] Elasticity calculated from the equation of butter demand and an elasticity of margarine consumption to butter consumption of 0.89.

[2] Not statistically significant.

[3] This elasticity was calculated with a model that did not include income effect, and is therefore very imperfectly known. But the existing colinearities made it impossible to introduce the variables of price and income at the same time.

[4] An elasticity of - 2.23 to the price of olive oil should also be noted. The two elasticities have been calculated from the equation of olive oil demand and an elasticity of consumption of seed oils to consumption of olive oil of - 1.64.

[5] An elasticity of + 0.54 to the price of seed oil should also be noted.

[6] There is also a non-significant elasticity to the margarine price of + 0.44.

b) Shortcomings of traditional demand analysis

In the usual type of demand analysis, consumption per head is explained in terms of income per head, the price of the product and the prices of competing products. Our econometric study showed, as regards the EEC countries, that:

The influence of butter and oil prices on consumption per head is real but relatively slight, except as regards the consumption of butter in the Netherlands and of olive and seed oils in Italy (see Table 40 opposite);

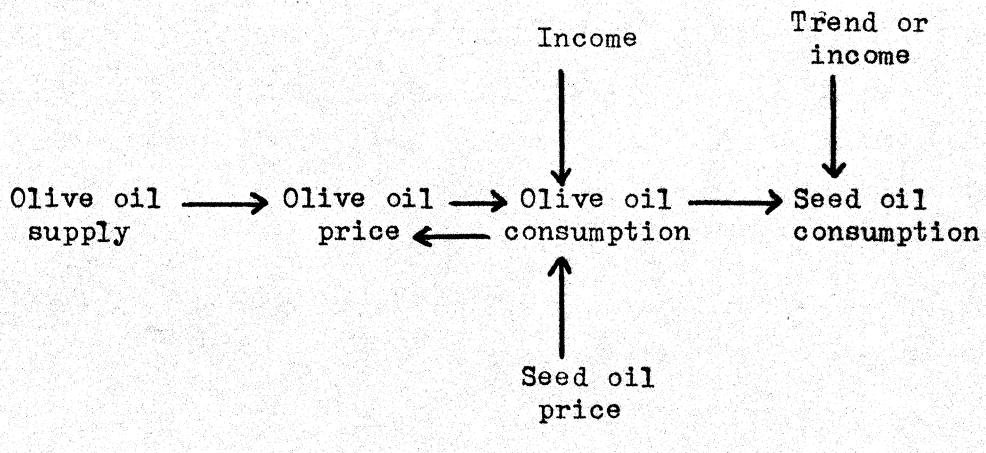
Income is not a determining influence. The results of the SOEC survey show, for instance, that the influence of social and occupational category is often stronger than that of income. Nevertheless, this survey reveals that income has a significant effect on the consumption of butter in Germany, France and Italy, and of oil in Italy.

Furthermore, it appeared that the income elasticities calculated from the data in time series very often measured the trend of consumer habits rather than an actual income effect. It was sometimes found better to use a trend term rather than income in the regressions. But "consumer habits", an expression which modestly veils our ignorance on the inner causes of these trends, are hard to predict five or ten years ahead, and thus render the forecast uncertain.

In a number of cases we observed that the symmetrical machinery of choice between two competing products, as used in the traditional analysis of demand, did not describe the true situation accurately. For example, it appears in Germany that butter consumption depends on household incomes, butter prices, and the trend of consumer habits; and margarine then comes in to supplement butter, at least for some uses.[1] Similarly, in Italy the consumption of seed oil is clearly explained by the following diagram:

.../...

[1] Margarine consumption reacts very sensitively to the butter consumption rate (elasticity 0.89) but not directly to the price of butter.



In both cases there is a leader and the second product is merely, for some uses at least, a substitute for it; symmetry of choice effected by the two prices does not appear to give a true picture of the situation.

c) Saturation levels

A saturation level for the total final demand for fats and oils undoubtedly exists, but may differ from one country to another. For example, since 1955 German consumption has stood at about 29 kg per head (by weight of product) whilst Dutch consumption has passed 30 kg per head and is still rising. This rise, however, will probably level off very perceptibly in the Netherlands between now and 1975.

In France and Belgium, total consumption will rise more slowly but real saturation may not set in before 1975. It will probably be at a higher level than in Germany, but lower than in the Netherlands.[1] In Italy, total consumption has progressed rapidly in the last fifteen years and this growth may continue practically unchecked up to 1975.

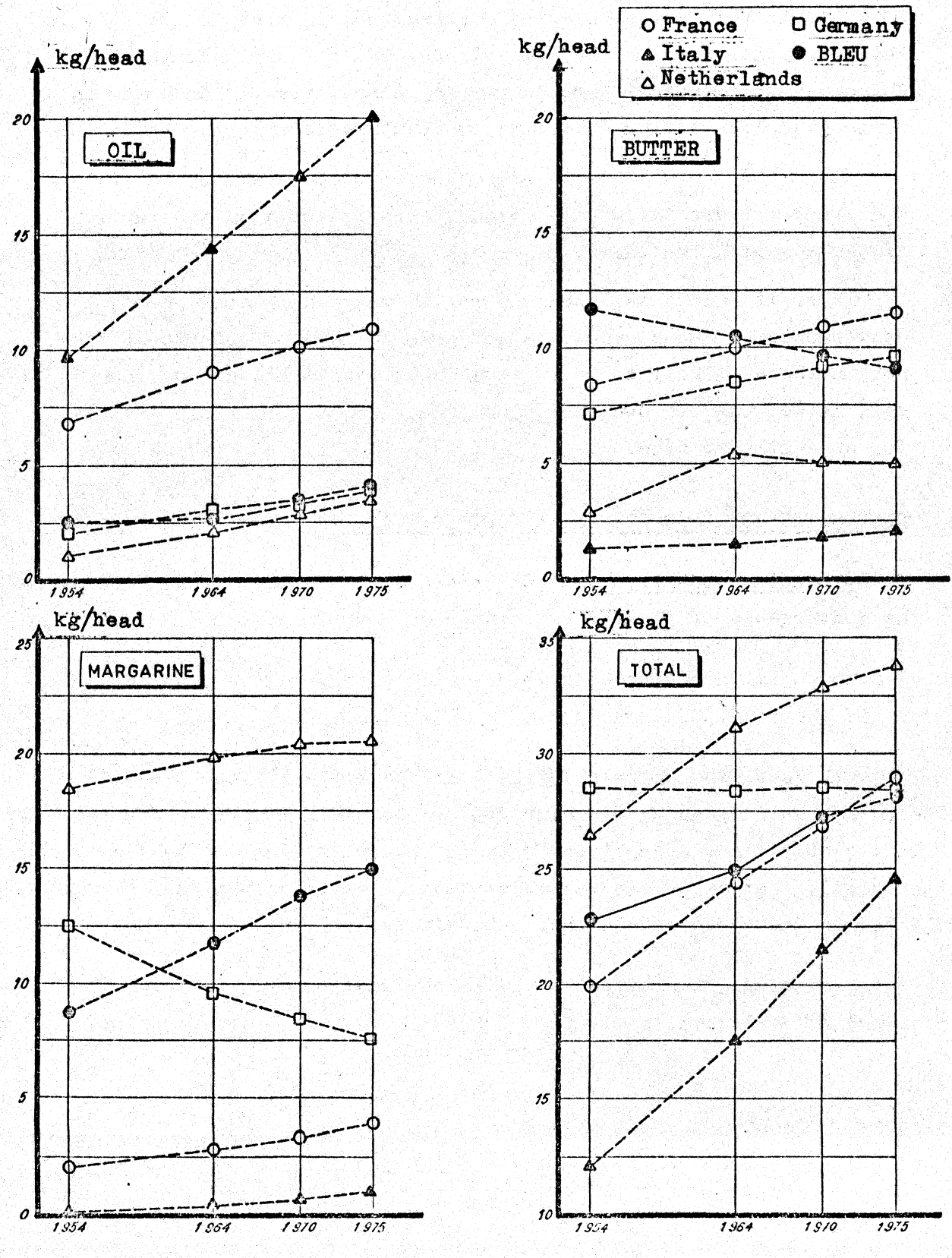
.../...

[1] As the definitions differ from country to country, these are only broad comparisons.

Diagram 2 (34)

CONSUMPTION OF OILS AND FATS

- Retail market -



d) Diverging consumption patterns

Contrary to what one might have expected, the past and predicted trends of consumption of the different products in each EEC country exhibit no common feature. Diagram 34, opposite, shows clearly that there is no convergence towards a common consumption pattern, even if Italy is left out of account. Butter consumption is dropping in Belgium, stationary in the Netherlands, and rising in France and Germany; on the other hand, margarine consumption is dropping in Germany and increasing in the other countries.

Fluid oil consumption is increasing far more rapidly in Italy and France, where these oils already account for a major fraction of the consumption figure.

Thus, it can be said that there is practically no sign of convergence of the consumption patterns in the different countries, nor is there likely to be any such convergence between now and 1975; each market has its own characteristics and will probably keep them for some time to come.

4 - COMPOSITION OF PRODUCTS AND IMPORT FORECASTS

The product composition analysis produced rather different findings on the convergence of the various countries' supply patterns.

The composition of products, particularly of margarine, varies widely in the five EEC areas.

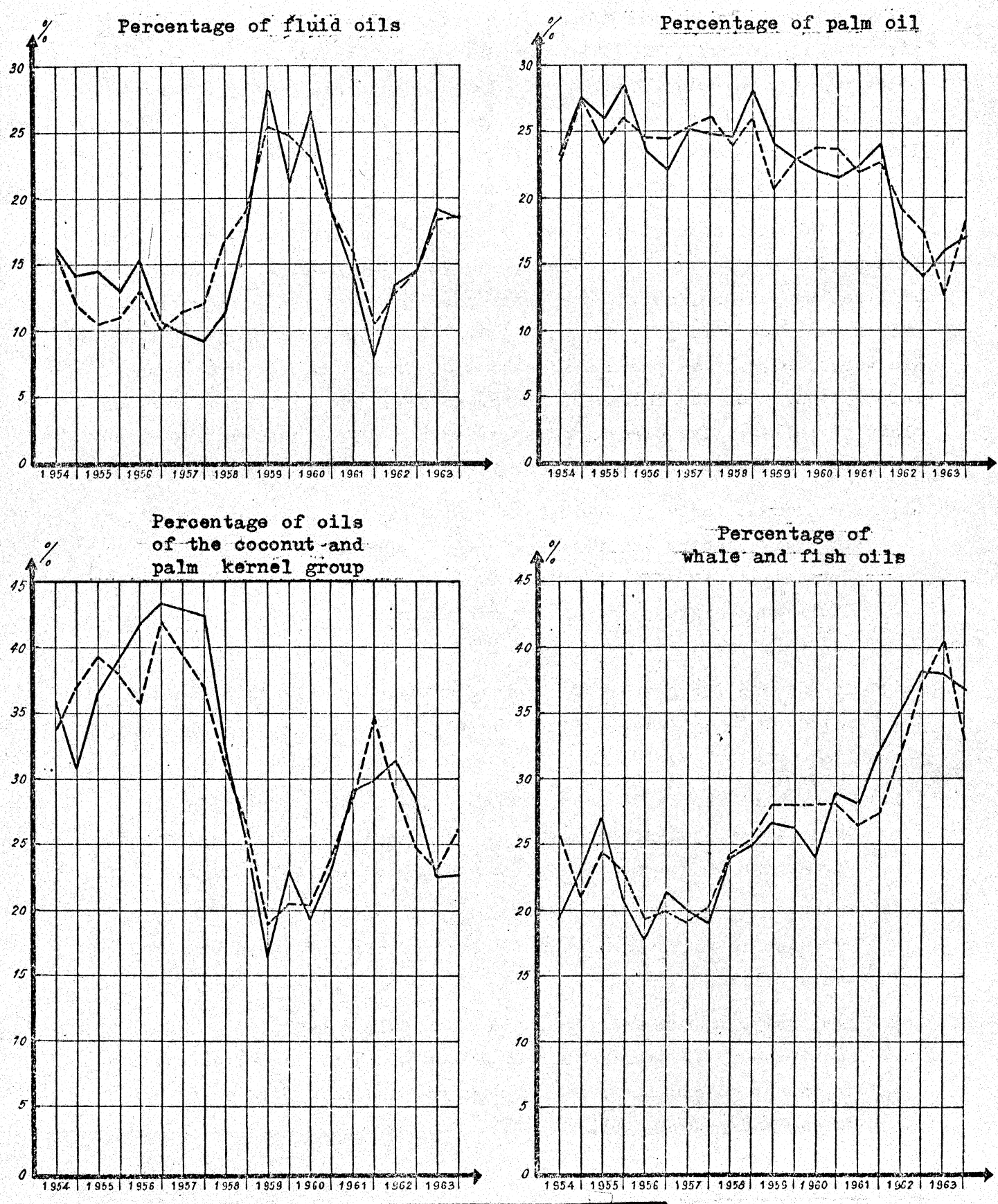
Nevertheless, the changes forecast are nearly all along the same lines, with an increasing fraction of soya bean oil, a diminishing fraction of lauric oils, increases of the "other fluid oils" and a slight decrease of palm oil. Marine oils advance in certain countries but fall back in others; on the whole, their share diminishes.

This relatively convergent trend is obviously due to the common influence of world prices.

.../...

Diagram 3 (35)

COMPOSITION OF MARGARINE IN THE NETHERLANDS



Source: MVO.

It became apparent from our study that a very large part of the composition changes could be accounted for by variations in raw material prices. This can be seen most distinctly in the Netherlands where, thanks to the work of the MVO,[1] half-yearly statistics of composition per product are available. Diagram 35 opposite shows the trend for the principal raw material fractions in Dutch margarine, partly observed and partly calculated by means of a model in which the prices of the different substances are the only factors; it will be seen that the model reproduces the variations in composition very well.

In the other countries, except France, the statistics are decidedly less useful and we had to confine ourselves to an analysis of the total utilization pattern, as the composition of the different products is only known from a one-year survey. In Belgium, in particular, statistics are very poor, as the producers' associations do not communicate any information. But the influence of raw material prices is nevertheless plainly visible. The direct and substitution price elasticities found are given in Chapter 2, Part II, of the report; we may mention that:

(i) The demand for soya bean oil is very sensitive to price variations in every country except France, where consumption is very low. This demand is sensitive to the price of groundnut oil in Germany, Italy and Belgium, and of coconut or palm oil in the Netherlands and Belgium;

(ii) The demand for groundnut oil is sensitive to variations in the price of this product and to the price of soya bean oil in Germany, Italy and Belgium;

(iii) The demand for marine oils is very sensitive to variations in their price, but also sometimes - though to a lesser degree - to variations in the price of soya bean oil or the solid oils;

(iv) The demand for palm oil is sensitive to variations in its price, but also to variations in the prices of coconut, soya bean and whale oils;

(v) Similarly, the demand for coconut and palm kernel oil is very sensitive to variations in the prices of these products, but also to variations in the price of soya bean and palm oils and, in the Netherlands, whale oil.

.../...

[1] Produktschap voor margarine, vetten en oliën.

These findings show that the solid oils face strong competition from soyabean oil and to a lesser extent from fish and whale oils, but also compete with one another.

Thus, our utilization forecasts for the various raw materials depend closely on the hypotheses adopted concerning world prices for the products. For instance, soya bean oil's increased share in total utilization stems from the price drop predicted for that product. Similarly, the lauric oils have a smaller share, because coconut oil maintains its price. The table opposite sums up the past and predicted trend for the whole of the EEC.

It will be seen that, although their market will expand, the tropical oleaginous products will constitute a diminishing fraction of the EEC's supplies.

This shrinkage is due to the solid oils; the proportion of groundnut oil, on the other hand, will increase slightly.

.../...

Diagram 4 (36)

APPARENT CONSUMPTION OF UNREFINED OILS IN THE EEC

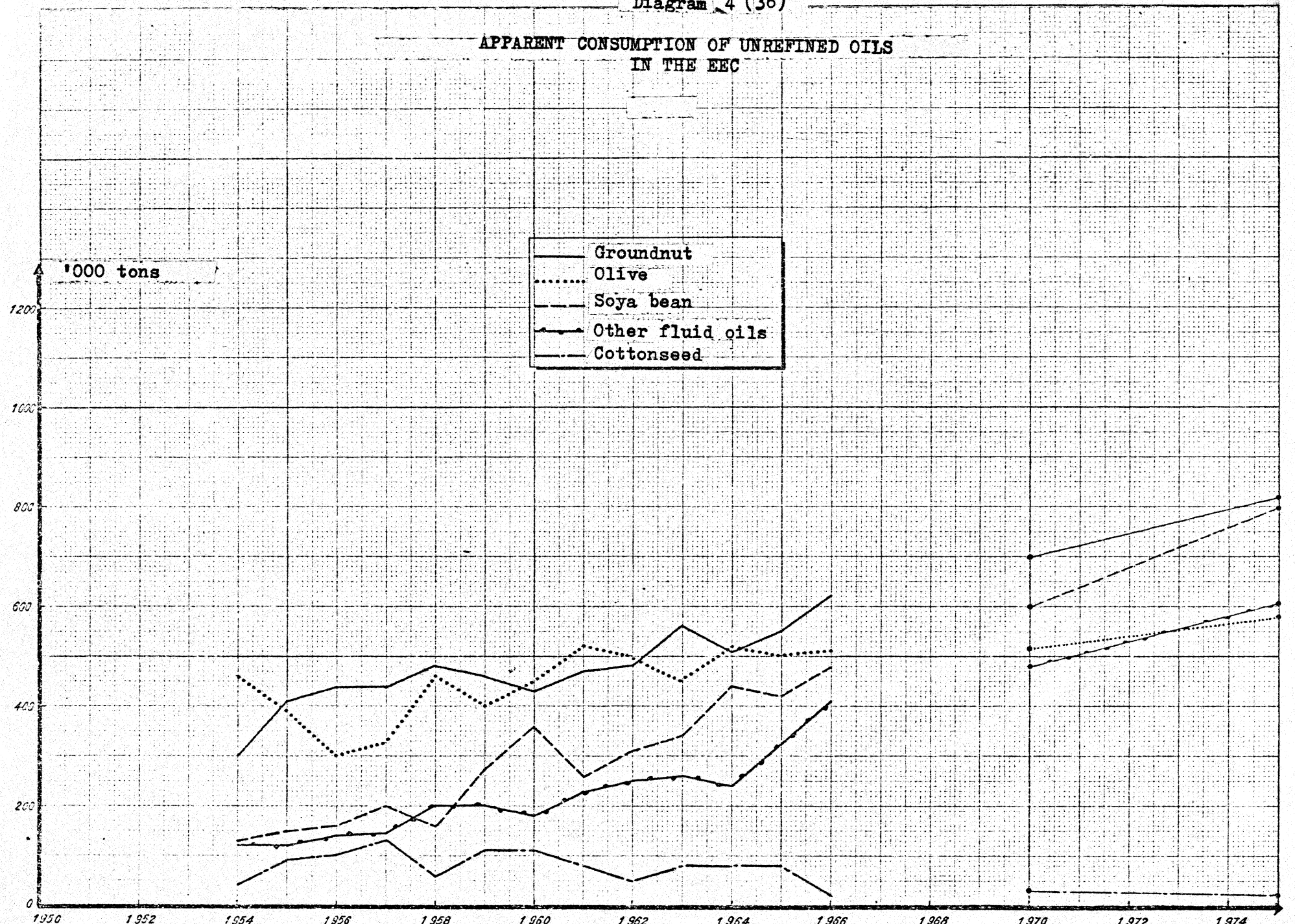


Diagram 4 bis (36bis)

APPARENT CONSUMPTION OF UNREFINED OILS IN THE EEC

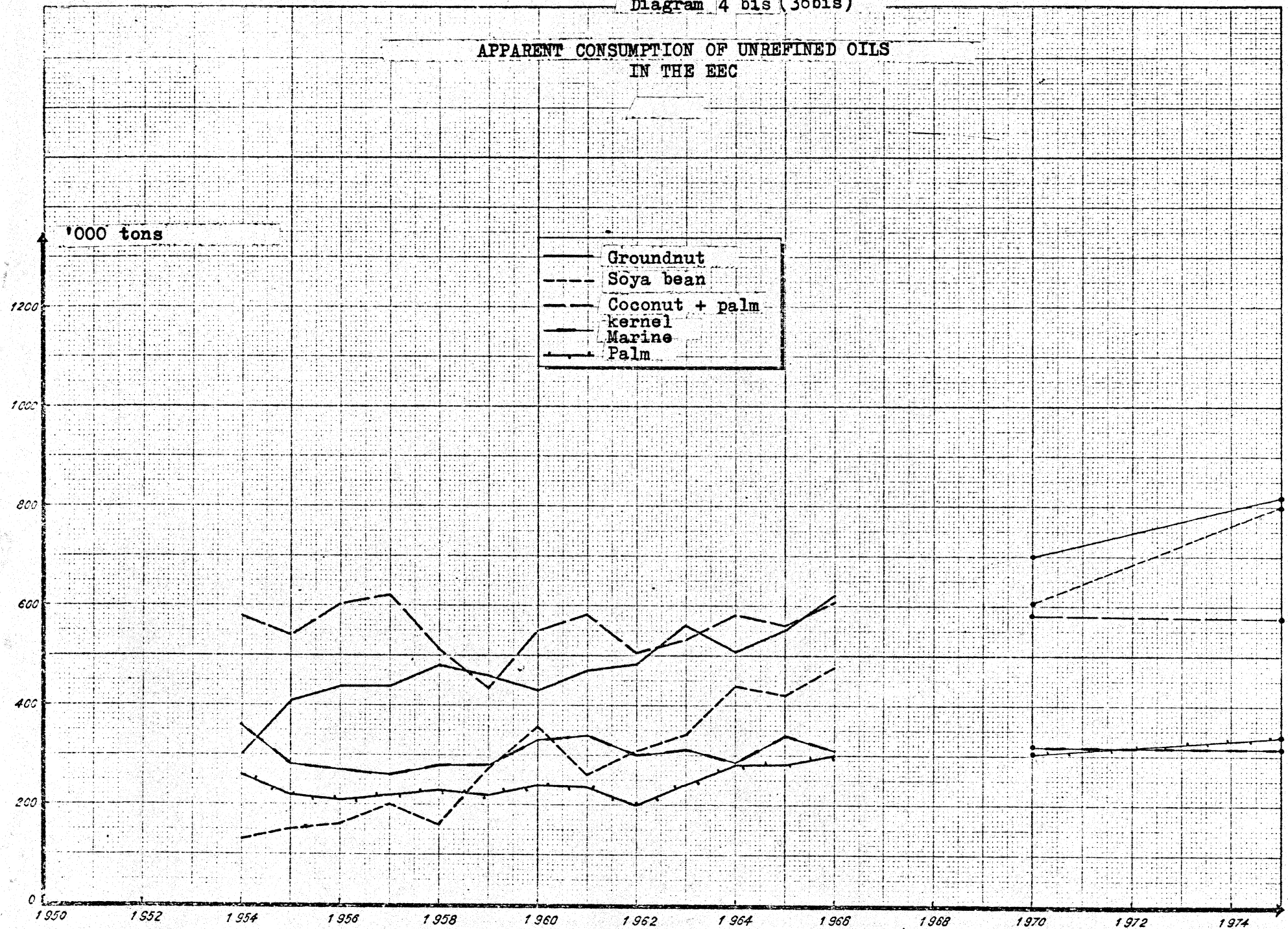


Table 6

FORECASTS OF USE AND IMPORTS OF OILS AND FATS

EEC	Quantities in thousands of tons				Percentages			
	Average 1954 1955 1956	Average 1964 1965 1966	1970	1975	Average 1954 1955 1956	Average 1964 1965 1966	1970	1975
Soya bean	127	443	614	802	,6	14,2	17,1	19,6
Cottonseed	105	68	36	15	4,6	2,2	1,0	0,4
Groundnut	383	566	702	816	16,9	18,1	19,6	19,9
Olive	388	522	522	580	17,2	16,7	14,6	14,1
Other fluid oils	139	333	489	606	6,2	10,7	13,7	14,8
Total edible fluid oils	1 142	1 932	2 363	2 819	50,5	61,9	66,0	68,8
Palm	235	292	318	357	10,4	9,3	8,9	8,7
Coconut and palm kernel	580	586	577	581	25,6	18,8	16,1	14,2
Total solid oils	815	878	895	939	36,0	28,1	25,0	22,9
Marine oils	306	313	325	340	13,5	10,0	9,0	8,3
TOTAL	2 263	3 123	3 583	4 097	100,0	100,0	100,0	100,0
including tropical oleaginous products	1 198	1 444	1 597	1 754	52,9	46,2	44,6	42,8

PART II

The forecasts of imports of tropical oleaginous products made in this study rest on the assumption that the oils and fats policy followed by the various countries, and more especially by the EEC and the USA, will be continued. We shall now try to express in figures the consequences of three aspects of that policy:

US government aid to soya bean growers;
the influence of margarine and butter prices;
the Community policy for olive oil.

1 - THE UNITED STATES' SOYA BEAN POLICY

The aid granted by the American Government to soya bean growers has two facets - the support price, and the oil exports under Public Law 480.

(i) The Commodity Credit Corporation (CCC), which implemented the price support programmes in the United States, fixes a soya bean support price at the beginning of each season (October-September). It also grants, to growers who so desire, loans equal to the value of their crop calculated at the support price, accepting the crop itself as security. The farmer can either repay the loan at any time before the end of the season (end of spring) if he finds a buyer on the market at a better price, or else hand over the crop at the due date.

The CCC can then export, stockpile or sell the soya beans to American crushers. In the period 1951-1965, the average price received by the farmers was equal to or less than the support price in 1957, 1958 and 1961.

(ii) Since the end of 1955, however, the Government has intervened by means of the law of 1954 on farm aid and development (Public Law 480).

.../...

This law authorizes the US Government to sign sales agreements with other governments. These agreements may be for supply against payment in the currency of the importing country, such currency to be used for various purposes by arrangement between the two parties; or they may take the form of gifts or barter agreements; or they may be accompanied by the grant of long-term credit. Thus the US Government's intervention has been in the shape of oil exports to countries which, in principle, lacked sufficient resources to purchase in the free market; for the rule is that the latter must not be disturbed.

This type of export represents 50-60% of oil exports but only 9% of soya bean production (and some 9.5% of soya bean and cottonseed production). For, although oilcake is in particularly great demand in the developed countries, the same cannot be said of the oil.

The influence of this policy as a whole on the developing countries is complex and has often been debated. In the first place the support price, intended to encourage soya bean growing and to ensure a certain income for the American farmer, has two effects. On the one hand, it stabilizes the annual price fluctuations and in this way does not lead to the building-up of permanent stocks but only of carry-over stocks. On the other hand, it maintains the price, but this is only possible by building up a permanent oil stock which is disposed of under PL 480. So we shall take care to distinguish between the two measures:

(a) the support price system,

(b) non-commercial exports under PL 480.

a) The support price system

If this system were abandoned, or the support price lowered, the farmers would reduce their soya bean acreage and therefore their next crop, at any rate if market conditions threatened a significant fall in prices.

.../...

All other things being equal: a crop reduction of, say, a %, would bring the oil price in that year up by 0.7 a % of the previous year's price,[1] so that the American farmer would find his income reduced by a - 0.7 a = 0.3 a %.

But the higher price would lead to a less pronounced increase in the price of the other raw materials, the reciprocal elasticity values being under 0.7 (e.g. 0.3 for groundnut oil); hence the producers of other oils and fats would profit by both the higher prices and the substitution effect which would be in their favour.

It is plain that any measure which increases output must be against the interests of the producers of competing products, since such measures bring down the price of the product and also, though to a lesser extent, the price of the allied products. Thus the competitors lose both on unit value and on quantity.

b) Non-commercial exports under PL 480

These harmful effects would be clearly seen if the CCC put its oil stocks on the open market, but fortunately the non-commercial exports enable the price of oil to be kept up. Several countries have asked for an investigation of the competition offered by these non-commercial exports on the markets of rival raw materials. Our survey threw no light on the matter. It would be necessary to study, country by country, the extent to which these exports have taken the place of normal exports of other oils. This could be done by analysing the time series of imports into the countries in question; the FAO has carried out such a study, which has already given rise to several memoranda. We shall merely observe here that the conclusions of these memoranda are very cautious.

Turning now to the effect of support on prices of this, at least partly new, demand constituted by the non-commercial exports, we worked out the influence of a variation of the American crop fraction exported under PL 480. We took as our basic hypothesis a soya bean crop fraction of 9% (and 9.5% of the aggregate soya bean and cottonseed crops), corresponding to the average of the observed past annual rates.

.../...

[1] The availabilities elasticity of the price for oil is 0.7.

A 12% or 6% rate corresponds to an increase or decrease in non-commercial exports of 170 thousand tons in 1975, i.e. a 3.8% variation of the developed countries' soya bean oil availabilities. In view of the elasticity of the soya bean oil price, this corresponds to a 2.8% rise or fall in that price and to the following changes in the prices of the allied products:

± 2.8% for whale and fish oils

± 1.4% for lard

± 1% for groundnut oil.

If we assume that, as seems probable, the overall demand for fats and oils in the developed countries is very little affected by price, the increase of 170 thousand tons (in the case of a 12% rate) will benefit all the raw materials (including soya bean) owing to their price variation and elasticity. The tropical oleaginous products (groundnut oil in particular) could therefore find their outlets expanding by 80 to 100 thousand tons. In the EEC in particular, outlets for oleaginous products would thus expand by 50 to 60 thousand tons, or some 3%, in spite of a price rise which would be of the order of 1%.

2 - INFLUENCE OF MARGARINE AND BUTTER PRICES

Table 40 (price elasticities) provides an answer to several questions concerning butter and margarine pricing policy.

a) In the first place, it is recognized that the price of butter is relatively high, owing to a milk price fixed to keep the farmers' income at an acceptable level. This policy naturally leads to large butter stocks that are difficult to sell on foreign markets, even at a low price. At first sight, then, it may be asked if a lower retail price would improve the situation, and how it would affect margarine consumption and hence imports of tropical oleaginous products.

.../...

A 10% cut in the price of butter would probably only increase consumption by about 4% in the EEC as a whole, which is obviously not enough to offset the drop in receipts; only the Netherlands has an elasticity greater than 1, and a price cut there would bring in higher receipts. As for margarine consumption, this would fall by about 3.2% in Germany (butter consumption rising by 3.5%) and by only 1% in the Netherlands. In the other countries, consumption would probably fall by very little. In the EEC as a whole margarine consumption would therefore drop by perhaps 1%, and the incidence on tropical oils and fats would be negligible.

b) What would be the result of raising the margarine price, by 5% for instance? It has not been possible to determine statistically a margarine price elasticity in any country. So it is very probable that such an increase would cause practically no drop in consumption.

3 - INFLUENCE OF THE COMMUNITY POLICY FOR OLIVE OIL

The new Community regulations on olive oil have been in force since November 1966. Customs duties on seed oils have been abolished and the retail price should therefore drop considerably (about 20% to 30%). Every year the EEC has to fix a target price which would make it possible to market output with due regard, particularly, to the price of seed oils. In practice it tries to establish this price in such a way as to permit consumption of the order of 500 thousand tons.

From the calculated elasticities of olive oil consumption in relation to the prices of olive oil (-1.36) and of seed oil (+0.54), it is possible to work out the olive oil retail price required to bring about a given consumption. Parity of the two prices is not necessary, as olive oil consumption is distinctly more price-sensitive. But analysis of the seed oil demand also makes it possible to work out what the consumption of this oil would be if the chosen level of olive oil consumption were not 500 thousand tons but 50 thousand more or less. With a 10% variation, the corresponding variation in the seed oil demand would be 16%, i.e. of the order of 50-60 thousand tons, of which 20 thousand tons would perhaps be groundnut oil.

CONSUMPTION OF OILS AND FATS PER HEAD

- Excluding butter -

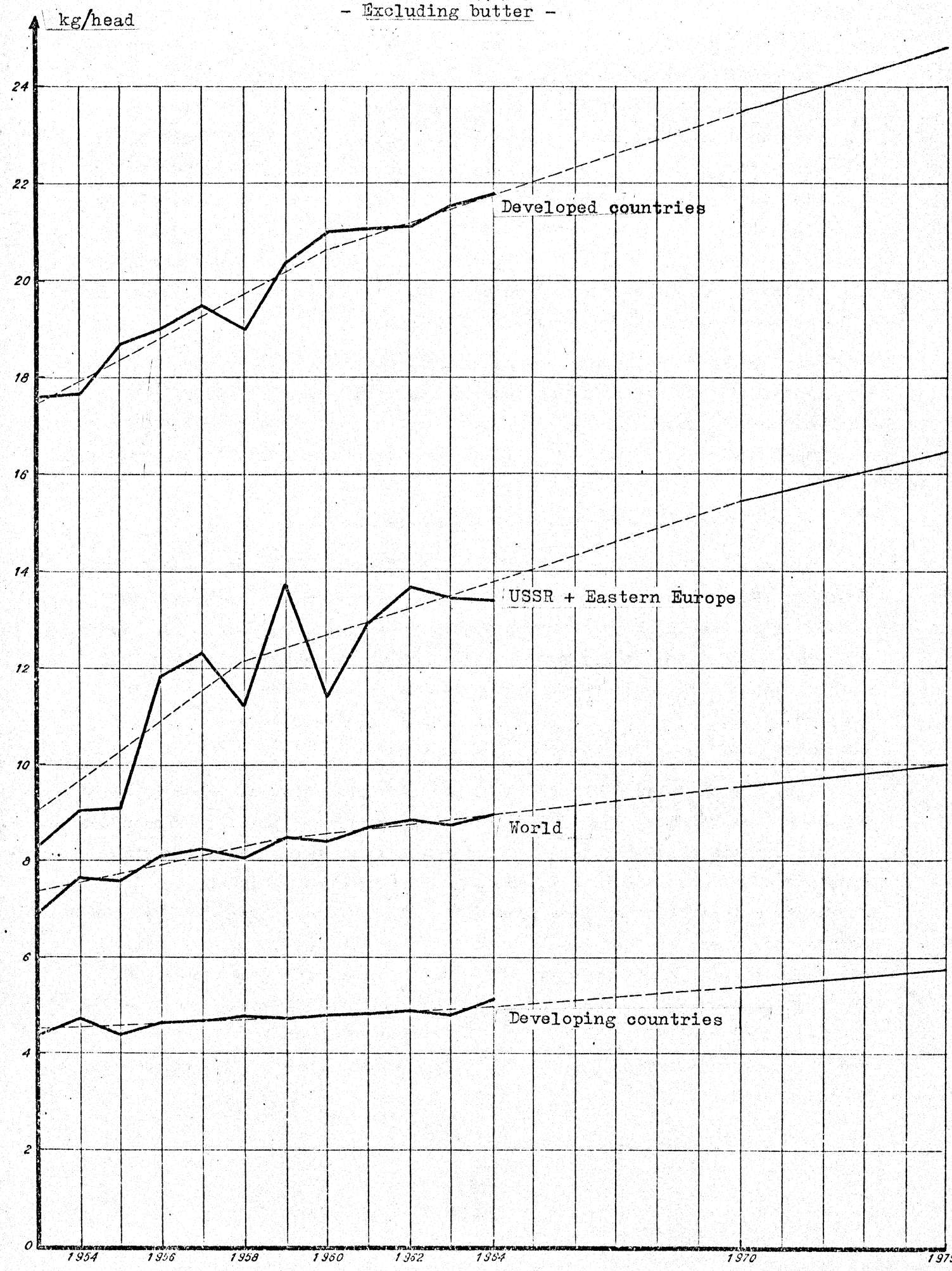


Diagram 6 (22)

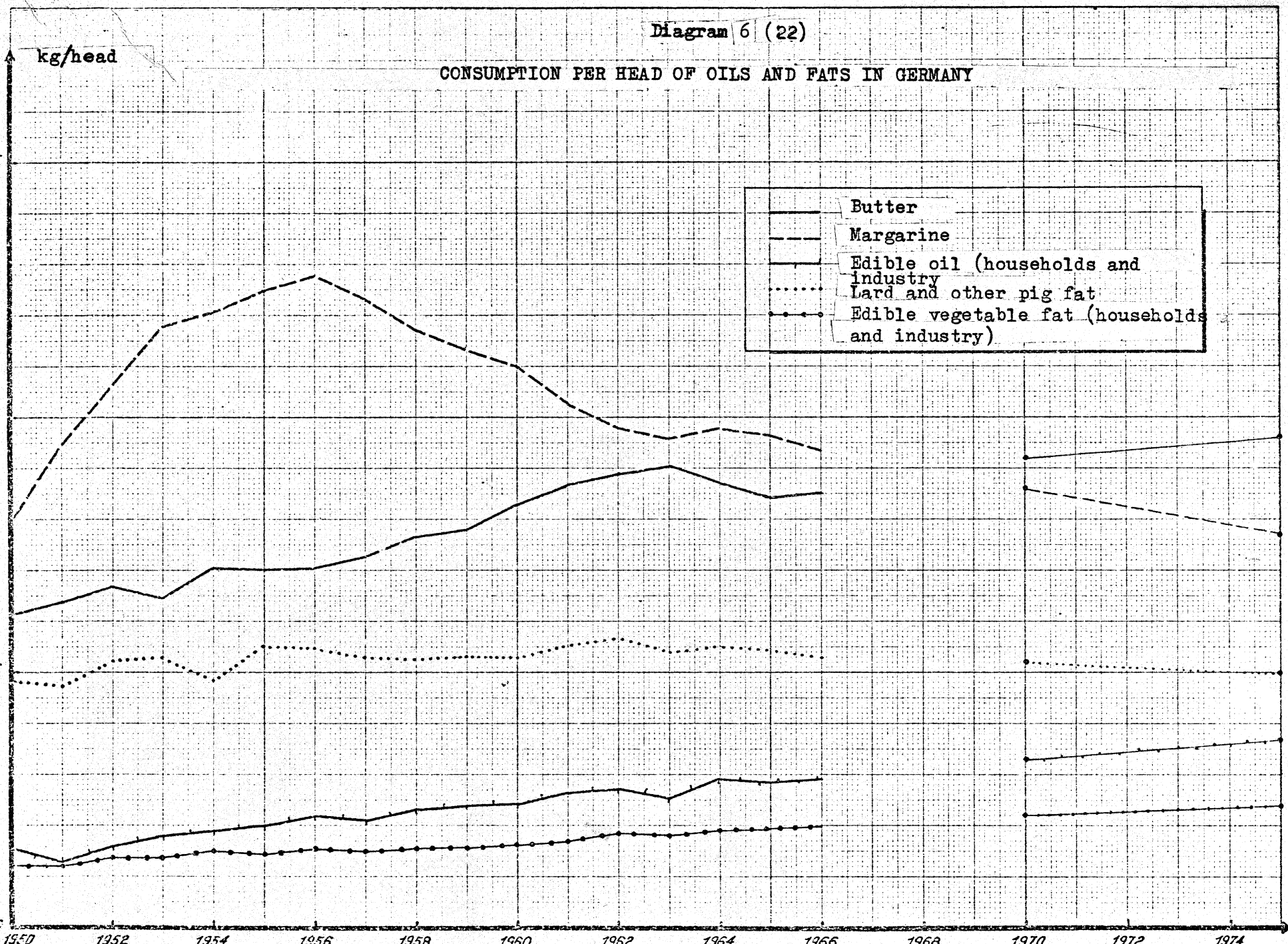

kg/head
CONSUMPTION PER HEAD OF OILS AND FATS IN GERMANY
15
10
5
0
Butter
Margarine
Edible oil (households and industry
Lard and other pig fat
Edible vegetable fat (households and industry)
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974

Diagram 7 (24)

DIRECT CONSUMPTION PER HEAD OF OILS AND FATS IN FRANCE

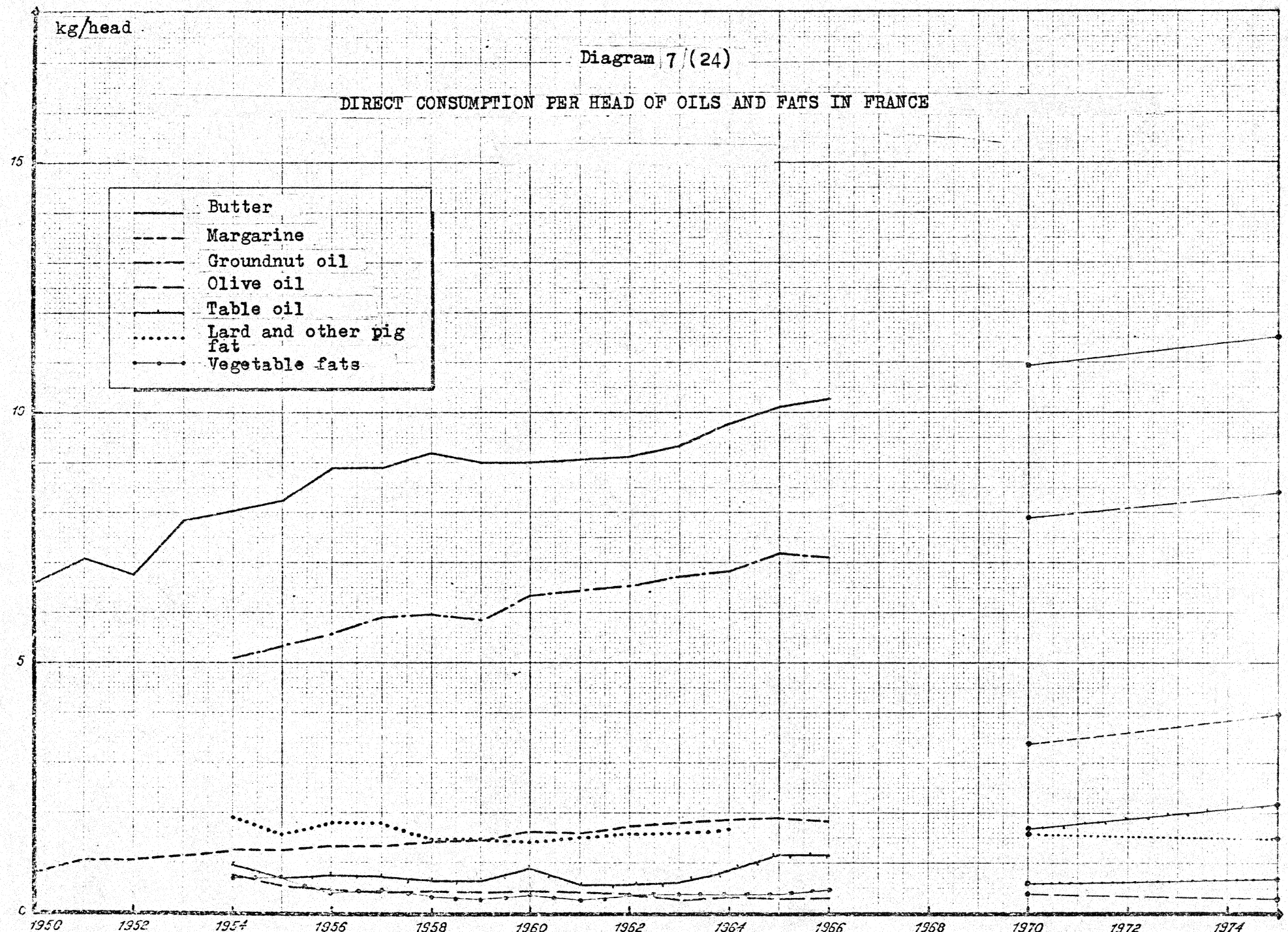
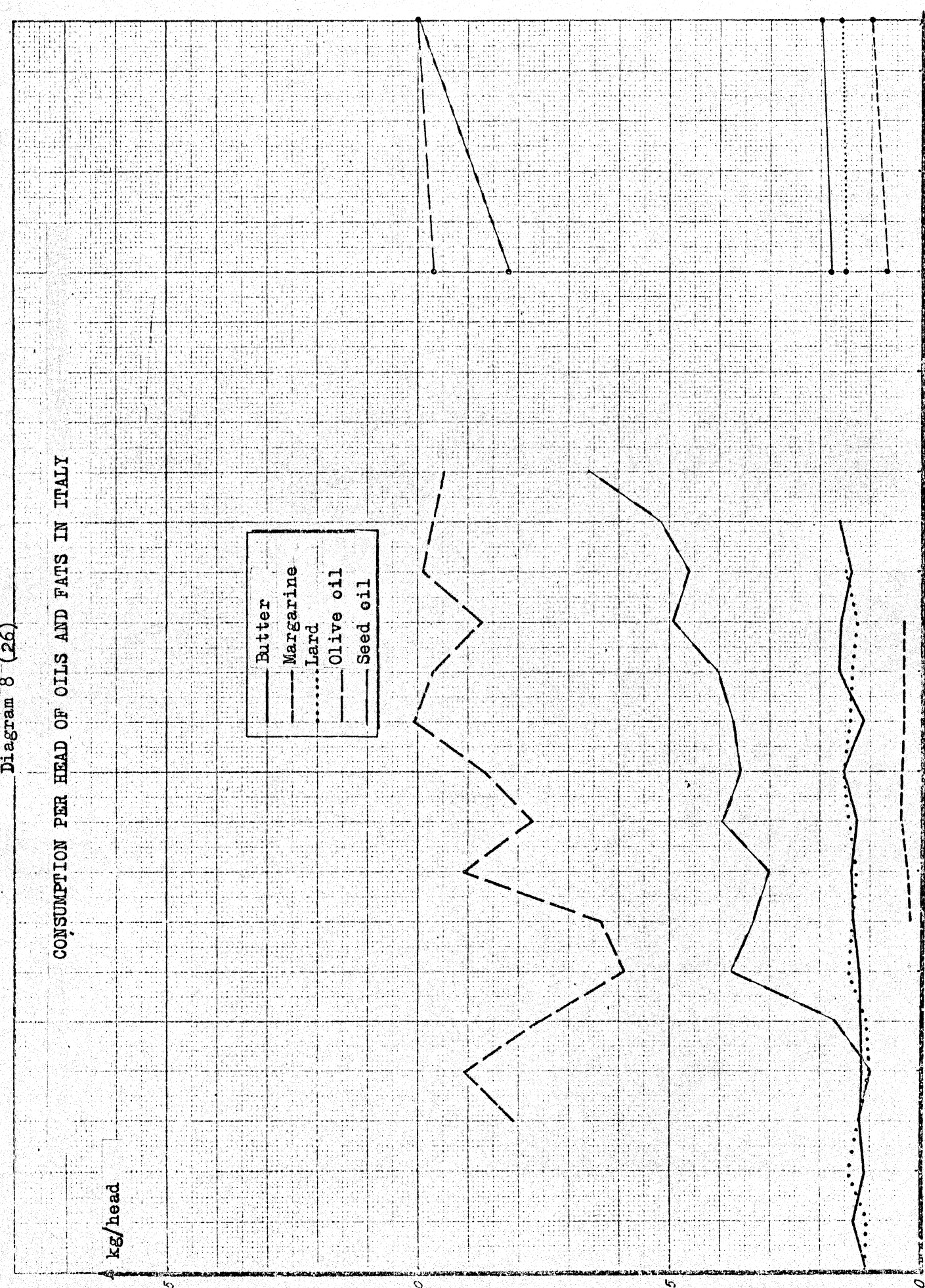


Diagram 8 (26)


CONSUMPTION PER HEAD OF OILS AND FATS IN ITALY
kg/head
15
10
5
0
Butter
Margarine
Lard
Olive oil
Seed oil
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974

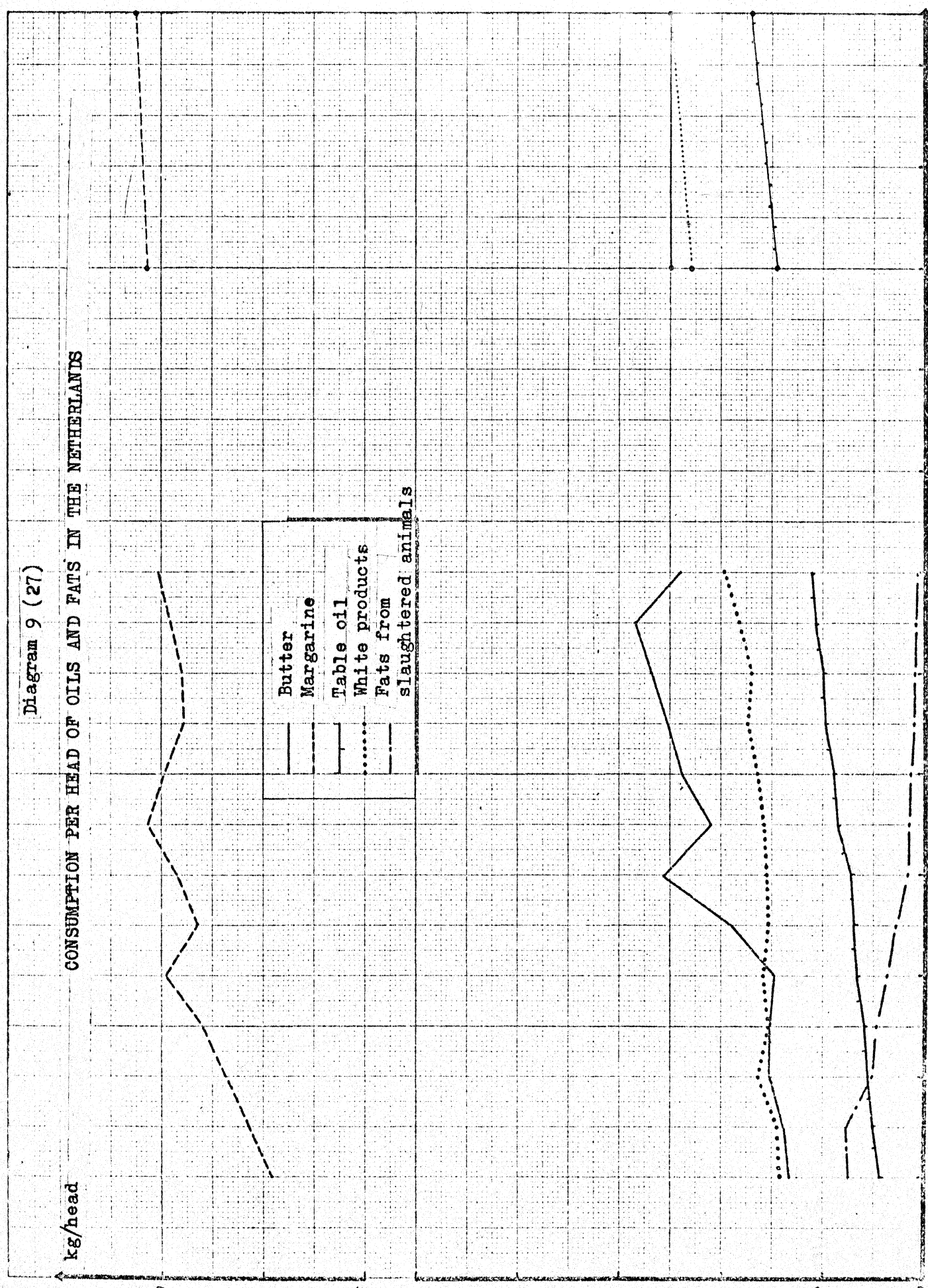


Diagram 9 (27)
CONSUMPTION PER HEAD OF OILS AND FATS IN THE NETHERLANDS
kg/head
Butter
Margarine
Table oil
White products
Fats from slaughtered animals
20
18
16
10
8
6
4
2
0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974

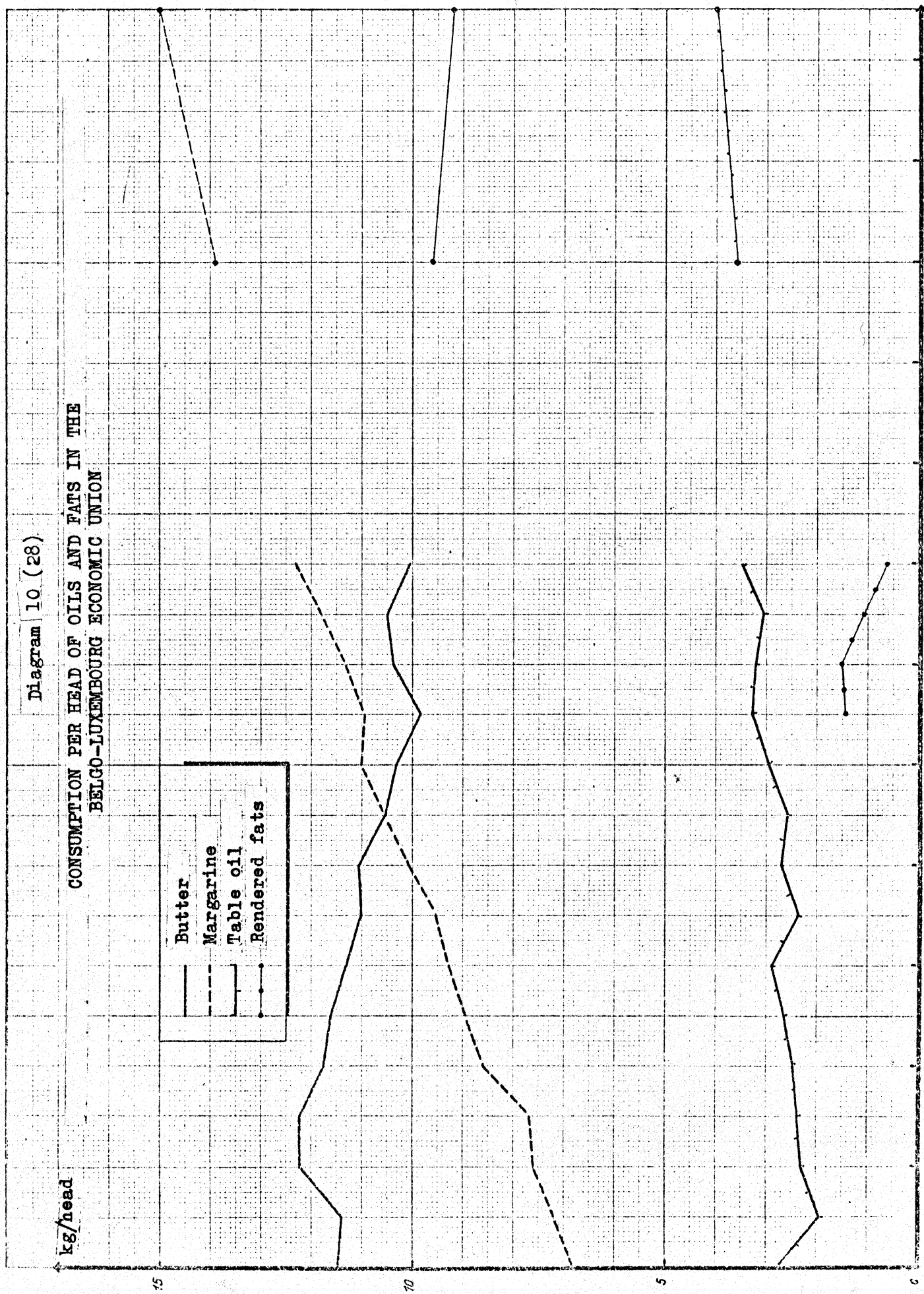


Diagram 10 (28)
CONSUMPTION PER HEAD OF OILS AND FATS IN THE BELGO-LUXEMBOURG ECONOMIC UNION
kg/head
Butter
Margarine
Table oil
Rendered fats
15
10
5
0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974

Diagram 11 (29)

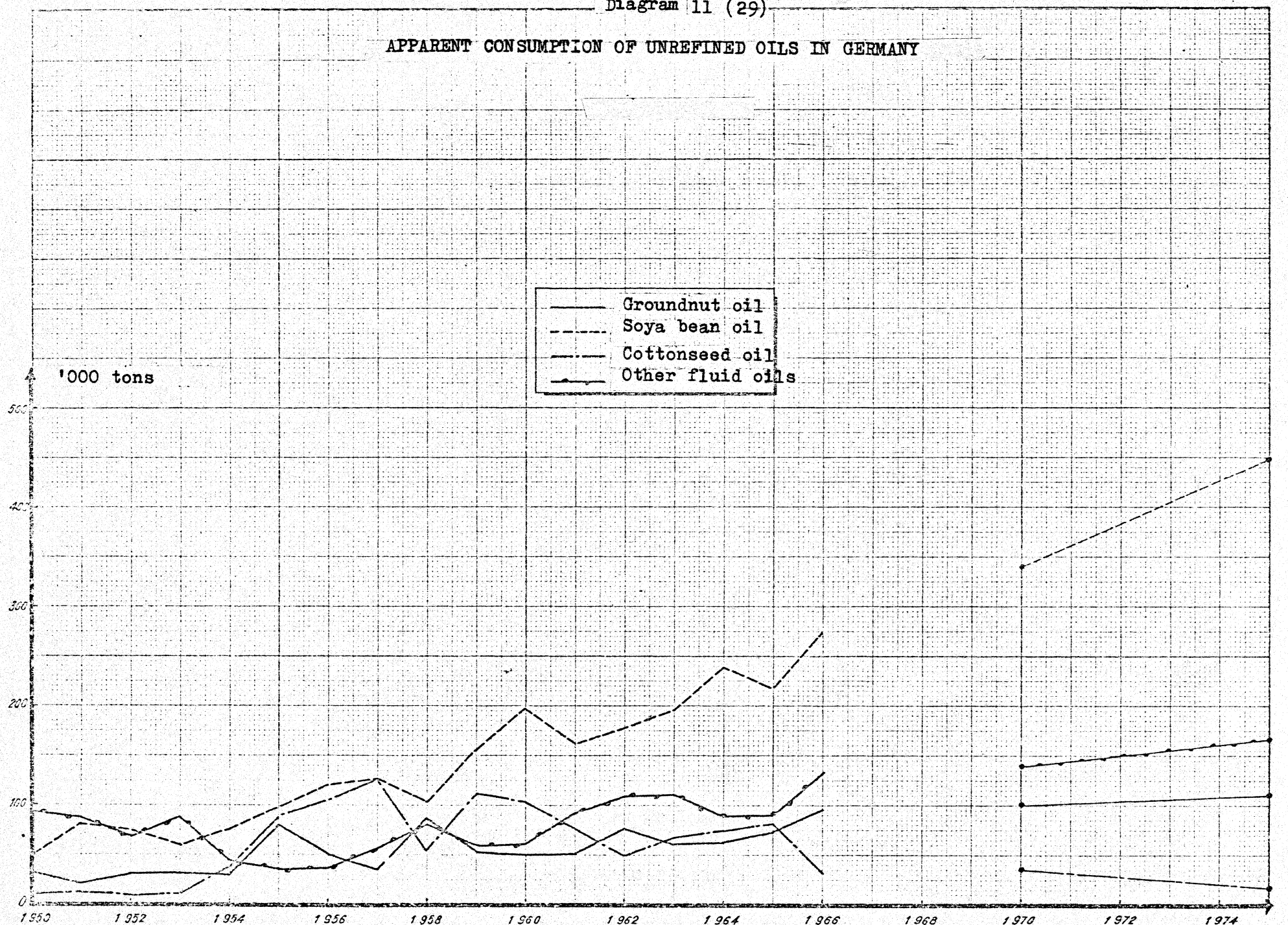


Diagram 11 bis ~~(29 bis)~~

APPARENT CONSUMPTION OF UNREFINED OILS IN GERMANY

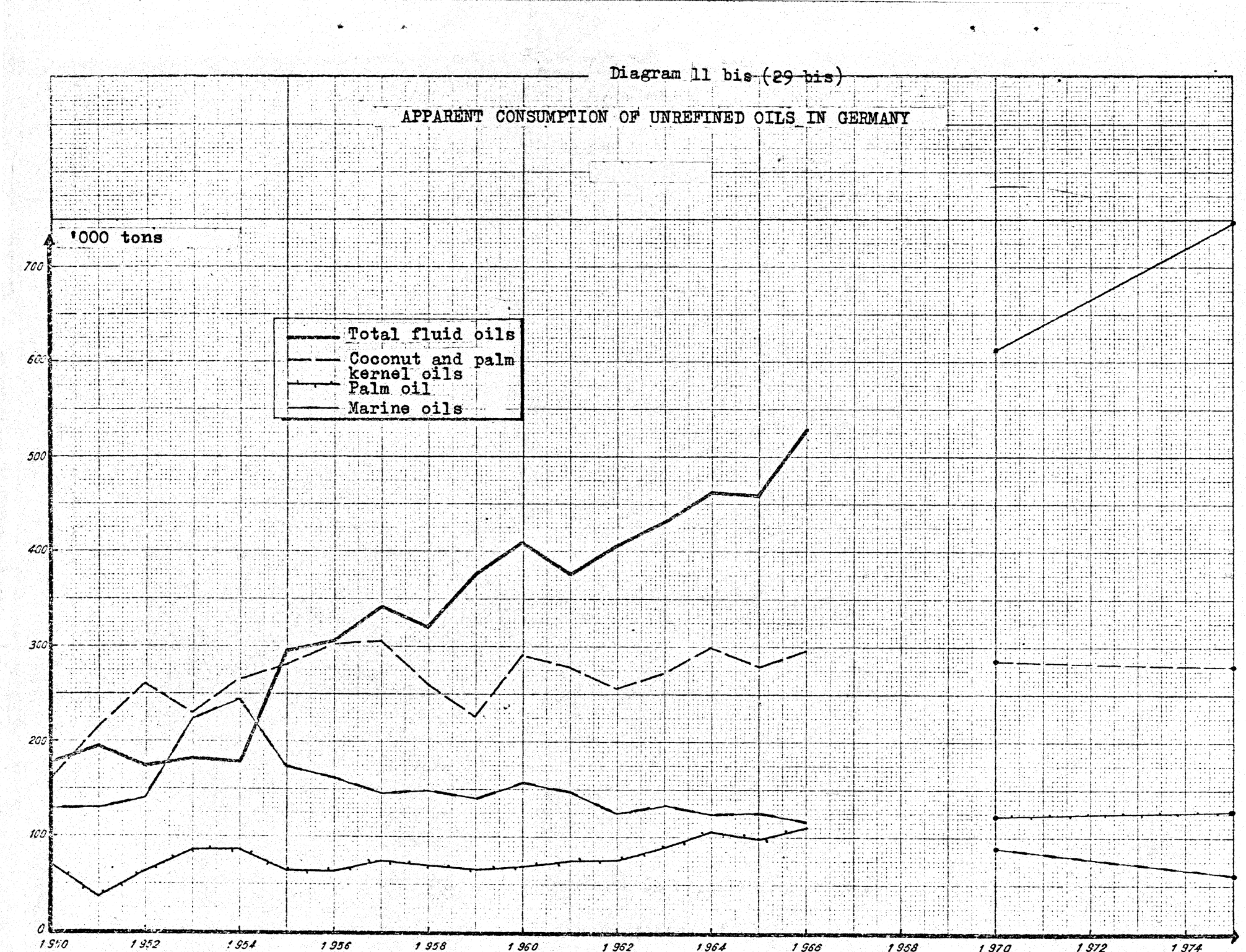


Diagram 12 (30)

APPARENT CONSUMPTION OF UNREFINED OILS IN FRANCE

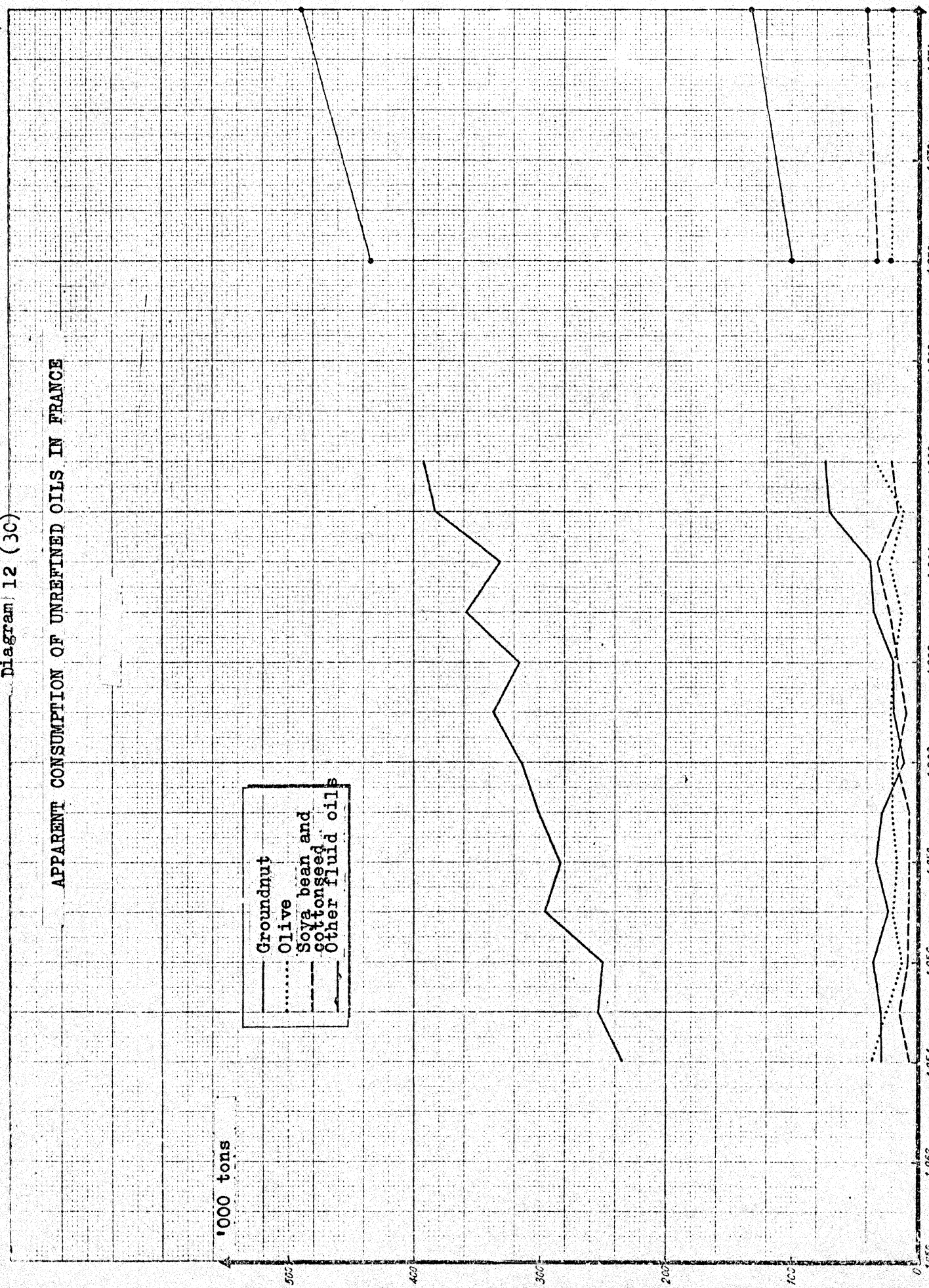


Diagram 12 bis (30 bis)

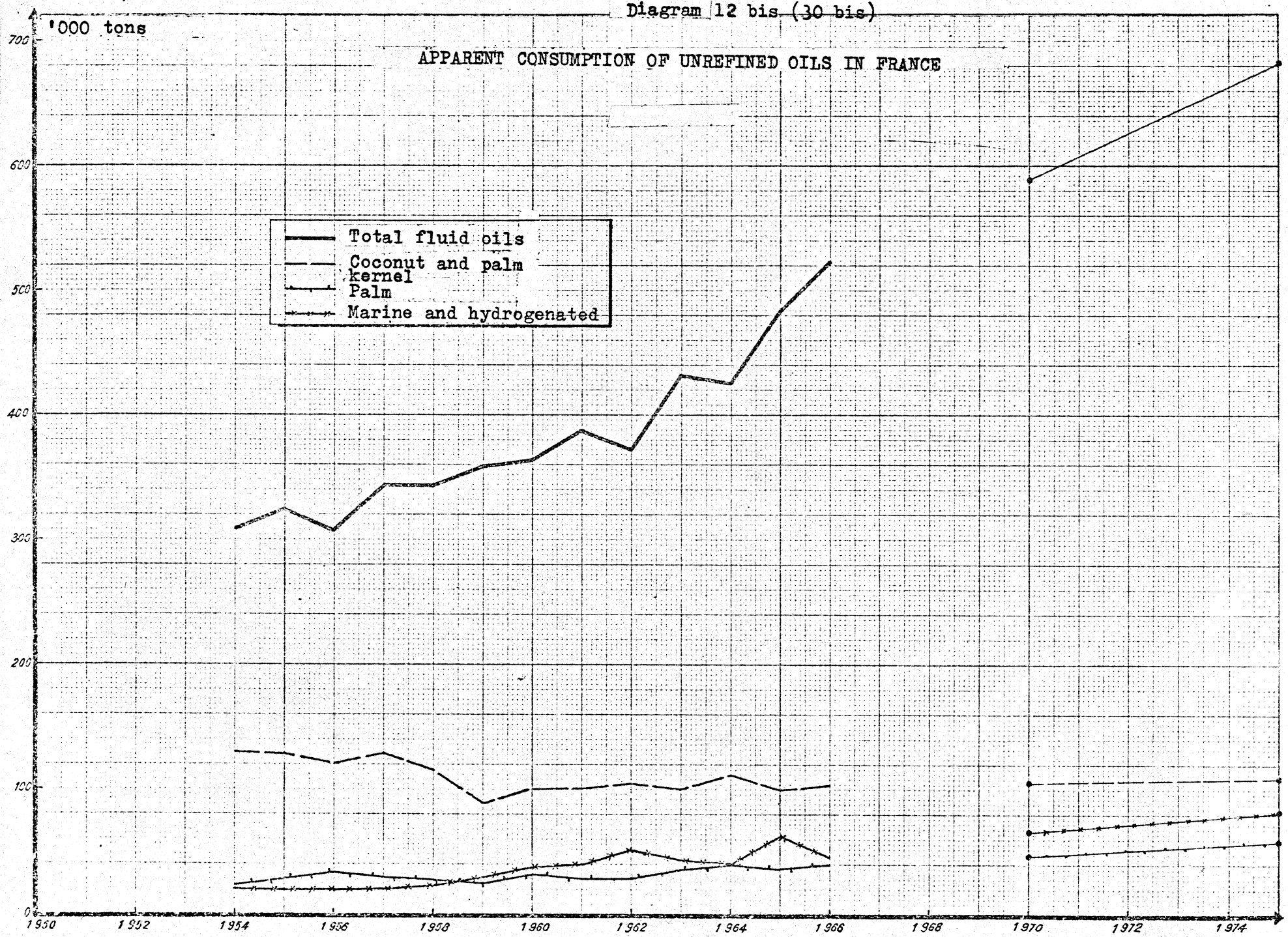


Diagram 13 (31)

APPARENT CONSUMPTION OF UNREFINED OILS IN ITALY

Diagram 13 bis (31 bis)

APPARENT CONSUMPTION OF UNREFINED OILS IN ITALY

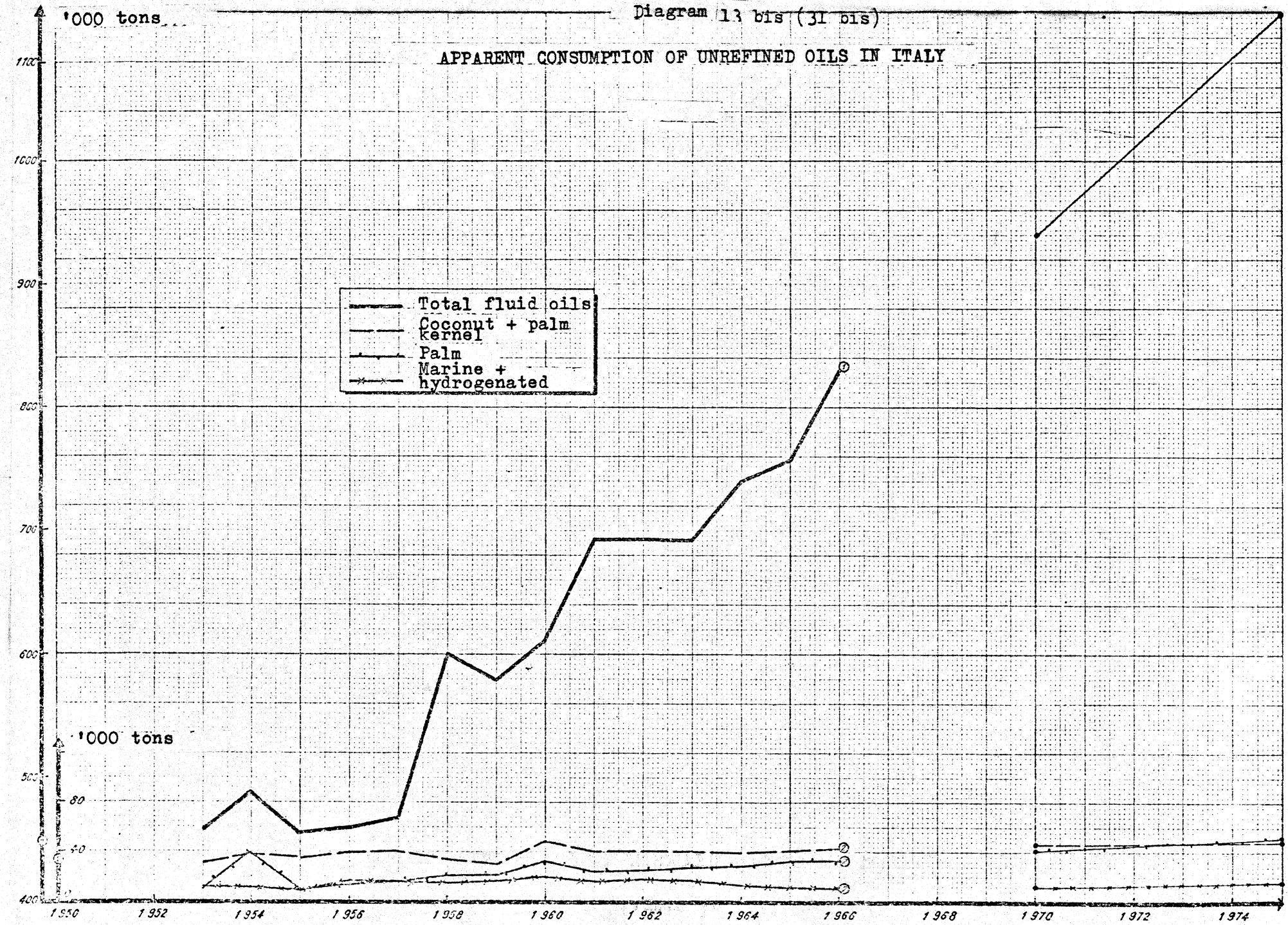


Diagram 14 (32)

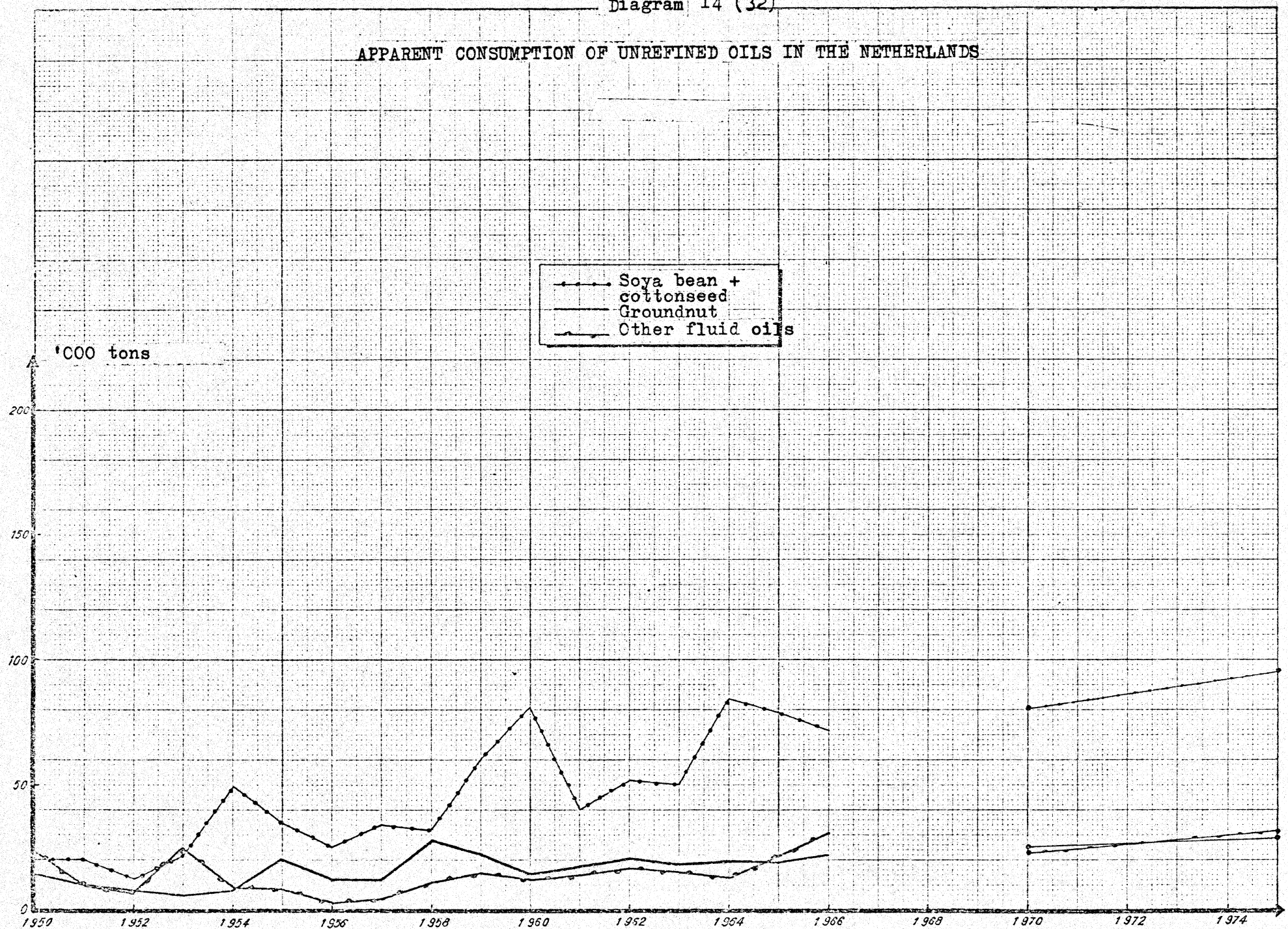


Diagram 14 bis (32 bis)

APPARENT CONSUMPTION OF UNREFINED OILS IN THE NETHERLANDS

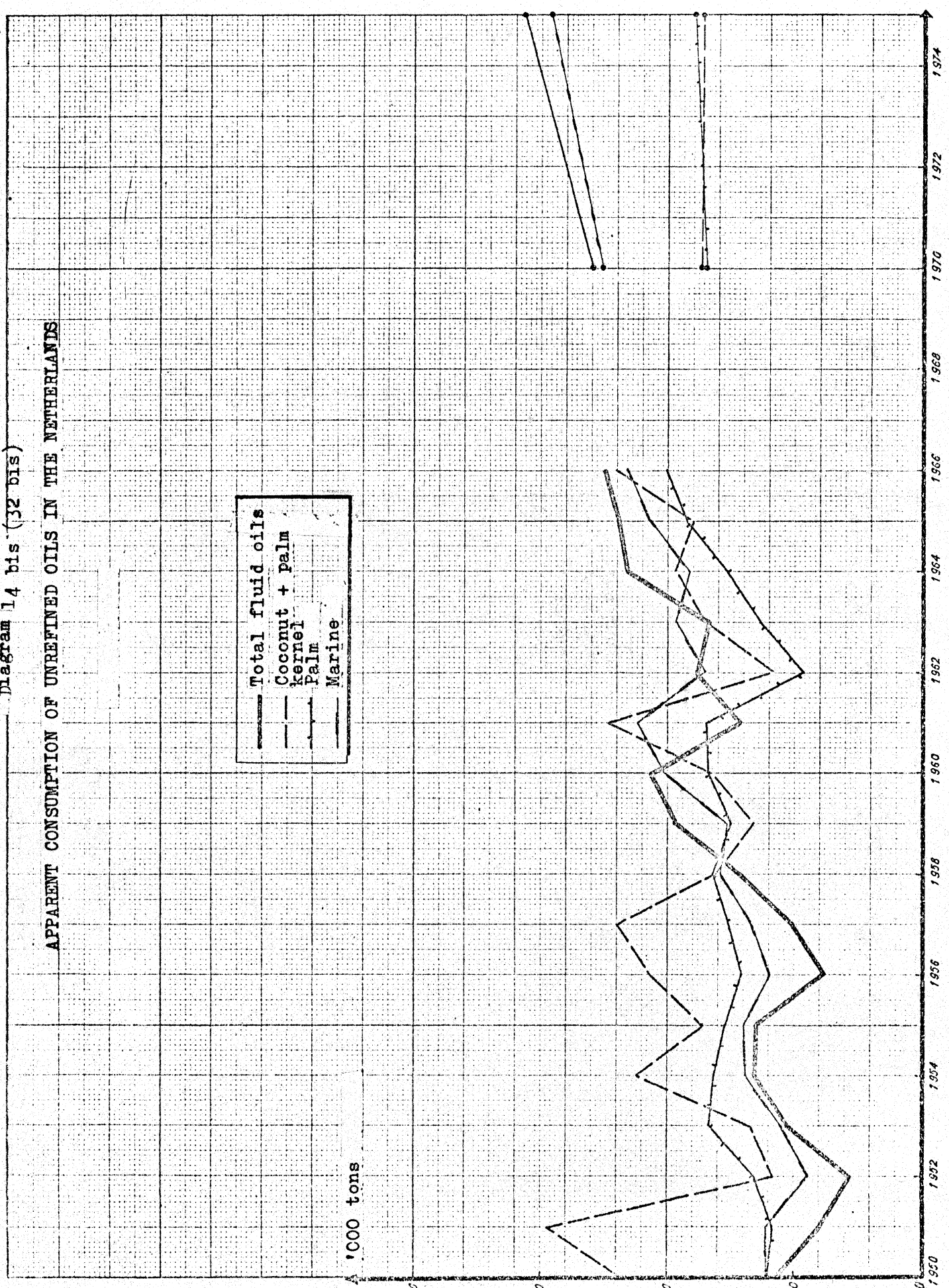


Diagram 15 (33)

APPARENT CONSUMPTION OF UNREFINED OILS IN THE BELGO-LUXEMBOURG ECONOMIC UNION

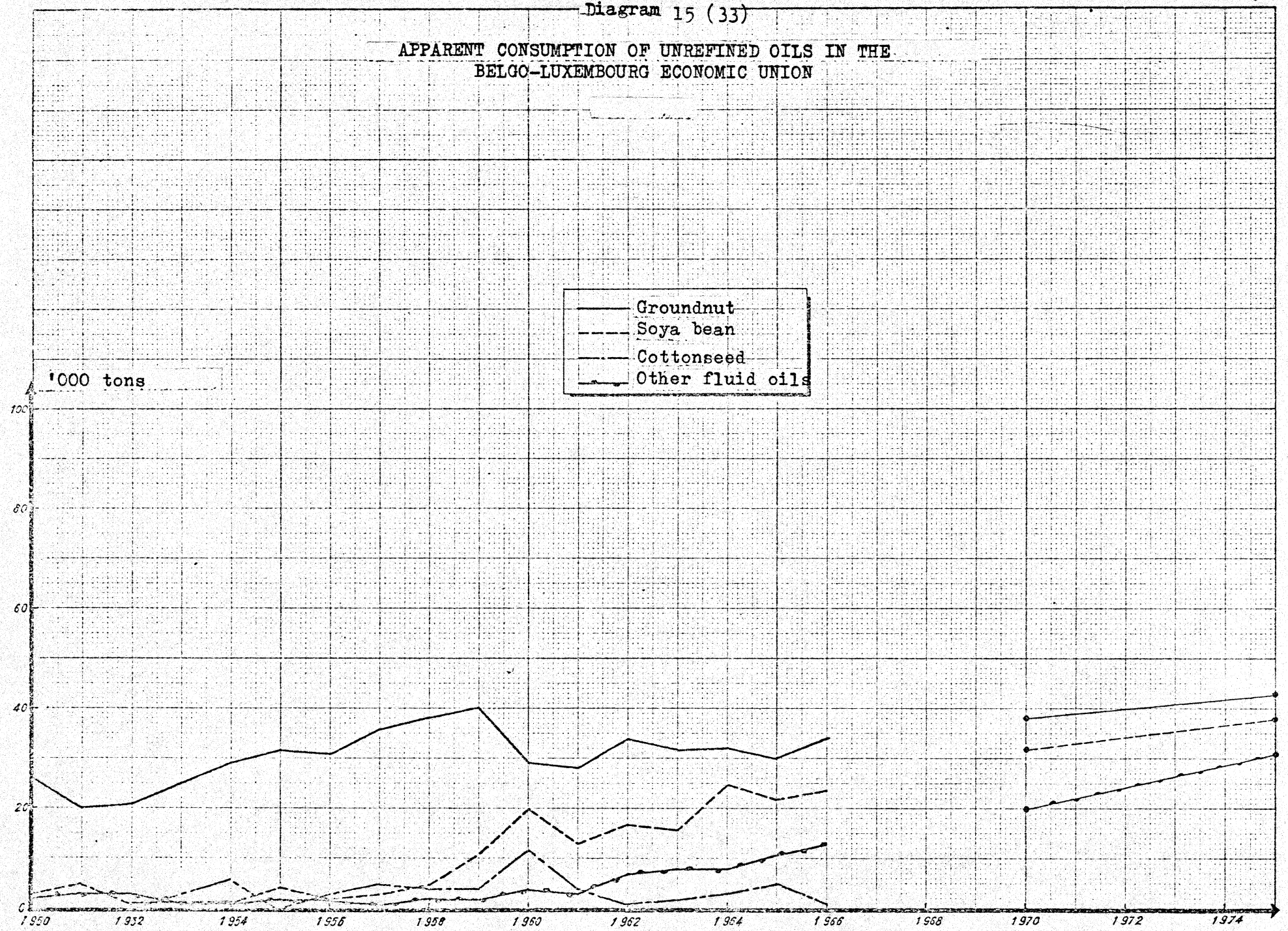


Diagram 15 bis (33 bis)

APPARENT CONSUMPTION OF UNREFINED OILS IN THE BELGO-LUXEMBOURG ECONOMIC UNION